Liverpool Cruise Terminal

Environmental Statement Addendum

Fourth Issue

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Comments		Addressing Additional MMO comments		
Fourth	October 2019	Lara Russo Senior Consultant Gavin Spowage Associate Director	John Hughes Regional Operations Director	John Hughes Regional Operations Director
Comments		Addressing further consultation comments		

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0. Preface

Background

0.1. In November 2017, Liverpool City Council (LCC) submitted a hybrid planning application (part full, part outline) (reference 17O/3230) for a new cruise ship terminal and associated infrastructure (hereafter referred to as the 'Development'). The Development would be located within an area (hereafter referred to as the 'Site') covering approximately 5.77 hectares (ha), located at Princes Parade, Liverpool on the east bank of the Mersey Estuary.

0.2. The hybrid planning application, together with an Environmental Statement (ES) (hereafter referred to as the 'November 2017 ES') prepared by Waterman Infrastructure & Environment Limited (hereafter referred to as 'Waterman') and supporting planning documents were validated by Liverpool City Council on 17th November 2017. Planning permission was granted on 3rd April 2018.

Why this Environmental Statement Addendum has been Produced

0.3. Mersey Docks and Harbour Company Ltd has now applied to the Marine Management Organisation ('MMO') for a Harbour Revision Order ('HRO') pursuant to Section 14 of the Harbours Act 1964 to authorise *inter alia* the construction and maintenance of works forming part of the Development within the Port of Liverpool. The Mersey Docks and Harbour Company Ltd is the Statutory Harbour Authority for the Port and Harbour of Liverpool. Liverpool City Council are also applying to the MMO for a Marine Works Licence pursuant to Section 65 of the Marine and Coastal Access Act 2009.

0.4. To this end, an Environmental Impact Assessment (EIA) Scoping Report was submitted to the MMO on 18th December 2017 to request a formal EIA Scoping Opinion under the requirements set out in both the Marine Works (Environmental Impact Assessment) Regulations 2007[1], (as amended)[2] and Schedule 3 of the Harbours Act 1964, hereafter collectively referred to as the 'EIA Regulations'.

0.5. An EIA Scoping Opinion was issued by the MMO on 16th March 2018 (reference DC10147). The MMO's Scoping Opinion included a number of requirements additional to those already addressed in the November 2017 ES.

0.6. A First Issue of this ES Addendum was submitted to the MMO in July 2018 with the HRO application. As part of the consultation undertaken in accordance with the 1964 Act, the MMO and their consultee organisations reviewed the First Issue of the ES Addendum and provided consultation responses in September 2018. A number of the responses provided included requests for additional information and confirmations to supplement the EIA undertaken by the applicant in support of the HRO application.

0.7. A Second Issue of the ES Addendum was compiled to address the additional requirements of the March 2018 Scoping Opinion and the September 2018 consultation responses. It was issued in January 2019.

0.8. A Third Issue of the ES Addendum was compiled to address subsequent additional comments received from the MMO.

0.9. This Fourth Issue of the ES Addendum has been compiled to address consultation responses subsequently received from various consultees. It supersedes the previous three issues of the ES Addendum. It should be read in conjunction with the November 2017 ES.

1 HMSO (2007) Marine Works (Environmental Impact Assessment) Regulations'
2 HMSO (2017) Marine Works (Environmental Impact Assessment) (Amendment) Regulations

0.10. This ES Addendum provides:

- Text and graphics which either amend, supplement or replace text and graphics in the November 2017 ES;
- Additional information which has been compiled since the November 2017 ES was completed;
- Information that was submitted separately in support of the November 2017 hybrid planning application but is now provided as appendices to this ES Addendum for convenience; and
- Confirmation as to which assessments contained within the November 2017 ES are or are not materially affected by the additional requirements imposed by the MMO in its March 2018 Scoping Opinion or the subsequent consultation responses and requests for additional information.

0.11. This ES Addendum should be read alongside the November 2017 ES. Both documents together form the ES for the purposes of MDHC's application for an HRO and LCC's application for a Marine Licence.

Document Structure

0.12. **Table 0.1** sets out the structure of this ES Addendum. Given that this ES Addendum is intended to be read alongside the November 2017 ES, **Table 0.1** indicates where the various components of this ES Addendum supplement or amend the information contained within the November 2017 ES. Where there is no change to the November 2017 ES chapter, this is noted.

Table 0.1: ES Addendum Structure

ES Addendum Structure	Comment
Non-Technical Summary	Supersedes and replaces the November 2017 Non-Technical Summary (NTS)
ES Addendum Chapters	
Chapter 0: Preface	No equivalent chapter in the November 2017 ES.
Chapter 1: Introduction	Supplements the November 2017 ES Chapter 1: Introduction
Chapter 2: EIA Methodology	Supplements the November 2017 ES Chapter 2: EIA Methodology
Chapter 3: Existing Land Uses and Activities	No change to this chapter. Refer to the November 2017 ES for this chapter and its associated Figures and Appendices.
Chapter 4: Alternatives and Design Evolution	Amendments to this chapter are provided.
Chapter 5: Description of the Development	No change to this chapter. Refer to the November 2017 ES for this chapter and its associated Figures and Appendices.
Chapter 6: Development Programme and Construction	Amendments to this chapter are provided.
Chapter 7: Air Quality	No change to this chapter. Refer to the November 2017 ES for this chapter and its associated Figures and Appendices.
Chapter 8: Noise and Vibration (Demolition and Construction)	This replaces the assessment of demolition and construction noise and vibration effects contained in the November 2017 ES. There is no change to the assessment of completed Development noise and vibration effects. Refer to the November 2017 ES for the assessment of completed Development noise and vibration effects and associated Figures and Appendices.

ES Addendum Structure	Comment
Chapter 9: Townscape and Visual Impact Assessment	Amendments to this chapter are provided.
Chapter 10: Built Heritage	No change to this chapter. Refer to the November 2017 ES for this chapter and its associated Figures and Appendices.
Chapter 11: Archaeology	No change to this chapter. Refer to the November 2017 ES for this chapter and its associated Figures and Appendices.
Chapter 12: Ground Conditions and Contamination	Amendments to this chapter are provided.
Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology	Supersedes and replaces the November 2017 ES Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology
Chapter 14: Coastal Processes, Sediment Transport and Sediment Contamination	Supersedes and replaces the November 2017 ES Chapter 14: Coastal Processes, Sediment Transport and Sediment Contamination
Chapter 15: Cumulative Effects	Supplements the November 2017 ES Chapter 15: Cumulative Effects
ES Addendum Figures	
Figure A1: Location Plan	Supplements November 2017 ES Volume 2: Figures. Additional figures presented specific to the applications for a Marine Works Licence and an HRO
Figure A2: Key Plan	
Figure A3: Sections Work Nos 2, 3a, 3b and 5	
Figure A4: Works Plan – Work Nos 1a, 1b and 2	
Figure A5: Works Plan – Work Nos 3a, 3b and 5	
Figure A6: Works Plan – Work No 4	
Figure 8.1a: Noise Monitoring Locations and Sensitive Receptors	Replicates Figure 8.1: Noise Monitoring Locations and Sensitive Receptors from the November 2017 ES
Figure 13.1a: Designated Ecological Sites	Replicates Figure 13.1: Designated Ecological Sites from the November 2017 ES
Figures 14.1a to 14.25a	Replicate Figures 14.1 to 14.25a from the November 2017 ES
ES Addendum Appendices	
Appendix 2.3a: EIA Scoping Report for Harbour Revision Order and Marine Licence Applications	Supplements November 2017 ES Appendix 2.3. Additional EIA Scoping Report specifically for the purposes of the Harbour Revision Order and Marine Licence Applications
Appendix 2.4a: EIA Scoping Opinion	Supplements November 2017 ES Appendix 2.4. Additional EIA Scoping Opinion specifically for the purposes of the Harbour Revision Order and Marine Licence Applications
Appendix 2.5a: Additional Consultation Responses	No equivalent appendix in the November 2017 ES. Consultation responses received since the Third Issue of the ES Addendum have been added.
Appendix 2.6a: Navigation Risk Assessment	No equivalent appendix in the November 2017 ES.
Appendix 6.1a: Piling and Construction Methodology	No equivalent appendix in the November 2017 ES.

ES Addendum Structure	Comment
Appendix 6.2a: Framework CEMP	No equivalent appendix in the November 2017 ES. This version of the Framework CEMP supersedes the version submitted with the Third Issue of the ES Addendum.
Appendix 8.4a: Demolition & Construction Noise Assessment	Supersedes and replaces the version submitted as Appendix 8.4 in the November 2017 ES.
Appendix 13.1a: Marine Ecology Benthic Survey Report	Replicates Appendix 13.1: Marine Ecology Benthic Survey Report from the November 2017 ES
Appendix 13.2a: Ornithology Desk Study & EIA Screening	Replicates Appendix 13.2a: Ornithology Desk Study & EIA Screening from the November 2017 ES
Appendix 13.3a: Mersey Estuary Fish Species List	Replicates Appendix 13.3a: Mersey Estuary Fish Species List from the November 2017 ES
Appendix 13.4a: Preliminary Ecological Appraisal	Replicates Appendix 13.4a: Preliminary Ecological Appraisal from the November 2017 ES
Appendix 13.5a: Summary of Relevant Ecological Legislation, Planning Policy and Guidelines	Replicates Appendix 13.5a: Summary of Relevant Legislation, Planning Policy and Guidelines from the November 2017 ES
Appendix 13.6a: Consideration of Liverpool Bay SPA	No equivalent appendix in the November 2017 ES.
Appendix 13.7a: Information to inform a Habitat Regulations Assessment (HRA) Appropriate Assessment	No equivalent appendix in the November 2017 ES. This report supersedes all previously submitted versions.
Appendix 13.8a: Starlet sea anemone *Nematostella vectensis* in the vicinity of the proposed Liverpool Cruise Terminal Site Investigation works	No equivalent appendix in the November 2017 ES.
Appendix 13.9a: Liverpool Cruise Terminal Wintering Bird Survey Report	No equivalent appendix in the November 2017 ES.
Appendix 13.10a: Biosecurity Risk Assessment	No equivalent appendix in the November 2017 ES.
Appendix 13.11a: Responses to HRO Consultation Issues	No equivalent appendix in the November 2017 ES.
Appendix 13.12a: Fishing Activity Technical Note	No equivalent appendix in the November 2017 ES.
Appendix 14.1a: Hydrodynamic and Coastal Process Studies	This report supersedes the version submitted as Appendix 14.1 in the November 2017 ES.
Appendix 14.2a: Hydrodynamic and Coastal Process Legislation and Guidance	Replicates Appendix 14.2: Hydrodynamic and Coastal Process Legislation and Guidance from the November 2017 ES
Appendix 14.3a: Water Framework Directive Scoping Report	No equivalent appendix in the November 2017 ES. This report supersedes the version submitted separately in support of the hybrid planning application in November 2017.

1. Introduction

1.1. The contents of this chapter of the ES Addendum supplement the November 2017 ES Chapter 1: Introduction. Both should be read together.

1.2. Much of the November 2017 ES Chapter 1: Introduction remains applicable and valid. Where the contents of the MMO's EIA Scoping Opinion has necessitated changes to the original November 2017 ES text, this is set out in **Table 1.1a**. In some cases, amended text is provided. In other cases, an informative comment is provided. The informative comments are provided in italic text.

Table 1.1a: Changes to Chapter 1: Introduction

Location	Text in November 2017 ES Chapter 1	Amended Text or Informative Comment
Paragraph 1.1	This Environmental Statement (ES) has been prepared by Waterman Infrastructure & Environment Limited (hereafter referred to as 'Waterman'), on behalf of Liverpool City Council (hereafter referred to as 'LCC' or the 'Applicant') to obtain planning permission, a Marine Works Licence and a Harbour Revision Order for a new cruise ship terminal and associated infrastructure (hereafter referred to as the 'Development').	This Environmental Statement (ES) has been prepared by Waterman Infrastructure & Environment Limited (hereafter referred to as 'Waterman'), on behalf of Liverpool City Council (LCC) to support LCC's applications for planning permission and a Marine Licence and to support The Mersey Docks and Harbour Company Limited's application for a Harbour Revision Order, which will authorise the construction and operation of a new cruise ship terminal and associated infrastructure (hereafter referred to as the 'Development').
Paragraph 1.9	The scope of the EIA was agreed with LCC through the preparation and consultation on an EIA Scoping Report, which is described in further detail in **Chapter 2: EIA Methodology**. The findings of the EIA are presented in this document, which comprises an ES in accordance with the EIA Regulations. Accordingly, the outline planning application will be determined by LCC, taking into account the environmental effects of the Development reported herein.	The scope of the EIA for the purposes of supporting the hybrid planning application was agreed with LCC through the preparation and consultation on an EIA Scoping Report, which is described in further detail in the November 2017 ES Chapter 2: EIA Methodology. An amended EIA Scoping Report was submitted to the Marine Management Organisation (MMO) in December 2017. The findings of the EIA, responding to the Scoping Opinions provided by LCC and the MMO, are presented in this document and its Addendum, which together comprise an ES in accordance with the relevant EIA Regulations. The relevant EIA Regulations are: • The Town and Country Planning (EIA) Regulations 2017 for the hybrid planning application; and • The Marine Works (EIA) Regulations 2007 as amended and the Harbours Act 1964 for the applications for a Marine Licence and an HRO. Accordingly, the hybrid planning application has been determined by LCC, and the applications for a Marine Licence and an HRO will be determined by the MMO, taking into account the environmental effects of the Development reported herein.

Location	Text in November 2017 ES Chapter 1	Amended Text or Informative Comment
Paragraph 1.10	These key issues were identified during the Scoping Study described in **Chapter 2: EIA Methodology**.	These key issues were identified during the Scoping Studies described in the November 2017 ES Chapter 2: EIA Methodology and Chapter 2 of this ES Addendum.
Paragraph 1.11	*This paragraph presents the description of the development as set out in the hybrid planning application form.*	*The description of the Development is unchanged but the distinction between full and outline elements of the planning application is not relevant to the application for a Marine Licence and an HRO.*
Paragraph 1.12	The Development is defined by the drawings submitted as part of the planning application. These drawings, together with the description of the Development provided in **Chapter 5: The Proposed Development**, form the basis of the EIA. The drawings used to inform the EIA are presented in **ES Volume 2: Figures**.	The Development is defined by the drawings submitted as part of the applications for a Marine Licence and an HRO. The drawings are presented in **Figures A1** to **A6** in this ES Addendum. These drawings, together with the description of the Development provided in the November 2017 ES Chapter 5: The Proposed Development, form the basis of the EIA.
Paragraph 1.14 and 1.18 to 1.22	*The structure of the November 2017 ES described in paragraph 1.14 and paragraphs 1.18 to 1.22 remains accurate. The structure of this ES Addendum is as set out in within the **Preface**.*	
Paragraph 1.15	*An updated NTS has been prepared to accompany the ES Addendum.*	
Paragraphs 1.16 and 1.17 and Table 1.1	*The text in these paragraphs and the information provided in Table 1.1 are relevant to the Town and Country Planning (Environmental Impact Assessment) Regulations 2017. Additional text, relevant to the Marine Works and Harbour Work EIA Regulations, is provided in **Tables 1.2a** and **1.3a** below.*	
Paragraph 1.24	The ES is available for viewing by the public on LCC website: www.liverpool.gov.uk. Copies of the ES are also available for viewing by the public during normal office hours in the LCC planning department at the address provided below. Comments on the planning application should be forwarded to the planning case officer at the following address: Liverpool City Council Planning Municipal Building Dale Street Liverpool L2 2DH	The ES and the ES Addendum (third issue) are available for viewing by the public on the MMO website: https://www.gov.uk/check-marine-licence-register

1.3. **Table 1.2a** indicates where the required information is located within this ES (including this ES Addendum), in line with the requirements of Schedule 3 of the Marine Works (Environmental Impact Assessment) Regulations, 2007 (as amended).

Table 1.2a: Location of Information within the ES (as per Schedule 3 of the Marine Works EIA Regulations)

Specified Information		Location(s) within ES and/or ES Addendum
1.	A description of the project and of the regulated activity, including in particular:	
(a)	a description of the location of the project and the regulated activity;	Chapter 3: Existing Land Uses and Activities; Chapter 5: The Proposed Development

Specified Information		Location(s) within ES and/or ES Addendum
(b)	a description of the physical characteristics of the whole project and regulated activity, including where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases;	Chapter 5: The Proposed Development; Chapter 6: Development Programme and Construction
(c)	A description of the main characteristics of the operational phase of the project and the regulated activity (in particular any production process): for instance, energy demand and energy used, the nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used;	Chapter 5: The Proposed Development
(d)	an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities and types of waste produced during the construction and operation phases) resulting from the operation of the proposed project and the regulated activity.	Chapter 5: The Proposed Development; Chapter 6: Development Programme Construction; All technical ES chapters (Chapters 7-14)
2.	A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the applicant, which are relevant to the proposed project, the regulated activity and their specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.	Chapter 4: Alternatives and Design Evolution
3.	A description of the relevant aspects of the current state of the environment (baseline scenario), and an outline of the likely evolution thereof without implementation of the project, as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.	'Future baseline conditions' are discussed where relevant within technical ES chapters (Chapters 7-14)
4.	A description of the factors specified in regulation 21A(2)(a) to (e) likely to be significantly affected by the project and the regulated activity: population, human health, biodiversity (for example, fauna and flora), land (for example, land take), soil (for example, organic matter, erosion, compaction, sealing), water (for example, hydromorphological changes, quantity and quality), air, climate (for example, greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.	Chapter 3: Existing Land Uses and Activities; All technical ES chapters (Chapters 7-14)
5.	A description of the likely significant effects of the project and the regulated activity on the environment resulting from, inter alia:	

Specified Information		Location(s) within ES and/or ES Addendum
(a)	the construction and existence of the project and the regulated activity, including, where relevant, demolition works;	All technical ES chapters (Chapters 7-14)
(b)	the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources;	Chapter 12: Ground Conditions and Contamination; Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology; Chapter 14: Coastal Processes, Sediment Transport and Sediment Contamination
(c)	the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste;	Chapter 6: Development Programme and Construction; Chapter 7: Air Quality; Chapter 8: Noise and Vibration
(d)	the risks to human health, cultural heritage or the environment (for example, due to accidents or disasters);	Chapter 6: Development Programme and Construction; Chapter 7: Air Quality; Chapter 8: Noise and Vibration; Chapter 10: Built Heritage; Chapter 11: Archaeology; Chapter 12: Ground Conditions and Contamination; Appendix 2.6a: Navigational Risk Assessment
(e)	the cumulation of effects with other existing or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;	Chapter 15: Cumulative Effects
(f)	the impact of the project on climate (for example, the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change;	Chapter 13: Marine Ecology; Standalone Flood Risk Assessment; Chapter 14: Coastal Processes, Sediment Transport and Sediment Contamination
(g)	the technologies and the substances used.	All technical ES chapters (Chapters 7-14)
6.	The description of the likely significant effects on the factors specified in regulation 21A(2)(a) to (e) must cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the project and the regulated activity. This description must take into account the environmental protection objectives established at Union or member State level which are relevant to the project and the regulated activity.	Chapter 2: EIA Methodology; All technical ES chapters (Chapters 7-14)
7.	A description of the forecasting methods or evidence used to identify and assess the significant effects on the environment including details of difficulties (for example, technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.	All technical ES chapters (Chapters 7-14)
8.	A description of the measures envisaged to avoid, prevent, reduce or if possible offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example, the preparation of a post-project analysis). That description must explain the extent to which significant adverse effects	All technical ES chapters (Chapters 7-14)

Specified Information		Location(s) within ES and/or ES Addendum
	on the environment are avoided, prevented, reduced or offset, and must cover both the construction and operational phases.	
9.	A description of the expected significant adverse effects of the project and the regulated activity on the environment deriving from the vulnerability of the project and the regulated activity to risks of major accidents or disasters which are relevant to the project and the regulated activity concerned. Relevant information available and obtained through risk assessments pursuant to EU legislation such as Directive 2012/18/EU of the European Parliament and of the Council on the control of major accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC or Council Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations or UK environmental assessments may be used for this purpose provided that the requirements of the EIA Directive are met. Where appropriate, this description must include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.	Appendix 2.6a: Navigational Risk Assessment
10.	A non-technical summary of the information provided under paragraphs 1 to 9.	Standalone Non-Technical Summary
11.	A reference list detailing the sources used for the descriptions and assessments included in the report.	List of references provided as endnotes to each ES chapter.

1.4. **Table 1.3a** indicates where the required information is located within this ES (including this ES Addendum), in line with the requirements of Schedule 3 to the Harbours Act 1964 (as amended).

Table 1.3a: Location of Information within the ES (as per Schedule 3 of the Harbours Act 1964 (as amended))

Specified Information		Location(s) within ES
a.	a description of the site, design, size and any other relevant features of the project;	Chapter 5: The Proposed Development and Chapter 6: Development Programme and Construction
b.	a description of the likely significant effects of the project on the environment	All technical ES chapters (Chapters 7-14); Chapter 15: Cumulative Effects
c.	a description of any features of the project or measures envisaged to avoid, prevent or reduce and, if possible, offset any likely significant adverse effects of the project on the environment	All technical ES chapters (Chapters 7-14); Chapter 15: Cumulative Effects

Specified Information		Location(s) within ES
d.	description of the reasonable alternatives studied by the applicant, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the likely effects of the project on the environment	Chapter 4: Alternatives and Design Evolution
e.	a non-technical summary of the information mentioned in paragraphs (a) to (d)	Standalone Non-Technical Summary
f.	any additional information specified in Annex IV to the EIA Directive (information for the environmental impact assessment report) relevant to the specific characteristics of the project or type of project and to the environmental features likely to be affected	All technical ES chapters (Chapters 7-14); Chapter 15: Cumulative Effects, as appropriate

2. EIA Methodology

2.1. The contents of this chapter of the ES Addendum supplement the November 2017 ES Chapter 2: EIA Methodology. Both should be read together.

2.2. As noted in **Chapter 0: Preface** of this ES Addendum, the requirements of the EIA Scoping Opinion issued by the Marine Management Organisation (MMO) and subsequent consultation responses has necessitated the provision of additional information to supplement the November 2017 ES.

2.3. The purpose of this ES Addendum is to provide the additional information necessary to satisfy the MMO's requirements and those of their consultees. However, the provision of this additional information has no implications upon the general and overarching approach to EIA already applied. The November 2017 ES and this ES Addendum therefore together support the applications for a Marine Licence and a Harbour Revision Order (HRO).

2.4. This ES Addendum has been compiled in line with the Marine Works (Environmental Impact Assessment) Regulations 2007[3], (as amended)[4] and the Harbours Act 1964 (as amended).

2.5. In view of the above, the majority of the November 2017 ES Chapter 2: EIA Methodology remains applicable and valid. However, some updated text is required and is therefore set out in **Table 2.1a**. In some cases, amended text is provided. In other cases, an informative comment is provided. The informative comments are provided in italic text.

Table 2.1a: Changes to Chapter 2: EIA Methodology

Location	Text in November 2017 ES Chapter 2	Amended Text or Informative Comment
Paragraph 2.6	As stated within **Chapter 1: Introduction**, a hybrid planning application is being submitted for the Development.	*The hybrid planning application was submitted in November 2017 and planning permission was granted on 3rd April 2018.* *This ES Addendum should be read in conjunction with the November 2017 ES and has been prepared to support the applications for a Marine Licence and an HRO.*
Paragraphs 2.13 & 2.14	The findings of this [EIA Scoping] exercise were presented in a report submitted to LCC in July 2017 to provide them and the statutory consultees the opportunity to comment on the content and the methodology to be used for the EIA. A copy of the EIA Scoping Report is provided in Appendix 2.1. Following receipt of the EIA Scoping Report, LCC consulted with a number of statutory and non-statutory consultees before providing its Scoping Opinion. A copy of LCC's Scoping Opinion dated 8th September 2017 and the individual responses from the consultees are provided in Appendix 2.2.	The findings of this [EIA Scoping] exercise were presented in a report submitted to the MMO on 18th December 2017 to provide them and their consultees the opportunity to comment on the content and the methodology to be used for the EIA. A copy of the EIA Scoping Report is provided in **Appendix 2.3a**. Following receipt of the EIA Scoping Report, the MMO consulted with a number of consultees before providing its Screening Opinion and Scoping Opinion. A copy of the MMO's Scoping Opinion is provided in **Appendix 2.4a**. Copies of subsequent consultation responses received from the MMO and their consultees, relevant to the EIA, are provided in **Appendix 2.5a**.
Table 2.1	*The information provided in Table 2.1 is relevant to LCC's EIA Scoping Opinion dated 8th*	

3 HMSO (2007) Marine Works (Environmental Impact Assessment) Regulations'
4 HMSO (2017) Marine Works (Environmental Impact Assessment) (Amendment) Regulations

Location	Text in November 2017 ES Chapter 2	Amended Text or Informative Comment
	*September 2017. Text relevant to the MMO's EIA Scoping Opinion, received 16th March 2018, is provided in **Table 2.2a** below. Text relevant to subsequent consultation responses received from the MMO and their consultees is provided in **Table 2.3a** below.*	
Paragraph 2.22	The EIA process aims to provide LCC with sufficient information…	The EIA process aims to provide LCC and the MMO with sufficient information…

2.6. Table 2.1 in the November 2017 ES Chapter 2: EIA Methodology set out a summary of LCC's EIA Scoping Opinion dated 8th September 2017. A copy of the MMO's Scoping Opinion is provided in **Appendix 2.4a**. of this ES Addendum. The key issues raised by the MMO are summarised in **Table 2.2a** below and an indication is provided regarding how each issue has been addressed.

Table 2.2a: How and Where the Issues Identified in the MMO's Scoping Opinion are Addressed in the ES

Location in the MMO's Scoping Opinion	Key Issues Identified by the MMO	Where Addressed in the ES
Section 4.1: Nature Conservation Designations	There must be a separate section of the ES to address the impacts upon European and Ramsar sites entitled 'Information for Habitats Regulations Assessment' The ES must consider the impact of the proposal on the breeding, passage and wintering birds that the SSSI, SPAs and Ramsar sites are designated for, and the habitats that support these species. The ES must consider the impacts on the features of the designated sites through operation of the jetty and future maintenance activity (any future dredging requirements) which will be required at the site.	ES Addendum Appendix 13.7a: Information to inform a Habitat Regulations Assessment (HRA) Appropriate Assessment
	Liverpool Bay SPA was fully classified as an SPA on 31 October 2017. The site must be considered within any assessments coming forward as a whole site rather than two distinct sites. All interest features of the site need to be included in the ES and the most up to date citation for population figures of the birds must be used. As a result of the extension to the SPA, numbers of red throated diver and common scoter have also been amended, please refer to the site citation for up to date population numbers.	ES Addendum Appendix 13.6a: Consideration of Liverpool Bay SPA

Location in the MMO's Scoping Opinion	Key Issues Identified by the MMO	Where Addressed in the ES
	The potential effects due to loss of intertidal feeding habitat due to the change in the hydrodynamic regime, bird disturbance and smothering of habitats must be included. The potential disturbance due to noise (resulting from piling) must be fully assessed and suitable mitigation techniques, such as timing of the works must be implemented. The ES must include a full assessment of the direct and indirect effects of the development on the features of special interest within these sites and must identify such mitigation measures as may be required in order to avoid, minimise or reduce any adverse significant effects.	ES Addendum Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology
Section 4.2.1: Local Habitats	The ES must consider any impacts upon local wildlife and geological sites. The ES needs to therefore include an assessment of the likely impacts on the wildlife and geodiversity interests of such sites The assessment must include proposals for mitigation of any impacts and if appropriate, compensation measures. The potential impact of the proposal upon features of nature conservation interest and opportunities for habitat creation / enhancement must be included within this assessment in accordance with appropriate guidance on such matters.	ES Addendum Appendix 13.4a: Preliminary Ecological Appraisal
	The ES must consider whether there is likely to be a loss of intertidal habitats due to the construction causing a change in the hydrodynamic regime within the estuary.	ES Addendum Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology
	The MMO recommends that the applicant must use modelling to assess the potential changes in the hydrodynamic functioning of the estuary (tidal propagation, tidal prism etc.) due to the development of the new berth.	ES Addendum Chapter 14: Coastal Processes, Sediment Transport and Sediment Contamination
	The ES must assess the additional boat wash resulting from more heavily laden vessels and present any evidence available on the current impacts of wash on the erosion of the intertidal and subtidal habitats in the area.	ES Addendum Chapter 14: Coastal Processes, Sediment Transport and Sediment Contamination
Section 4.2.2: Protected Species	The ES must assess the impact of all phases of the proposal on protected species.	ES Addendum Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology ES Addendum Appendix 13.4a: Preliminary Ecological Appraisal

Location in the MMO's Scoping Opinion	Key Issues Identified by the MMO	Where Addressed in the ES
	The MMO is aware that records of starlet sea anemone (*Nematostella vectensis*) have been identified through survey work in association with the proposed works. This species is protected under Schedule 5 of the Wildlife and Countryside Act 1981. It is advised that the onus is on the developer to ensure they are complaint with the legislation. The MMO expect to see evidence provided within the ES to demonstrate compliance with regard to the legislation.	ES Addendum Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology ES Addendum Appendix 13.8a: Starlet sea anemone *Nematostella vectensis* in the vicinity of the proposed Liverpool Cruise Terminal Site Investigation works
	The ES must thoroughly assess the impact of the proposals on habitats and/or species listed as 'Habitats and Species of Principal Importance' within the England Biodiversity List	ES Addendum Appendix 13.4a: Preliminary Ecological Appraisal
	A habitat survey must be carried out on the site, in order to identify any important habitats present. In addition, ornithological, botanical and invertebrate surveys should be carried out at appropriate times in the year, to establish whether any scarce or priority species are present. [Details to be included are listed at page 7 the MMO's EIA Scoping Report.]	ES Addendum Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology ES Addendum Appendix 13.4a: Preliminary Ecological Appraisal All details listed at page 7 the MMO's EIA Scoping Report have been included.
Section 4.2.3: Invasive Species	The risk posed by invasive, non-native species (INNS) within the existing dock must be considered and fully assessed. The MMO expects to see reference to biosecurity and INNS in the EIA. The possible impacts of releasing any non-native marine species needs to be included in the EIA.	ES Addendum Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology
Section 4.3: Benthic Ecology	It is not clear from the Scoping Report whether data on benthic invertebrate communities specifically within designated sites will be used or collected. These animals provide a source of food for bird species that the SPA sites are designated to protect, and therefore if any sites could possibly be affected by the proposed development then it will be necessary to obtain data that will allow the impact on benthic communities within them to be assessed. This must be included in the ES.	ES Addendum Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology
Section 4.4: Coastal Processes	The EIA must consider whether there is likely to be a loss of intertidal habitats due to the construction causing a change in the hydrodynamic regime within the estuary. The MMO recommends that modelling must be used to assess the potential changes in the hydrodynamic functioning of the estuary (tidal propagation, tidal prism etc.) due to the development of the new berth. The modelling of sediment transport will also need to include some analysis of the impacts upon sensitive receptors.	ES Addendum Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology ES Addendum Chapter 14: Coastal Processes, Sediment Transport and Sediment Contamination

Location in the MMO's Scoping Opinion	Key Issues Identified by the MMO	Where Addressed in the ES
	The ES must consider the importance of the modification of the wave field around the new facility. Modelling must include an examination of the extent of the sediment plume and its possible impacts on sensitive habitats.	ES Addendum Chapter 14: Coastal Processes, Sediment Transport and Sediment Contamination
	The ES must assess the additional boat wash resulting from more heavily laden vessels and present any evidence available on the current impacts of wash on the erosion of the intertidal and subtidal habitats in the area.	ES Addendum Chapter 14: Coastal Processes, Sediment Transport and Sediment Contamination
Section 4.5.1: Fish Ecology	The ES must include estuarine/marine and migratory fish and significant impacts arising during demolition, construction and operation of the proposal (where applicable) must be assessed. The degree to which these impacts occur will depend upon noise magnitude, duration and timing. Piling works is a particularly well-known source of damaging noise in the aquatic environment and noise transmission in the Estuary must be modelled to better understand its impacts and mitigation.	ES Addendum Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology
Section 4.5.2: Migratory Fish	The ES must fully consider the importance of the Mersey Estuary for the passage of migratory species and the effects from both the construction and operational phase of this development.	ES Addendum Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology
Section 4.5.3: Commercial / Non-Commercial Fishing	The potential impacts on commercial charter boat operators in the Mersey, and other types of commercial fishing must be scoped in.	Refer to ES Addendum Appendix 13.12a: Fishing Activity Technical Note
Section 4.6: Archaeology / Cultural Heritage	This development could potentially have an impact upon a number of designated heritage assets and their settings in the area around the site. In line with the advice in the National Planning Policy Framework (NPPF), the ES must contain a thorough assessment of the likely effects which the proposed development might have upon those elements which contribute to the significance of these assets. The ES must review the potential impacts on non-designated features of historic, architectural, archaeological or artistic interest	November 2017 ES Chapter 9: Townscape and Visual Impact Assessment November 2017 ES Chapter 10: Built Heritage November 2017 ES Chapter 11: Archaeology
	The site is situated partially within the Liverpool Maritime Mercantile World Heritage Site, and partially within its Buffer Zone. Whilst the Scoping Report makes reference to the need to consider the potential impacts of the proposed development on the Outstanding Universal Value of the designation, this analysis must be carried out in a separate Heritage Impact Assessment (HIA), with the findings incorporated into the main body of the ES.	A standalone ICOMOS Report has been fully referenced within November 2017 ES Chapter 10: Built Heritage

Location in the MMO's Scoping Opinion	Key Issues Identified by the MMO	Where Addressed in the ES
Section 4.7: Navigation / Other Users of the Sea	A marine Navigation Risk Assessment (NRA) must be included in the ES under a 'Shipping and Navigation' chapter. This risk assessment needs to detail proposed risk mitigation measures, including any proposed alteration to aids to navigation in the area, particularly during the construction phase of this project.	An NRA is provided as ES Addendum Appendix 2.6a. As this does not constitute an impact assessment in terms of the EIA Regulations, we have not included this under a separate ES chapter.
Section 4.8: Water Quality	The ES must consider the potential volume of sediment which may be re-suspended and establish if sediment contaminant testing is necessary. It must also include information on the sediment quality and the potential for effects on water quality through suspension of contaminated sediments, as well as identify whether increased SSC resulting from construction are likely to impact upon the interest features and supporting habitats of any designated sites.	ES Addendum Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology ES Addendum Chapter 14: Coastal Processes, Sediment Transport and Sediment Contamination
	The ES must also consider an increase in the pollution risk as a result of the increased number and size of vessels the berth will accommodate during the operation of the development.	ES Addendum Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology
Section 4.8.1: Water Framework Directive	The MMO requires that the assessment work considers the relevant WFD hydromorphology supporting quality elements as potential effects (or receptors). It is likely that a WFD assessment will be required as part of any marine licence application and it is recommended the scope for this is agreed as early as possible. A large amount of modelling and assessment work has been carried out for other large developments in the Mersey Estuary. The MMO recommends that this work is reviewed to provide further evidence to support the EIA and WFD assessment.	ES Addendum Appendix 14.3a: Water Framework Directive Scoping Report The WFD Scoping Report is informed by the hydrodynamic modelling carried out by HR Wallingford who are market leaders in this field. Their model builds on extensive previous modelling and survey results collated for the wider Mersey Estuary area. The WFD Scoping Report was completed in October 2017. Subsequent changes to the proposed demolition and construction methodologies make no difference to the conclusions of the WFD Scoping Report.
Section 4.9: Dredge and Disposal	The MMO expects to see an assessment of the impacts of dredging and disposal on marine receptors in the ES.	There is no dredging proposed as part of the Development.
Section 4.10.1: Noise and Vibration	The MMO expect that the potential effects of both underwater noise and underwater vibration are considered in the ES where applicable.	ES Addendum Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology
Section 4.10.2: Soil and Groundwater Contamination	It is important that modelling is sufficiently extensive in terms of dispersion and dilution for the fate of any contamination released during construction to have been assessed.	ES Addendum Chapter 14: Coastal Processes, Sediment Transport and Sediment Contamination

Location in the MMO's Scoping Opinion	Key Issues Identified by the MMO	Where Addressed in the ES
Section 4.11: Risks including Climate Change	The England Biodiversity Strategy published by Defra establishes principles for the consideration of biodiversity and the effects of climate change. The ES must reflect these principles and identify how the development's effects on the natural environment will be influenced by climate change, and how ecological networks will be maintained.	ES Addendum Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology
Section 4.12: Additional Points	The ES must include a description of the following aspects in relation to construction of the proposed development: • Likely programme and sequencing of Site works; • Description of the demolition works; • Anticipated types of piling, foundations, ground engineering likely to be employed; • Description of structures to be constructed within the Mersey; • Outline methods of construction; and • Working hours.	November 2017 ES Chapter 5: Description of the Development; November 2017 Chapter 6: Development Programme and Construction ES Addendum Chapter 6: Development Programme and Construction ES Addendum Appendix 6.1a: Piling and Construction Methodology
Section 5: Cumulative and In-Combination Impacts	The ES must include an impact assessment to identify, describe and evaluate the effects that are likely to result from the project in combination with other projects and activities that are being, have been or will be carried out.	November 2017 ES Chapter 15: Cumulative Effects ES Addendum Chapter 15: Cumulative Effects ES Addendum Appendix 13.7a: Information to inform a Habitat Regulations Assessment (HRA) Appropriate Assessment

2.7. Copies of subsequent consultation responses received from the MMO and their consultees are provided in **Appendix 2.5a**. of this ES Addendum. The key issues raised are summarised in **Table 2.3a** below and an indication is provided regarding how each issue has been addressed.

Table 2.3a: How and Where the Issues Identified in Subsequent Consultation Responses are Addressed in the ES

Consultee	Key Issues Identified	Where Addressed in the ES
Charter boat operators (including the Mersey Charter Boat Association)	Concerns about potential impact of the proposed works on commercial fishing for cod and flounder on the Mersey during winter season (October to February) during construction and operational phases.	ES Addendum Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology and ES Addendum Appendix 13.12a: Fishing Activity Technical Note
Natural England	20th September 2018 Natural England advises that there is likely significant effect, therefore a requirement for appropriate assessment, and as it stands insufficient information within the application documents to conclude that the proposed works, as described in the Harbour Revision Order, will not have an adverse effect on the internationally designated sites. Sufficient detail and commitment is required [in relation to mitigation] to justify and support conclusions of an	The HRA previously submitted in support of the applications for an HRA and a marine licence has been updated to include an Appropriate Assessment. Refer to ES Addendum Appendix 13.7a: Information to inform a Habitat Regulations Assessment

Consultee	Key Issues Identified	Where Addressed in the ES
	appropriate assessment to demonstrate that there will be no adverse effect on site integrity and therefore no further progression through the Habitats Regulations tests will be required. The updated HRA screening report should replace the November 2017 version. Uncertainties remain relating to effects that may become significant when considered in combination with other plans or projects. When your authority undertakes the necessary Habitats Regulations Assessment, consideration also needs to be given to the in combination effects with other plans and projects (if it can be determined that the project itself would not result in likely significant effect)." [Note that these uncertainties relate to impacts upon the Mersey Narrows SSSI as well as the European designated sites.] A succinct overarching table highlighting the revisions of documentation and their purpose should be provided.	(HRA) Appropriate Assessment
	20th September 2018 We acknowledge that additional information regarding starlet sea anemone (*Nematostella vectensis*) has been included with the application (Appendix 13.8a). The species is also discussed within the Environmental Statement (November 2017) however, it is unclear whether an assessment of impact on this species from the overall proposed works has been carried out. Appendix 13.8a includes information relevant to the ground investigation works (boreholes). We advise that the thorough consideration of impact of the development (including demolition, construction and operational impacts) on the species is made and we highlight that the onus is on the developer to ensure they are complaint with the legislation.	ES Addendum Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology provides a thorough assessment of likely significant effects to *N. vectensis*, first during the demolition and construction phase and then through the operational phase. Relevant legislation, policy and guidance, with which the assessment comply, is summarised in ES Addendum Appendix 13.5a
	10th June 2019 [With regards to the Appropriate Assessment] we overall concur with the assessment conclusions subject to satisfactory mitigation measures being agreed and secured. However, whilst we note that mitigation for cormorants has been included, we advise that further information and certainty of deliverability is required to ensure that the mitigation is appropriate and will deliver success. Therefore, whilst we agree with the overall conclusion of the Appropriate Assessment further detail and information is required to support the measures proposed. We advise that further information could be provided through conditions via the marine licence process, however we acknowledge that the HRO process does not accommodate the provision of conditions and therefore further information will be required to support the HRO application.	Refer to ES Addendum Appendix 13.7a: Information to inform a Habitat Regulations Assessment (HRA) Appropriate Assessment. In particular, refer to the Cormorant Technical Note and Adaptive Management Plan provided as appendices to ES Addendum Appendix 13.7a and also as appendices to the CEMP (ES Addendum Appendix 6.2a)
	10th June 2019 We note that piling activity will take place for approximately 11 months and will occur over the wintering period. We advise the inclusion of a severe winter weather restriction in order to limit disturbance during periods of severe cold weather (when birds are	This is now included in Section 13.4 of the Framework CEMP in ES Addendum Appendix 6.2a.

Consultee	Key Issues Identified	Where Addressed in the ES
	most sensitive to disturbance impacts).	
	10th June 2019 A Biosecurity Risk Assessment should be provided	Refer to ES Addendum Appendix 13.10a: Biosecurity Risk Assessment
	10th June 2019 …we noted that Appendix 13.8a includes detailed background on [*Nematostella vectensis*] and also explains the reasonable measures that were proposed by the applicants for the ground investigation works. It is not clear whether these same measures are to be carried out for the main development proposal.	Refer to paragraphs 13.266-267 of ES Addendum Chapter 13 and Section 13.4 of the Framework CEMP in ES Addendum Appendix 6.2a..
	10th June 2019 *Annex A of Natural England's response contained a list of specific comments on the CEMP*	Each of the specific comments has been addressed in the Framework CEMP in ES Addendum Appendix 6.2a A Biosecurity Risk Assessment has been provided as ES Addendum Appendix 13.10a
	10th June 2019 *Annex B of Natural England's response contained specific comments on ES Addendum Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology*	ES Addendum Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology
Centre for Environment Fisheries and Aquaculture Science (CEFAS)	<u>Underwater Noise</u> Major comments: • Recommend periods of downtime when no piling (neither impact or vibro-piling) is taking place per 24 hours to minimise the risk of potential impact during key months/sensitive periods for fish migration. Minor comments: • For marine mammals, it would have been more appropriate to refer to the recent NMFS (2016) guidance rather than Southall et al. (2007). • There are uncertainties regarding the potential effects of vibro-piling on sensitive fish receptors/fish behaviour. Graham et al. (2017) observed an unexpectedly high source level for vibration piling in their study, compared to impact piling. Furthermore, the pulsed sound signature of the vibration piling was more comparable to impact piling than previously thought. The study, which focused on cetaceans, found that displacement by impact piling was more limited than expected and vibration piling had greater impacts than anticipated.	ES Addendum Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology
	<u>Coastal Processes</u> Major comments: • The applicant proposes to use scour protection assets (e.g. concrete mattresses or rock placement) in order to reduce scour of sediments within the development site and surrounding area as a result of vessel operations (e.g. prop wash). Whilst this is considered to be suitable mitigation in line with common practice, further design details are required (e.g. type and extent). • No reference is provided to justify this assumption	ES Addendum Chapter 14: Coastal Processes, Sediment Transport and Sediment Contamination

Consultee	Key Issues Identified	Where Addressed in the ES
	[i.e. the expected negligible nature of water level changes within the Mersey as a result of climate change]. I recommend that future climate change scenarios are modelled. Minor comments: • I recommend that the applicant undertakes regular bathymetric surveys of the site and the surrounding area; prior to the commencement of the proposed works (baseline), during the works and post-construction. • I would expect to see summary details of the bathymetric data used [to monitor bathymetric changes within the Mersey] to give confidence that this data is suitable (e.g. date of survey, surveyor, equipment used etc.). • I would expect to see some form of justification or comparison to ensure the use of this data [i.e. the ADCP transect measurements and HR Wallingford report] is suitable…Additionally, I do not have access to the [HR Wallingford report] and so cannot comment on its validity. • A comparison of modelled and observed tidal discharge and sediment fluxes under spring tide conditions has been provided (Figures 14.4 and 14.5). However, no unbiased statistical accuracy assessment of the model has been provided. I recommend a targeted assessment be undertaken and reported to give confidence to the model outputs.	
	<u>Dredging / Disposal and Sediment Contamination</u> Minor comments: • Sediment contamination data was acquired in the APEM Marine Ecology survey … [we] would expect the name of the processing laboratory and a methods statement to be included. Specifically, the test(s) without UKAS accreditation should be noted. • The units of tables 14.16/14.17 (PAHs) ad 14.8 (PCBs) are incorrectly stated as mg.kg-1. These should be µg.kg-1.	ES Addendum Chapter 14: Coastal Processes, Sediment Transport and Sediment Contamination
	<u>Benthic Ecology</u> Minor comments: • Regarding sections 13.105-108 of the ES "… a clarification of how the impact was determined to be of minor, not moderate, significance would be helpful." • There doesn't appear to be any conclusions regarding impacts on designated sites and associated benthic features in the ES. • It's not clear why the value of [subtidal species and habitats] is recorded as medium in Table 13.10.	ES Addendum Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology
	<u>Various comments from CEFAS regarding Fisheries (7th June 2019) and Underwater Noise (11th June 2019)</u>	Refer to specific responses set out in ES Addendum Appendix 13.11a
Environment Agency	Request for the following changes to Para 13.99 of the ES Addendum: 1) if any piling is to be conducted between these dates it is proposed that piling would be restricted ~~to the ebb tide~~ between the dates 13th 1st September to 30th	ES Addendum Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology

Consultee	Key Issues Identified	Where Addressed in the ES
	November; and 2) remove text in brackets stating salmonids are unlikely to be present early September. This is a misunderstanding.	
North Western Inshore Fisheries Conservation Authority (NWIFCA)	Concerns about the potential impacts of the development, both independently and in combination with other developments, on marine ecology, and potential socio-economic effects on commercial fisheries, charter boat operators and recreational anglers.	ES Addendum Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology
	Various comments from NWIFCA regarding fisheries and marine ecology (4th June 2019)	Refer to specific responses set out in ES Addendum Appendix 13.11a
Marine Management Organisation – Local Office	*Various comments from Dan Howarth, Local MMO Officer, regarding impacts to fisheries (31st May and 17th June 2019)*	Refer to specific responses set out in ES Addendum Appendix 13.11a

3. Existing Land Uses and Activities

3.1. No changes are required to November 2017 ES Chapter 3.

4. Alternatives and Design Evolution

4.1. The following minor amendment to November 2017 ES Chapter 4 is required.

Location	Text in November 2017 ES	Amended Text
Paragraph 4.2	Under the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (the 'EIA Regulations'), an ES is required to provide: "*a description of the reasonable alternatives studied by the developer, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment*."	Under the Marine Works (EIA) Regulations 2007 (as amended), an ES is required to provide: "*A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the applicant, which are relevant to the proposed project, the regulated activity and their specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects*". Under Schedule 3 to the Harbours Act 1964 (as amended), an ES is required to provide: "*a description of the reasonable alternatives studied by the applicant, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the likely effects of the project on the environment*".

5. Description of the Development

5.1. No changes are required to November 2017 ES Chapter 5.

6. Development Programme and Construction

6.1. The following amendments and additions to November 2017 ES Chapter 6 are required.

Location	Text in November 2017 ES	Amended Text
Paragraph 6.4	For the purposes of assessment, it has been assumed that the Works would commence in Quarter 1 of 2018 and would be undertaken in a phased manner over approximately 24 months. Completion is therefore estimated to be in the first quarter of 2020.	For the purposes of assessment, it has been assumed that the Works would commence in Quarter 4 of 2019 and would be undertaken in a phased manner over approximately 18 months. Completion is therefore estimated to be in Quarter 2 of 2021.
Table 6.1	The following activities and overlapping approximate durations (months) were listed in Table 6.1: • Pre-commencement surveys: 1 • Service diversions/incoming connections – external/site boundary: 4 • Enabling works (service diversions / temporary works): 2 • Mobilisation, demolition and site clearance: 6 • Suspended deck piling & main beams (marine works): 5 • Secondary beams and slabs (marine works): 5 • Building steel frame (Terminal building): 3 • First floor slab: 2 • Roof and envelope: 3 • Partitions and builders work: 3 • MEP fit-out: 4 • General fit-out: 5 • External works: 4 • Commissioning and handover: 3	The following activities and overlapping approximate durations (months) are predicted: • Jetty demolition: 5.5 • Land-based piling: 2.5 • Marine-based piling: 9 • Precast installation: 9.5 • In-situ concrete deck: 8 • Terminal building construction: 3
Paragraphs 6.13 to 6.21	These paragraphs briefly summarise the methodology for removing the existing jetty and installing new piles and jetty structure. A more detailed methodology has now been developed by the Contractor – refer to **Appendix 6.1a**.	
Paragraphs 6.31 & 6.32	It is anticipated that no noise, vibration or light generating construction works, including engineering and preparatory works, that would be audible or visible at the Site boundary, would be carried out outside of normal construction working hours of: • 08:00 to 18:00 hours Monday to Friday; • 08:00 to 13:00 hours Saturday; and • No working on Sundays or bank holidays. Special working outside the hours specified above, such as heavy plant activities, crane and equipment assembly, would be kept to a minimum and would be subject to prior agreement with LCC's Environmental Health Officer (EHO).	It is proposed that works would be predominantly limited to 0700-1900 Monday to Saturday. Due to some works being tidal dependent, flexibility of working Sunday 0700-1900, evenings (1900-2300) and at night time (2300-0700) is also proposed, subject to advance notification and agreement with LCC. However, only 'low noise' generating works are proposed to be undertaken after 1900 and during night time hours (2300-0700). In particular, no piling works are proposed during these hours.

Location	Text in November 2017 ES	Amended Text
Paragraphs 6.34 to 6.71	These paragraphs of the November 2017 ES set out the basis for a future CEMP. A Framework CEMP has now been drafted and is presented as **Appendix 6.2a** of this ES Addendum.	
Paragraph 6.57	Any asbestos would be removed by a licensed contractor in accordance with the Control of Asbestos Regulations…	Any asbestos would be removed by a licensed contractor in accordance with the Control of Asbestos Regulations (2012) …

7. Air Quality

7.1. No changes are required to November 2017 ES Chapter 7.

8. Noise and Vibration (Demolition and Construction)

Introduction

8.1. This ES Addendum chapter addresses the likely significant airborne noise and vibration effects of the demolition and construction activities associated with the Development on human receptors and listed buildings and structures. It replaces the assessment of demolition and construction activities contained in Chapter 8 of the November 2017 ES. The remaining parts of Chapter 8 of the November 2017 ES remain valid and applicable. Assessment of underwater noise and vibration on ecological receptors is presented in this ES Addendum in **Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology**.

8.2. This chapter provides a description of the methods used in the assessment of airborne noise and vibration effects. This is followed by a description of the relevant baseline conditions of the Site and surrounding area, and an assessment of the likely significant effects of the Development during the demolition and construction works. Mitigation measures are identified, where appropriate to avoid, reduce or offset any adverse effects identified, together with the nature and significance of likely residual effects. Taking account of the mitigation measures, the nature and significance of the likely residual effects are described.

8.3. The chapter is accompanied by the following appendices:

- **Appendix 8.4a:** Demolition & Construction Noise Assessment**.**

Assessment Methodology and Significance Criteria

Assessment Methodology

8.4. The assessment of likely significant noise and vibration effects has involved the following:

- identifying sensitive receptors (SRs), both existing and future, within the surrounding area of the Application Site;
- establishing the baseline noise and vibration conditions currently existing at the Site and at existing SRs surrounding the Site using appropriate noise and vibration surveys;
- assessing likely noise and vibration levels generated during the demolition and construction works associated with the proposed Development;
- formulating proposals for mitigation (where appropriate); and
- assessing the likely significance of any residual noise and vibration effects.

8.5. In addition to the EIA Scoping process (refer to November 2017 ES Chapter 2: EIA Methodology) direct consultation has been undertaken with the Environmental Protection Unit of Liverpool City Council (LCC) to agree the baseline noise survey strategy and specific aspects of the assessment methodology. Relevant correspondence is provided in November 2017 ES Appendix 8.3.

Demolition and Construction Noise

8.6. As noted in November 2017 ES Chapter 6: Development Programme and Construction, construction would occur in phases. Exact timing will be determined dependant on a number of external factors, however, it is currently anticipated that work will commence in 2019 with a completion date of 2020, approximately 17 months in total. Noise levels associated with these works have been estimated based upon the plant typically used for such a development, as detailed within Method Statements LCT/MS/001 ‘Existing Jetty Demolition (30/10/18) and

LCT/MS/005 'Construction of New Jetty Structure and Terminal Building' produced by Mc Laughlin Harvey. The source noise levels on which the calculations are based are contained within BS 5228-1:2009+A1:2014[5] '*Code of practice for noise and vibration control on construction and open sites –Part 1: Noise*' together with information provided in the following reports:

- Noise and Vibration Impact Assessment of Piling Work at the New Liverpool Cruise Terminal by C Hobbs Associates Ltd;
- Liverpool Cruise Terminal – Review of Plant Requirements;
- Noise Monitoring Report BMB Tideway West (April 2017) detailing noise level emissions from Solimec SR-75 Piling Rig (auger type) in inform extent of hearing protection zone; and
- Review of Marine Pile Options (Sept 2018) by Mc Laughlin and Harvey.

8.7. The demolition and construction works which are considered to be the nosiest have been assessed. These can be divided into the following main activities:

- Dismantling of Jetty;
- Piling (land-based work)
- Piling (marine work);
- Precast Installation and Insitu Concrete Deck;
- Concreting;
- Terminal Building Steel Erection; and
- Terminal Building Roof and Cladding.

Demolition and construction traffic noise is assessed separately (see below). Other activities, such as the dismantling of the Pilot Launch Building and landscaping works, would be quieter activities so they have not been subject to specific assessment. The above list represents the 'worst-case' scenario.

8.8. To assess the likely significant effects of construction works on existing SRs surrounding the Site the 'ABC Method' provided in BS 5228-1:2009+A1:2014, has been used but with an absolute noise limit of 75dB L_{Aeq} at residential receptors as defined by Condition 45 of Liverpool Waters Planning Permission Decision Notice (planning reference: 10O/2424):

"45. Noise levels at any occupied residential property due to construction or demolition or Site Engineering and Preparation Works shall not exceed 75dB $L_{Aeq\ (10\ hour)}$ measured at 1m from the façade of the nearest occupied property, between the hours of 0800:1800, Monday to Friday, and 75dB $L_{Aeq\ (5\ hour)}$ during the hours of 0800:1300 on Saturday, as controlled through the CEMP, unless such works have the prior approval of Local Authority under S61 of the Control of Pollution Act 1974."

8.9. However, it is understood that works are tide dependent and therefore works outside those specified in Condition 45 are being sought; namely 0700-1900 Monday to Saturday but also with the flexibility to include Sunday working. On this basis, the assessment of potential significant effects during the daytime period as specified in the ABC Method provided in BS 5228-1:2009+A1:2014, which includes 0700-1900 Monday to Friday and 0700-1300 Saturday, has been extended to include Saturday working until 1900 and assessed using the same threshold, which is considered reasonable.

5 British Standard (BS) (2014) 5228:1 +A1 2014: Code of practice for noise and vibration control on construction and open sites, Part one: Noise, BSI, Great Britain

8.10. To make best use of the tides and complete the works in a reasonable timeframe there may be a requirement to conduct works outside the above stated hours. On this basis, and in order to provide an assessment based on possible 'worst-case' scenarios, assessment of potential works during the evening period 1900-2300 Monday to Saturday and Sunday between 0700-2300 has therefore also been undertaken based on the ABC Method provided in BS 5228-1:2009+A1:2014.

8.11. Based on current planning and programming, there is the potential for 'low noise' works to be undertaken outside the requested operational hours of 0700-1900 7-days a week. This is to allow preparation for piling works, precast and in-situ works that would be undertaken the following day. Such activities may include: -

- Moving of barge to required location and jack-up
- Setup of temporary pile gates
- Placement of reinforcement cages
- Moving of service barges for disposal of arisings and material supply.

8.12. Assessment of these 'low noise' activities has been undertaken using the ABC Method provided in BS 5228-1:2009+A1:2014 for evening, weekend and night-time work.

8.13. The ABC method defines category threshold values which are determined by the time of day and existing prevailing ambient noise levels. The noise generated by construction activities is then compared with the threshold value. If the construction noise level exceeds the 'threshold value', a significant effect is deemed to occur.

8.14. Noise threshold levels have been established for the relevant existing SRs based upon the prevailing baseline noise levels. Noise levels associated with the construction works have been predicted using the calculation methodology detailed within BS 5228-1:2009+A1:2014. Calculations representing a worst-case scenario over a one-hour period with plant operating at the closest point to the nearest SR and in the absence of mitigation are presented. In practice, noise levels would tend to be lower owing to greater separation distances, screening effects and periods of plant inactivity.

Demolition and Construction Vibration

8.15. There are two aspects of vibration that require consideration:

- Potential vibration effects on people or equipment within buildings; and
- Potential vibration effects on buildings.

8.16. There are currently no British Standards that provide a methodology for predicting levels of vibration from construction activities other than BS 5228-2[6] '*Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration'*, which relates to percussive, or vibratory, rolling and piling only. As stated in BS 5228-2, and as generally accepted, the threshold of vibration perception for humans in residential environments is typically in the PPV range 0.15 to 0.3 mm/s at frequencies between 8 Hertz (Hz) and 80Hz with complaints likely at 1 mm/s. Based on historical field measurements undertaken by Waterman and having regard to information contained within BS 5228-2, **Table 8.1a** details the distance at which certain activities may give rise to 'just perceptible' levels of vibration.

6 British Standard (BS) (2019) 5228:2 Code of practice for noise and vibration control on construction and open sites, Part Two: Vibration, BSI, Great Britain.

Table 8-1a: Distance at Which Vibration May Just be Perceptible

Construction Activity	Distance from Activity when Vibration may Just be Perceptible (metres)[1]
Heavy vehicles	5 – 10
Excavation	10 – 15
CFA Piling	15 – 20
Rotary Bored Piling	20 – 30
Vibratory Piling	40 – 60

Note: [1]Distances for perceptibility are only indicative and dependent upon a number of factors, such as the radial distance between source and receiver, ground conditions, and underlying geology.

8.17. **Table 8.2a** presents typical levels of vibration with distance from CFA and rotary bored vibration. It is understood that the selected method of piling for the Development is rotary bored for both land and marine based piling.

Table 8-2a: Typical Levels of Vibration Resultant from CFA/Rotary Bored Piling

Distance (m)	Peak Particle Velocity[1] (PPV) mm/s
5	0.54
10	0.38
20	0.30
30	0.03

Note: [1]Indicative. Dependent on ground conditions and underlying geology.

8.18. It is not necessarily the case that if vibration can be felt, then damage to property is inevitable. Vibration levels at least an order of magnitude higher than those for human disturbance are required to cause damage to buildings. It is generally accepted that building damage would not arise at PPV levels below 12.5 mm/s.

8.19. Information detailed within the method statements[7][8] and the following documentation has been used to undertake an assessment of the potential effects from construction vibration together with vibration data within BS5228 Part 2.:

- Noise and Vibration Impact Assessment of Piling Work at the New Liverpool Cruise Terminal by C Hobbs Associates Ltd;
- CIRA Technical Note 142 (2009) Ground-borne vibrations arising from piling;
- Settlement and vibration monitoring during shaft piling at Hammersmith pumping station (Doc ref: 3200-BMBJV-HAMPS-182-CZ-RG-000001); and
- Review of Marine Pile Options (Sept 2018) by Mc Laughlin and Harvey.

Demolition and Construction Road Traffic Noise

8.20. A qualitative assessment of potential effects resultant from construction road traffic noise has been undertaken at this stage.

7 Mc Laughlin & Harvey Ltd. (30 Oct 2018) Outline LCT/MS/001 Liverpool Cruise Terminal Existing Jetty Demolition.
8 Mc Laughlin & Harvey Ltd. (29 Oct 2018) Planning RAMS. LCT/MS/005. Liverpool Cruise Terminal Construction of New Jetty Structure and Terminal Building.

Significance Criteria

Demolition and Construction Noise and Vibration

8.21. As outlined above, to assess the significance of effects from demolition and construction noise on existing SRs, 'The ABC Method' provided in BS 5228-1:2009+A1:2014 was used. The vibration assessment has been made against the criteria for human perception as presented in BS 5228-2:2009.

8.22. The criteria in **Table 8.3a** were adopted to provide transparency in the definition of the significance of identified effects. Full details are provided in **Appendix 8.4a**.

Table 8-3a: Significance Criteria for the Assessment of Construction Noise and Vibration

Significance	Level Above Threshold Value dB(A)	Level of Vibration	Definition
Negligible	≤ 0 to 2.9	< 0.14mm/s	The effect is not of concern
Adverse effect of minor significance	3.0 to 4.9	>0.14mm/s to <1mm/s	The effect is undesirable but of limited concern
Adverse effect of moderate significance	5.0 to 10.0 Maximum construction noise value of: 75dB $L_{Aeq,T}$ Day	1mm/s to 3mm/s continuous 5mm/s intermittent	The effect gives rise to some concern but is likely to be tolerable depending on scale and duration
Adverse effect of major significance	>10 or 75dB $L_{Aeq,T}$ day	>3mm/s continuous >5mm/s intermittent	The effect gives rise to serious concern and it should be considered unacceptable

8.23. With regard to potential damage to utilities and listed buildings/structures, provided vibration is ≤7.5mm/s (derived from BS5228-2 advice) the potential effect is insignificant. For all other buildings, a vibration level of ≤10mm/s is insignificant with regard to building damage.

Demolition and Construction Traffic Noise

8.24. The criteria proposed for road traffic noise generated by the proposed Development as detailed in **Table 8.4a** would be appropriate for demolition and construction road traffic noise and has accordingly been adopted in the qualitative assessment.

Limitations and Assumptions

Demolition & Construction

8.25. The BS 5228 calculation methods allows accurate noise levels to be determined for various demolition and construction activities. The method statement outlines the general procedures which will be undertaken, however before the works commence detailed Method Statements will be produced with input from the relevant subcontractor and these will be approved by the Liverpool City Council team and Peel Ports. The detailed method statement will rely on the outcome of further Ground Investigation surveys and the conclusion of the Ramboll design which will then inform the exact methodology.

8.26. The ES assessment is based on detail provided within the Method Statements as they currently stand. The plant and equipment detailed with the Method Statements provides information on

plant type and number of plant and where possible an indication of the make/model is also provided. Where details on make/model are not stated, noise data within BS5228-1:2009+A1:2014 for typical generic plant has been used for assessment purpose. As such, construction noise levels have in part been based on generic plant detail contained within BS5228-1:2009+A1:2014 and other relevant reference documents as previously discussed.

8.27. The available information is considered sufficient to undertake a noise assessment of the demolition and construction work, focussing on key activities operating at the Site, with the aim of identifying whether a significant, albeit temporary, adverse noise effect is likely to arise at the nearest sensitive receptors. Full details of plant complement and distance to receptors are presented within **Appendix 8.4a.** In this respect, a medium to high degree of confidence is assigned to the predicted significance of the potential effects.

Baseline Conditions

Sensitive Receptors

8.28. The area surrounding the Site is urban in nature being a combination of residential and business / commercial use. Existing sensitive receptors (SRs), which were agreed in advance of conducting the baseline noise surveys with LCC, have been identified (refer to **Table 8.6a** and **Figure 8.1a**) based upon the locations which have the potential to experience significant noise and vibration effects due to the demolition and construction works.

8.29. It is important to note that the main demolition and construction activity will take place in the vicinity of Princes Jetty and Plot 11 in the northern part of the Site. As set out in **Appendix 8.4a**, rather than take account of the distance from SRs to the Site boundary, the assessment of potential demolition and construction noise impacts has therefore taken account of the distance from the actual proposed Works to the various SRs.

Table 8-4a: Sensitive Receptors

SR Ref (Fig 8.1a)	Sensitive Receptor	Type
A	Alexandra Tower	Residential
B	Liverpool City Lofts	Residential
C	Princes Reach	Future Residential
D	Malmaison	Hotel
E	Number 12 Princes Dock Offices	Commercial
F[1]	Titanic Memorial	Grade II Listed Structure
G[1]	Royal Liver Building	Grade I Listed Building, Offices
H[1]	Cunard Building	Grade II Listed Building, Offices

Note: 1: Vibration only.

Baseline Noise Surveys

8.30. A baseline noise survey was undertaken on Thursday 9th and Friday 10th March 2017 to establish the prevailing noise climate within the vicinity of the SRs. The baseline strategy, which was agreed in advance with the Environmental Protection Unit of LCC, included attended short-

term noise measurements of 1 hour during the day (0700-1900), 30-minutes evening (1900-2300) and 30-minutes night-time (2300-0700) periods. These measurements remain valid and relevant.

8.31. The selected noise monitoring locations are described in **Table 8.5a** and illustrated as **Figure 8.1a**. The noise survey results are summarised in **Table 8.6a** with full details of the baseline survey provided in November 2017 ES Appendix 8.2.

Table 8-5a: Description of Noise Monitoring Locations

Monitoring Location (Fig 8.1a)	Representative of Sensitive Receptor	Description	Dominant Source and Observations
ST1	Alexandra Tower	Free-field measurement at ground-floor level of Alexandra Tower, overlooking the proposed cruise terminal dock.	Noise climate dominated by constant distant vehicular traffic on the New Quay (A5052). Contributory noise from intermittent vehicular movements on the access road running through Princes Dock. During the night, when road traffic was at a lull, high tidal noise from the waves hitting the banks of the river were discernible. Human activities (i.e. intermittent pedestrian pass-by) influenced the noise climate throughout the monitoring periods to some extent.
ST2	Liverpool City Lofts	Free-field measurement at ground-floor level of City Loft building, overlooking Princes Dock.	Noise climate dominated by constant distant vehicular traffic on the New Quay (A5052). Noise climate influenced by intermittent vehicular traffic on the access road running through Princes Dock. Occasional human activities, as per monitoring location ST1.
ST3	Malmaison and Princes Reach	Microphone located 1.2m above the ground.	Noise climate dominated by constant distant vehicular traffic on the New Quay (A5052). Noise climate influenced by intermittent vehicular traffic on the access road running through Princes Dock. Occasional human activities, as per monitoring location ST1.
ST4	Number 12 Princes Dock Offices	Microphone located 1.2m above the ground.	Noise climate dominated by constant distant vehicular traffic on the New Quay (A5052). Contributory noise from intermittent vehicular movements on the access road running through Princes Dock. During the night, when road traffic was at a lull, high tidal noise from the waves hitting the banks of the river were discernible. Human activities (i.e. intermittent pedestrian pass-by) influenced the noise climate throughout the monitoring periods to some extent.

Table 8-6a: Summary of Baseline Noise Survey

Monitoring Location (Figure 8.1a)	Monitoring Period	$L_{Aeq,T}$[1] (dB(A))	L_{AMAX}[2] (dB(A))	$L_{A10,T}$[1] (dB(A))	$L_{A90,T}$[1] (dB(A))
ST1 (SR A)	Day (1415-1515)	54	68	58	49
	Evening (1912-2002)	58	77	59	49

Monitoring Location (Figure 8.1a)	Monitoring Period	$L_{Aeq,T}$[1] (dB(A))	L_{AMAX}[2] (dB(A))	$L_{A10,T}$[1] (dB(A))	$L_{A90,T}$[1] (dB(A))
	Night (2306-2336)	54	77	51	44
ST2 (SR B)	Day (1600-1640)	62	77	66	52
	Evening (2049-2119)	57	82	57	47
	Night (0020-0050)	51	69	52	46
ST3 (SR C, D)	Day (1645-1745)	64	77	67	56
	Evening (2010-2040)	57	71	60	52
	Night (2345-0015)	55	67	58	50
ST4 (SR E)	Day (1753-1853)	62	83	65	50
	Evening (1913-2003)	59	77	60	48
	Night (2305-2335)	53	76	52	43

1 Average of 5 minute measurements over the survey period (L_{Aeq} logarithmically averaged, L_{A10} and L_{A90} arithmetically averaged.)
2 Maximum 90th percentile measured over the survey period

8.32. The dominant noise source at all locations was noted to be road traffic noise. Noise levels during the night-time period were typically lower than those experienced during the day and evening time as a result of reduced traffic flows and human activity during this period.

Likely Significant Effects

Demolition and Construction

Noise

8.33. **Table 8.7a** presents a summary of the predicted noise levels at the nearest SRs. SR C (Princes Reach future residential blocks) has not been included in this assessment because it would not be completed and occupied during the demolition and construction works associated with the proposed Development.

8.34. It should be noted that the noise levels presented represent worst-case, when works are being conducted at the shortest distance. Further to this, the predicted noise levels are based on an un-mitigated scenario (e.g. no screening or additional acoustic measures assumed). Full calculation details are presented in **Appendix 8.4a.**

Table 8-7a: Predicted Demolition & Construction Noise Levels (Un-Mitigated)

SR Ref	Description	Dismantling Princes Jetty	Land Based Piling	Marine Based Piling	Precast Installation & Insitu Concrete Deck	Concreting	Terminal Building Steel Erection	Terminal Building Roof & Cladding Work
Day/Evening								
A	Alexandra Tower	84	80	83	81	82	76	79
B	Liverpool City Lofts	65	62	64	63	64	60	60
D	Malmaison	62	60	62	60	62	58	58

SR Ref	Description	Dismantling Princes Jetty	Land Based Piling	Marine Based Piling	Precast Installation & Insitu Concrete Deck	Concreting	Terminal Building Steel Erection	Terminal Building Roof & Cladding Work
E	No.12 Princes Dock Offices	79	80	83	81	82	79	79

		Moving of Barge to Required Location for Next Day	Positioning of Crash Deck	Moving of Service Barges for Removal of Debris
Night				
A	Alexandra Tower (when works 20m)	70	70	69
A	Alexandra Tower (when works 50m)	62	62	61
B	Liverpool City Lofts	54	54	53
D	Malmaison	52	51	50
E	No.12 Princes Dock Offices[1]	n/a	n/a	n/a

Note: [1] n/a – not applicable as not occupied during the night-time period.

8.35. **Table 8.8a** presents the level of significance of noise effects at the nearest SRs resultant from demolition and construction noise. SR C (Princes Reach future residential blocks) has not been included in this assessment because it would not be completed and occupied during the demolition and construction works associated with the proposed Development. All significant effects identified would be **temporary, local, short-term and adverse**.

Table 8-8a: Significance of Demolition & Construction Noise Effects (Un-Mitigated)

SR Ref	Description	Dismantling Princes Jetty	Land Based Piling	Marine Based Piling	Precast Installation & Insitu Concrete Deck	Concreting	Terminal Building Steel Erection	Terminal Building Roof & Cladding Work
Day								
A	Alexandra Tower (when works 15m)	Maj	Maj	Maj	Maj	Maj	Maj	Maj
B	Liverpool City Lofts	Neg	Neg	Neg	Neg	Neg	Neg	Neg
D	Malmaison	Neg	Neg	Neg	Neg	Neg	Neg	Neg
E	No.12 Princes Dock Offices	Maj	Maj	Maj	Maj	Maj	Maj	Maj
Evening & Sunday Day								
A	Alexandra Tower (when works 15m)	Maj	Maj	Maj	Maj	Maj	Maj	Maj
B	Liverpool City Lofts	Mod	Neg	Min	Min	Min	Neg	Neg
D	Malmaison	Min	Neg	Min	Neg	Min	Neg	Neg

SR Ref	Description	Dismantling Princes Jetty	Land Based Piling	Marine Based Piling	Precast Installation & Insitu Concrete Deck	Concreting	Terminal Building Steel Erection	Terminal Building Roof & Cladding Work
E	No.12 Princes Dock Offices	Maj	Maj	Maj	Maj	Maj	Maj	Maj
		Moving of Barge to Required Location for Next Day		**Positioning of Crash Deck**			**Moving of Service Barges for Removal of Debris**	
Night								
A	Alexandra Tower (when works 20m)	Maj		Maj			Maj	
A	Alexandra Tower (when works 50m)	Mod		Mod			Mod	
B	Liverpool City Lofts	Neg		Neg			Neg	
D	Malmaison	Neg		Neg			Neg	

Note: Neg – Negligible; Min – Minor; Mod – Moderate; Maj - Major

8.36. **Negligible** effects are predicted to occur during the daytime period (Monday-Saturday 0700-1900) at both Liverpool Lofts and Malmaison due to distance from works. During the evening (including Sunday 0700-1900), which when assessed in accordance with the ABC methodology of BS5228-1:2009+A1:2014 which has a lower threshold value for this time period, some **short-term, local, temporary minor adverse effects** are predicted at Malmaison with some **moderate adverse effects** at Liverpool City Lofts.

8.37. At both Alexandra Tower and No.12 Princes Dock Offices **major, short-term, temporary, local adverse effects** are predicted for all phases when works are undertaken at the closest distance to the receptors during both the day and evening (including Sunday daytime) periods.

8.38. At night-time during 'low noise' works negligible effects are predicted to occur at both Liverpool City Lofts and Malmaison due to distance attenuation. At Alexandra Tower **local, short-term temporary effects of major adverse** significance are predicted when works are undertaken within 20m, reducing to moderate adverse at 50m.

8.39. It should be noted that, in reality, construction works would be transient in nature, with works for the most part taking place at locations significantly greater from the receptors than those on which the assessment is based. Nonetheless, given that some temporary major adverse effects have been predicted, mitigation measures would be required to reduce noise levels from the demolition and construction phase of the proposed Development.

Vibration

8.40. The construction of the Development would necessitate the use of rotary bored piling both land based east of the existing river wall and marine side into the riverbed. Given the distance at which perceptible vibration may occur, as detailed in **Table 8.1a**, qualitatively there is the potential for **temporary, short-term, local minor adverse effects** at Alexandra Tower (SR A) and No. 12 Princes Parade Dock Office (SR E), although these are expected to reduce to **negligible** at a distance of 30 metres during rotary bored piling works. On review of the documents stated earlier, presenting land based measured vibration levels during rotary bored piling, the levels are

lower than those presented within BS5228-2:2009, ranging from 0.3 to 3.8mm/s at a distance of 3m from centre line of secant shaft piles undertaken by a Soilmec SR-75 rotary bored piling rig.

8.41. With regard to all other receptors, **negligible** effects are anticipated due to the distance separation from the works. The above qualitative assessment would however be dependent on ground conditions.

8.42. Vibration arising from activities other than piling are not anticipated to give rise to perceptible vibration at the SRs due to the type of activities and distance separation and therefore effects are **negligible**.

8.43. In addition to effects associated with human perception as described above, it should be noted that the levels of vibration generated by rotary bored piling are anticipated to **negligible effects** with regard to building damage at all receptors, including nearby Listed structures and buildings.

Demolition and Construction Traffic

8.44. At this stage in the Development specific detail regarding demolition and construction traffic is not known. In order to assess a 'worst-case' scenario, it has been assumed that the majority of demolition and construction traffic would be by road rather than by sea. Without mitigation, qualitatively there is the potential for **temporary, short-term, localised minor adverse effects** at the SRs adjacent to the construction traffic route. Mitigation measures are, therefore, discussed below.

Mitigation Measures

Demolition and Construction

Noise, Vibration & Traffic

8.45. In accordance with Planning Condition 39 of the Liverpool Waters Masterplan Decision Notice (planning reference: 10O/2424), a Construction Environmental Management Plant (CEMP) would be developed in accordance with LCC's requirements. With regard to noise and vibration this is likely to include:

- Use of hoarding to the required height and density appropriate to the noise sensitivity of the Site;
- Use of modern, quiet and well-maintained machinery such as electric powered plant, where possible and hoists should use the Variable Frequency Converter drive system;
- Vehicles and mechanical plant used for the Works would be fitted with exhaust silencers, which would be maintained in good and efficient working order and operated in such a manner as to minimise noise emissions in accordance with the relevant EU / UK noise limits applicable to that equipment or no noisier than would be expected based on the noise levels quoted in BS 5228. Plant should be properly maintained and operated in accordance with manufacturers' recommendations. Electrically powered plant would be preferred, where practicable, to mechanically powered alternatives;
- Establish noise and vibration target levels (a Section 61 agreement under the Control of Pollution Act 1974[9] (COPA)) to reduce noise and vibration to a minimum in accordance with best practicable means, as defined in Section 72 of COPA;

- Where high levels of noise and vibration are predicted, monitoring of noise and vibration levels to ensure target levels are not exceeded;
- Changing, where possible, methods and processes to keep noise and vibration levels low; for example, switching to a less noisy piling methodology;
- Positioning plant as far away from residential property as physically possible and switching off when not in use;
- Works would be predominantly limited to the specified hours 0700-1900 Monday to Saturday, with 'low noise' works undertaken post 1900 and during the night-time period (2300-0700). Due to some works being tidal dependent, flexibility of working Sunday 0700-1900 and evenings (1900-2300) is proposed, subject to advance notification and agreement with LCC;
- Where possible, adopt low vibration working methods or alternative working methods, use of cut off trenches, and
- Liaison with the occupants of adjacent properties most likely to be affected by noise or vibration from activities on the Site should also take place. The occupants should be informed of the nature of the works, proposed hours of work and anticipated duration prior to the commencement of activities.

8.46. With regards to traffic management during the demolition and construction works, all traffic logistics would be agreed between LCC, contractors and the Applicant. Such measures would be set out within a Construction Traffic Management Plan. Consideration would also be given to the avoidance (or limited) use of road during peak hours, where practicable.

Likely Residual Effects

Demolition & Construction

Noise

8.47. Accounting for the implementation of mitigation set out above which, based on information contained within Table B1 of BS5228-1:2009+A1:2014, should afford 10dB(A) reduction, the likely residual noise levels associated with the demolition and construction works are presented in **Appendix 8.4a** and summarised in **Table 8.9a** with significance of residual effects, which would be localised short-term and temporary in nature, presented as **Table 8.10a**.

Table 8-9a: Predicted Demolition & Construction Noise Levels (Mitigated)

SR Ref	Description	Dismantling Princes Jetty	Land Based Piling	Marine Based Piling	Precast Installation & Insitu Concrete Deck	Concreting	Terminal Building Steel Erection	Terminal Building Roof & Cladding Work
Day/Evening								
A	Alexandra Tower (when works 15m)	74	70	73	71	72	66	69
A	Alexandra Tower (when works 50m)	63	60	62	61	62	58	58

SR Ref	Description	Dismantling Princes Jetty	Land Based Piling	Marine Based Piling	Precast Installation & Insitu Concrete Deck	Concreting	Terminal Building Steel Erection	Terminal Building Roof & Cladding Work
B	Liverpool City Lofts	55	<55	<55	<55	<55	<55	<55
D	Malmaison	<55	<55	<55	<55	<55	<55	<55
E	No.12 Princes Dock Offices	69	70	73	71	72	69	69

		Moving of Barge to Required Location for Next Day	Positioning of Crash Deck	Moving of Service Barges for Removal of Debris
Night				
A	Alexandra Tower (when works 20m)	60	60	59
A	Alexandra Tower (when works 50m)	<55	<55	<55
B	Liverpool City Lofts	<55	<55	<55
D	Malmaison	<55	<55	<55
E	No.12 Princes Dock Offices[1]	n/a	n/a	n/a

Note: [1] n/a – not applicable as not occupied during the night-time period.

Table 8-10a: Significance of Demolition & Construction Noise Effects (Mitigated)

SR Ref	Description	Dismantling Princes Jetty	Land Based Piling	Marine Based Piling	Precast Installation & Insitu Concrete Deck	Concreting	Terminal Building Steel Erection	Terminal Building Roof & Cladding Work
Day								
A	Alexandra Tower (when works 15m)	Mod	Mod	Mod	Mod	Mod	Mod	Mod
A	Alexandra Tower (when works 50m)	Min	Neg	Min	Neg	Min	Neg	Neg
B	Liverpool City Lofts	Neg	Neg	Neg	Neg	Neg	Neg	Neg
D	Malmaison	Neg	Neg	Neg	Neg	Neg	Neg	Neg
E	No.12 Princes Dock Offices	Min	Mod	Mod	Mod	Mod	Min	Min
Evening & Sunday Day								
A	Alexandra Tower (when works 15m)	Maj	Maj	Maj	Maj	Maj	Mod	Mod
A	Alexandra Tower (when works 50m)	Min	Neg	Min	Neg	Min	Neg	Neg
B	Liverpool City Lofts	Neg	Neg	Neg	Neg	Neg	Neg	Neg
D	Malmaison	Neg	Neg	Neg	Neg	Neg	Neg	Neg

SR Ref	Description	Dismantling Princes Jetty	Land Based Piling	Marine Based Piling	Precast Installation & Insitu Concrete Deck	Concreting	Terminal Building Steel Erection	Terminal Building Roof & Cladding Work
E	No.12 Princes Dock Offices	n/a						
		Moving of Barge to Required Location for Next Day		**Positioning of Crash Deck**			**Moving of Service Barges for Removal of Debris**	
Night								
A	Alexandra Tower (when works 20m)	Mod		Mod			Mod	
A	Alexandra Tower (when works 50m)	Neg		Neg			Neg	
B	Liverpool City Lofts	Neg		Neg			Neg	
D	Malmaison	Neg		Neg			Neg	

Note: Neg – Negligible; Min – Minor; Mod – Moderate; Maj – Major. [1] Not applicable as not normally occupied during evening and Sunday period.

8.48. With the implementation of mitigation, **negligible** residual effects are predicted to occur at both Liverpool City Lofts and Malmaison, during both the day and evening period (including Sunday day) both of which benefit from distance attenuation effects. At the closer located Alexandra Tower and No. 12 Princes Parade Dock Offices potential residual effects during the daytime period are predicted to range from **minor to moderate short-term, temporary localised effects**. During the evening period (including Sunday day) when works are undertaken in close proximity of Alexandra Tower the predicted residual effects are **short-term, temporary localised of moderate to major significance** decreasing to **negligible** to **minor adverse** when works are undertaken at 50m.

8.49. At night-time (2300-0700) during 'low noise' works the potential effects at all receptors is **negligible** except at Alexandra Tower when works are within 20m where **moderate adverse effects** are predicted.

Vibration

8.50. Vibration limits would be set to ensure compliance with national standards and, hence, minimise the risk of complaints or building damage. These limits would be controlled through the implementation of the CEMP.

8.51. Following the implementation of appropriate mitigation measures construction generated residual vibration effects at Alexandra Tower and No. 12 Princes Parade Dock Office during piling works are anticipated to reduce predominantly to **negligible**. Vibration residual effects on all other receptors are anticipated to be **negligible** due to distance separation, although this would ultimately be dependent on ground conditions.

8.52. Vibration effects arising from all other demolition and construction operations would remain **negligible** due to the type of activities and distance separation.

8.53. The potential for damage to nearby listed buildings (e.g. Royal Liver Building, Cunard Building) and structures (e.g. the Titanic Memorial) remains **negligible** due to distance from works to receptors. Provided appropriate mitigation is implemented the residual effect of building damage would be **negligible** at all receptors given the adopted method of piling, namely rotary bored.

Demolition and Construction Traffic

8.54. Through implementation of a Construction Traffic Management Plan, it is qualitatively considered that the potential for adverse effects would be reduced to **negligible**.

Summary

8.55. In the absence of mitigation, the Development was assessed to have likely effects as follows:

- During site preparations and construction temporary increases in the prevailing ambient noise levels are predicted to occur which would have a **temporary, local effects of up to major adverse significance** at receptors proximate to the Site. Receptors proximate to the Site would also have **temporary, local adverse** effects of up to **moderate significance** from vibration generated during piling operations;
- During the construction phase, the increase in heavy plant movements on strategic roads would have a **temporary, district effect** up to **minor adverse significance**;

8.56. Following the mitigation recommended in this chapter the following residual effects are expected:

- Implementation of a CEMP would reduce noise effects during the construction phase to **temporary, local residual effect** up to **moderate adverse** during the daytime period with vibration effects of **negligible significance**. During the evening period (including Sunday) residual noise effects are predominantly **negligible** with possibility of some of major significance effects when works are proximate to Alexandra Tower. During the night-time period when 'low noise' works are undertaken residual effects are predicted to be **negligible** but with **moderate adverse effects** at Alexandra Tower when works are proximate. Implementation of a Construction Traffic Management Plan would result in **negligible** effects of construction traffic noise at nearby sensitive receptors.

9. Townscape and Visual Impact Assessment

9.1. The following minor amendments to November 2017 ES Chapter 9 are required.

Location	Text in November 2017 ES	Amended Text
Paragraph 9.8	The EIA Regulations…	The Marine Works (EIA) Regulations 2007 (as amended) and Schedule 3 to the Harbours Act 1964 (as amended) …
Paragraph 9.46	Planning Act 1990 (Listed Buildings and Conservation Areas)	Planning (Listed Buildings and Conservation Areas) Act 1990

10. Built Heritage

10.1. No changes are required to November 2017 ES Chapter 10.

11. Archaeology

11.1. No changes are required to November 2017 ES Chapter 11.

12. Ground Conditions and Contamination

12.1. The following minor amendments to November 2017 ES Chapter 12 are required.

Location	Text in November 2017 ES	Amended Text
Paragraph 12.10	• Duty of Care Regulations 1991; • Hazardous Waste (England and Wales) Regulations 2005; • Environmental Permitting (England and Wales) Regulations 2017; • The Waste (England and Wales) Regulations 2011.	• Hazardous Waste (England and Wales) Regulations 2005; • Environmental Permitting (England and Wales) Regulations 2016; • The Waste (England and Wales) Regulations 2011.
Paragraph 12.52	All wastes would then be transported to, and disposed of, at a licensed landfill site in accordance with the Duty of Care Regulations 1991 and, as applicable, in accordance with the Environmental Permitting (England and Wales) Regulations 2016 and the Hazardous Waste (England and Wales) Regulations 2005.	All wastes would then be transported to, and disposed of, at a licensed landfill site, as applicable, in accordance with the Environmental Permitting (England and Wales) Regulations 2016 and the Hazardous Waste (England and Wales) Regulations 2005.
Chapter 12, footnote reference 2	Secretary of State for the Environment (1991): The Environmental Protection (Duty of Care) Regulations 1991 (as amended). HMSO, London.	Delete. These regulations are now repealed.

13. Marine Ecology, Ornithology and Terrestrial Ecology

Introduction

13.1. This ES Addendum chapter, which was prepared by APEM Ltd (marine ecology and ornithology) and Waterman (terrestrial ecology), presents an assessment of the likely effects of the Development on marine ecology, ornithology and terrestrial receptors. In particular, consideration is given in the assessment to potential habitat loss and disturbance, changes to water quality and sediment transport regime, above water and underwater noise and vibration, collision risk and the potential for spread or introduction of non-native species.

13.2. This ES Addendum chapter replaces Chapter 13 of the November 2017 ES.

13.3. This ES Addendum chapter provides a description of the methods used in the assessment. This is followed by a description of the relevant baseline conditions of the Site and surrounding area, together with an assessment of the likely potential effects of the Development during the Site preparation and construction works and once the Development is completed and operational. Embedded mitigation (referred to here as inherent mitigation design) that is included as part of the project design/methods is considered as part of the initial assessment. For any significant effects identified after consideration of any inherent mitigation design, additional mitigation measures are identified where appropriate to avoid, reduce or offset any adverse effects identified and/or enhance likely beneficial effects. Taking account of the additional mitigation measures, the nature and significance of the likely residual effects are described.

13.4. Chapter 13 of the November 2017 ES was accompanied by a number of appendices. These have been resubmitted for the purposes of this ES Addendum chapter as follows:

- **Appendix 13.1a:** Marine Ecology Benthic Survey Report;
- **Appendix 13.2a:** Ornithology Desk Study & EIA Screening;
- **Appendix 13.3a:** Mersey Estuary Fish Species List;
- **Appendix 13.4a**: Preliminary Ecological Appraisal; and
- **Appendix 13.5a**: Summary of Relevant Legislation, Planning Policy and Guidelines.

13.5. In addition, this ES Addendum chapter is further accompanied by the following appendices:

- **Appendix 13.6a:** Consideration of Liverpool Bay SPA;
- **Appendix 13.7a:** Information to inform a Habitat Regulations Assessment (HRA) Appropriate Assessment;
- **Appendix 13.8a:** Starlet sea anemone *Nematostella vectensis* in the vicinity of the proposed Liverpool Cruise Terminal Site Investigation works; and
- **Appendix 13.9a:** Liverpool Cruise Terminal Wintering Bird Survey Report.

Assessment Methodology and Significance Criteria

Data Collation and Acquisition

Desk-Based Review

13.6. To enable an assessment of potential effects of the Development on marine ecology, ornithology and terrestrial ecology it was necessary to first establish the baseline (or existing) environment by

conducting a desk-based review of grey and published literature, and examining available data including previous surveys conducted in the vicinity of the Development.

13.7. Key information obtained from the data reviews for marine ecology, ornithology, terrestrial ecology and the site-specific benthic ecology survey is summarised in the Existing Baseline Conditions Section below.

Desk-Based Review: Marine Ecology

13.8. For the marine ecology assessment, the receptors identified as being potentially affected by the Development were:

- Plankton (phyto- and zoo-);
- Benthic infauna and epibiota (i.e. epifauna/flora) and associated habitats (intertidal and subtidal);
- Fish; and
- Marine mammals.

13.9. For plankton, fish and marine mammals, desk-based review of available data was considered sufficient to effectively inform the assessment of potential ecological effects and available data are summarised below in the Existing Baseline Conditions section.

13.10. For benthic fauna and habitats, it was concluded that insufficient up-to-date data were available for the Development area. Consequently, project-specific benthic grab and wall scrape surveys were conducted at the Site. Full details of the survey are provided in **Appendix 13.1a** with survey results summarised below in the Existing Baseline Conditions Section.

Desk-Based Review: Ornithology

13.11. A detailed review of available data for ornithology features was conducted to collate bird data for species of conservation interest and the habitats and protected sites on which they depend. Data were obtained from a wide range of organisations/individuals as indicated in **Appendix 13.2a**. The desk study within the ornithology data review identified that there were recent and comprehensive surveys carried out of waterbirds using the Mersey Estuary and the docks within Liverpool and that there was little terrestrial bird interest of conservation value in the area other than certain rare nesting birds that were already monitored.

Desk-Based Review: Terrestrial Ecology

13.12. As set out in **Appendix 13.4a**, an ecological desk study was undertaken during which all records of protected terrestrial species, and/or other notable fauna and flora within 1km of the Site were requested from Local Biodiversity Records Centre for North Merseyside (LBRCNM). Records also included those species listed on the North Merseyside Biodiversity Action Plan (LBAP).

13.13. Records of important statutory and non-statutory sites designated for their nature conservation value within 1km of the Site were searched for on the Multi-Agency Geographic Information for the Countryside website[10]. For European sites, the area of search was increased to 10km.

13.14. In addition, Habitats of Principal Importance (HoPI) and Species of Principal Importance (SoPI) listed under Section 41 of the NERC Act, as well as Habitat Action Plans (HAPs) and Species

10 Magic.defra.gov.uk. (2014). Magic. [online] Available at: http://magic.defra.gov.uk/ [Accessed April 2017].

Action Plans (SAPs) listed under the LBAP, were consulted to assign an ecological context to the Site.

Acquisition by Field Survey: Benthic Ecology Data

13.15. A benthic grab and wall scrape survey was conducted in the vicinity of Princes Jetty on 27th June 2017. The project-specific benthic survey was designed to collate data for subtidal habitats in the vicinity of the proposed works and the surrounding area including samples from within the part of the Liverpool Bay SPA which was, at the time that the surveys were undertaken, only a proposed extension to the Liverpool Bay SPA. No sampling was conducted in the intertidal area at the mouth of Princes Half-Tide Dock due to its very small size, restricted access and Health and Safety considerations.

13.16. A 0.1 m^2 Day grab was deployed to collect one macrobiota sample, a sediment sample for Particle Size Analysis (PSA) and further samples for chemical analysis at nine stations encompassing areas within and outside the Site red line boundary for the Development. Grab samples were collected in accordance with Ware & Kenny (2011)[11].

13.17. In addition, at four stations on hard structures within the survey area a 0.01m^2 wall scrape sample was taken of the epifaunal community. The sample was taken in accordance with the methodologies described by Worsfold (1998)[12].

13.18. Benthic grab and wall scrape samples were sieved over a 0.5 mm mesh in accordance with Water Framework Directive (WFD) guidance for benthic sampling in transitional waters[13]. Taxa were identified to the lowest possible practicable taxonomic level using appropriate taxonomic literature. PSA was performed in accordance with North East Atlantic Marine Biological Analytical Quality Control Scheme (NMBAQCS) Best Practice Guidance[14] and the particle size data was entered into GRADISTAT[15] to produce sediment classifications, following Folk (1954)[16].

13.19. Biotopes were assigned according to JNCC guidance v.04.05[17] and EUNIS[18] based on consideration of the species present, their relative abundances and sediment type.

13.20. In addition, a range of chemicals were analysed within the sediment samples based on a comprehensive suite which was agreed via consultation with the statutory authorities and their advisors.

13.21. Full details on the survey approach and results are provided in **Appendix 13.1a**.

[11] Ware, S.J. & Kenny, A.J. (2011). Guidelines for the Conduct of Benthic Studies at Marine Aggregate Extraction Sites (2nd Edition). Marine Aggregate Levy Sustainability Fund, 82pp..
[12] Worsfold, T. M. (1998). Sampling of cryptofauna from natural turfs (flora or fauna) on hard substrata. Version 1 of 26 March 1998. In: Biological monitoring of marine Special Areas of Conservation: a handbook of methods for detecting change. Part 2. Procedural guidelines, ed. By K. Hiscock, 4 pp. Peterborough, Joint Nature Conservation Committee.
[13] WFD-UKTAG (2014). UKTAG Transitional and Coastal Water Assessment Method Benthic Invertebrate Fauna. Infaunal Quality Index
[14] Mason, C. (2016). NMBAQC's Best Practice Guidance. Particle Size Analysis (PSA) for Supporting Biological Analysis. National Marine Biological AQC Coordinating Committee, 77pp, First published 2011, updated January 2016. Available online http://www.nmbaqcs.org/media/1255/psa-guidance_update18012016.pdf
[15] Blott, S.J. & Pye, K. (2001). GRADISTAT: a grain size distribution and statistics package for the analysis of unconsolidated sediments. Earth Surface Processes and Landforms 26: 1237-1248.
[16] Folk, R.L. (1954). The distinction between grain size and mineral composition in sedimentary rock nomenclature. Journal of Geology. 62(4): 344-359.
[17] Connor, D.W., Allen, J.H., Golding, N., Howell, K.L., Lieberknecht, L.M., Northen, K.O., & Reker, J.B. (2004). The Marine Habitat Classification for Britain and Ireland Version 04.05. In: JNCC (2015). The Marine Habitat Classification for Britain and Ireland Version 15.03 [Online]. Available from: jncc.defra.gov.uk/MarineHabitatClassification. Accessed: 19/09/17. ISBN 1 861 07561 8.
[18] Parry, M.E.V. (2015). Guidance on Assigning Benthic Biotopes using EUNIS or the Marine Habitat Classification of Britain and Ireland. JNCC Report, 546, March 2015, 29pp.

Acquisition by Field Survey: Ornithology

13.22. It was agreed through consultation with Merseyside Environmental Advisory Service (MEAS), acting on behalf of Liverpool City Council (LCC) as the local planning authority, that a programme of wintering bird surveys would be carried out between October 2017 and January 2018 to confirm the desk-based ornithological findings summarised in the ornithology desk study and EIA screening report (refer to **Appendix 13.2a**). It was agreed with all relevant parties that these surveys would be undertaken during the determination period of the planning application (i.e. late 2017 and early 2018). This wintering bird survey report is presented in **Appendix 13.9a**.

Acquisition by Field Survey: Terrestrial Ecology

13.23. An 'Extended' Phase 1 Habitat Survey of the Site was undertaken on the 10th of April 2017. Due to Site boundary changes, an update survey was undertaken on the 18th September 2017 using the Joint Nature Conservancy Council[19] standard 'Phase 1' survey technique. The Phase 1 Habitat Survey methodology was 'Extended' by undertaking an assessment of the Site to support protected and notable faunal species.

13.24. Where access allowed, adjacent habitats were also considered to assess the Site within the wider area, and to provide information with which to assess possible impacts of the proposed Development.

Consultation

13.25. For the purposes of the marine ecology assessment, written consultation was conducted with the Environment Agency, Natural England and the Marine Management Organisation in relation to the design of project-specific benthic survey work.

13.26. In addition, on 31st July 2017 an EIA Scoping Report was submitted and Scoping Opinion sought from LCC, as the Local Planning Authority, and its advisors. Comments were received from the MEAS, Environment Agency, Historic England, LCC and Natural England. All relevant responses are summarised in November 2017 ES Chapter 2: EIA Methodology and have been addressed appropriately within this chapter.

13.27. An EIA Scoping Report was issued to the MMO on 15th December 2017. The MMO's EIA Scoping Opinion was received on the 16th March 2018. An ES Addendum was issued to the MMO, addressing the contents of the Scoping Opinion, in July 2018. Subsequent consultation responses from the MMO and their consultees have necessitated this additional revision of the ES Addendum.

Assessment of Terrestrial Ecology

13.28. The desk-based review of terrestrial ecology and the subsequent 'Extended' Phase 1 Habitat Survey of the Site are reported in the Preliminary Ecological Assessment (PEA) report presented in **Appendix 13.4a**. The PEA confirmed that the on-site terrestrial habitats are commonly found locally and nationally, are not of geographical or legal importance and are unlikely to be significantly impacted.

13.29. All terrestrial ecological features identified through the PEA have been scoped out of further assessment because the population or area likely to be affected by the Development is of insufficient size or diversity to be of ecological value, no potential effect pathway between the

[19] JNCC. (2010). *Handbook for Phase 1 Habitat Survey*. Nature Conservancy Council

Development and these features has been identified; and/or contravention of the legislation relating to the feature is unlikely to occur. Therefore, terrestrial ecology is not considered further within this chapter.

Assessment Methodology and Significance Criteria for Marine Ecology and Ornithology

Introduction

13.30. The identification and assessment of the potential ecological effects associated with the development was conducted in accordance with the Chartered Institute of Ecology and Environmental Management (IEEM) guidelines for Environmental Impact Assessment (EIA)[20,21].

13.31. The assessment approach was based on the conceptual 'source-pathway-receptor' model. This model identified likely environmental effects resulting from the proposed construction, operation and decommissioning of the Development. This process provided an easy to follow assessment route between effect sources and potentially sensitive receptors ensuring a transparent impact assessment. The parameters of this model are defined as follows:

- **Source**: the origin of a potential effect (noting that one source may have several pathways and receptors) i.e. an activity such as jetty foundation installation and a resultant effect e.g. resuspension of sediments, seabed abrasion and removal of substrata, underwater noise and vibration etc.
- **Pathway**: the means by which the effect of the activity could influence a receptor e.g. for the example above, re-suspended sediment could settle across the seabed (i.e. smothering), or seabed disturbance could cause temporal or permanent habitat loss.
- **Receptor**: the element of the receiving environment that is affected e.g. for the above example, benthic invertebrate species living on or in the seabed could be smothered by the deposited sediments which could affect movement, feeding or respiration.

13.32. The assessment was quantitative where suitable data, evaluation and assessment methods were available and, if not, were qualitative and based on a combination of empirical data, anecdotal information and professional judgement.

13.33. Iterative steps involved in the assessment approach included:

- Determination of potential interactions between the Development and ecological receptors;
- Definition of baseline environment within the influence of the Development;
- Assessment of the value and sensitivity of ecological receptors;
- Consideration of inherent mitigation design (i.e. measures that are already included in the project design/methods to mitigate effects) as part of the initial assessment;
- Assessment of the magnitude of effects;
- Assessment of the significance of effects;
- Proposal of additional mitigation measures to reduce, prevent or where possible offset any adverse significant effects; identified after consideration of inherent mitigation design;

[20] CIEEM (Chartered Institute of Ecology and Environmental Management). (2010). The CIEEM Guidelines for Ecological Impact Assessment in Britain and Ireland: Marine and Coastal

[21] CIEEM. (2016). Guidelines for Ecological Impact Assessment in the United Kingdom: Terrestrial, Freshwater and Coastal. 2nd Edition January 2016.

- Assessment of the residual effects after any additional mitigation measures have been considered; and
- Assessment of cumulative effects (provided in November 2017 ES Chapter 15: Cumulative Effects).

Identification of Effect Pathways

13.34. An initial stage of the assessment was to identify potential interactions between the Development proposals and marine ecology and ornithology receptors. Potential environmental interactions are shown in **Table 13.1a** and **Table 13.2a** respectively. Interactions considered to result in a potential significant effect were taken forward to the effects assessment stage.

13.35. A point to note is that some invertebrates may be able to detect underwater noise or vibration which can potentially affect rates of food uptake, growth and reproductive rates[22, 23, 24, 25].

13.36. Underwater sound has two components: sound pressure and particle motion. Particle motion is the oscillatory displacement of fluid particles in a sound field with both magnitude and direction whereas sound pressure is a form of stress with magnitude only and is measured in terms of force/unit area[26]. Invertebrate species are unable to detect sound pressure but may detect particle motion through a variety of organs such as hairs on the body that respond to mechanical stimulation, chordotonal organs associated with joints, or vibrations transmitted through the exoskeleton from the substrate[27]. Sparse information is available for the potential effects of underwater noise and vibration on invertebrates and this is a developing area of research. Currently there are insufficient data on the effects of underwater noise and vibration on invertebrates to establish noise criteria[26].

13.37. Taking account of the fact that there would be no percussive piling and the sources of underwater noise and vibration would be pile removal (potentially by vibro-extraction), rotary drilling for pile installation and vessel noise, and the fact that invertebrate taxa recorded in the vicinity of the pile locations are widespread within the survey area, effects on invertebrates are considered likely to be negligible. For this reason although there is a potential interaction the impact of underwater noise and vibration on invertebrates has been screened out from further assessment.

22 Hawkins, A. D. & Popper, A. N. (2016). A sound approach to assessing the impact of underwater noise on marine fishes and invertebrates. – ICES Journal of Marine Science, doi:10.1093/icesjms/fsw205.
23 Aguilar de Soto, N., Delorme, N., Atkins, J., Howard, S., Williams, J. & Johnson, M. (2013). Anthropogenic noise causes body malformations and delays development in marine larvae. Nature Scientific Reports, 3 Article number: 2831. doi:10.1038/srep02831
24 Lagardère, J.P. (1982). Effects of noise on growth and reproduction of Crangon crangon in rearing tanks. Marine Biology, 71: 177-185.
25 Spiga, I, Cheesman, S, Hawkins, A, Perez-Dominguez, R, Roberts, L, Hughes, D, Elliott, M, Nedwell, J, Bentley, M. (2012). Understanding the Scale and Impacts of Anthropogenic Noise upon Fish and Invertebrates in the Marine Environment. SoundWaves Consortium Technical Review (ME5205).
26 Popper, A.N., Hawkins, A.D., Fay, R.R., Mann, D.A., Bartol, S., Carlson, T.J., Coombs, S., Ellison, W.T., Gentry, R.L., Halvorsen, M.B., Løkkeborg, S., Rogers, P.H., Southall, B., Zeddies, D.G. & Tavolga, W.N. (2014). Asa S3/Sc1.4 Tr-2014 Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report Prepared by ANSI-Accredited Standards Committee S3/Sc1 a (Springerbriefs in Oceanography).
27 Popper, A.N. & Hawkins, A.D. (2018). The importance of particle motion to fishes and invertebrates. Journal of the Acoustical Society of America. 143(1):470-488.

Table 13.1a: Interactions Matrix for Potential Effects on marine ecology receptors. ✓ = potential interaction.

Receptor	Phytoplankton	Zooplankton	Intertidal species & habitats	Subtidal species & habitats	Fish	Marine mammals
Demolition and Construction						
Loss of habitat			✓	✓		
Physical disturbance and displacement (disturbance of bottom sediments)				✓	✓	
Physical disturbance and displacement (visual)					✓	✓
Underwater noise and vibration				✓	✓	✓
Changes to water quality (suspended solids and release of chemicals from sediments)	✓	✓		✓		
Pollution (direct e.g. oil)	✓	✓	✓	✓	✓	✓
Collision risk due to vessel movements						✓
Spread of invasive non-native species	✓	✓	✓	✓		
Physical disturbance and displacement (indirect i.e. through the food chain)					✓	
Completed Development						
Physical disturbance and displacement (sediment accretion)			✓	✓	✓	
Physical disturbance and displacement (visual)						✓
Underwater noise and vibration				✓	✓	✓
Pollution (direct e.g. oil)	✓	✓	✓	✓	✓	✓
Collision risk due to vessel movements						✓
Spread of invasive non-native species	✓	✓	✓	✓		

Table 13.2a: Interactions Matrix for Potential Effects on Birds. ✓ = potential interaction

Receptor	Wintering waterbirds	Breeding birds
Demolition and Construction		
Loss of habitat	✓	✓
Physical disturbance and displacement (visual)	✓	✓
Airborne noise and vibration	✓	✓
Changes to water quality (suspended solids and release of chemicals from sediments)	✓	
Pollution (direct e.g. oil)	✓	
Physical disturbance and displacement (indirect – food chain)	✓	
Completed Development		
Physical disturbance and displacement (visual)	✓	✓
Airborne noise and vibration	✓	✓
Changes to water quality	✓	

Receptor	Wintering waterbirds	Breeding birds
Pollution (direct e.g. oil)	✓	

Assessment Criteria

13.38. Generic assessment criteria for this EIA are set out in Chapter 2: EIA Methodology. However, some deviation from these generic criteria have been developed for the assessment of ecological effects. Criteria therefore include:

- Nature of effect i.e. beneficial or adverse; direct or indirect;
- Extent of the effect (geographical area e.g. site-wide, local, district, regional, and the size of the population affected);
- Likelihood of effect occurring (refer to **Table 13.3a**);
- Persistence of the effect e.g. short term (1 year), medium term (2-10 years), long term (>10 years) or permanent; and
- Timing and frequency of effects in relation to key potential periods of increased sensitivity e.g. migration periods for diadromous fish species; food resources during coastal bird breeding periods etc.

13.39. The value/sensitivity of each receptor was determined based on consideration of factors outlined in **Table 13.4a** and **Table 13.5a** (the highest category allocated to value or sensitivity was taken forward to assessment), and the magnitude of the potential effect was based on the criteria set out in **Table 13.6a**. Based on the value/sensitivity of the receptor and the predicted magnitude of the potential effect, the significance of effect was then determined as indicated in **Table 13.7a**.

Table 13.3a: Likelihood of effect occurring and confidence in assessment

Likelihood	Guideline	Evidence base to evaluate likelihood of effects
Certain	Probability estimated at 95% chance or higher	Based on consideration of same pressures arising from similar activities, acting on the same type of receptor in comparable areas (i.e. UK). Previous studies indicate consistent magnitude of effect. Scientific evidence and/or construction information is detailed/ extensive.
Probable	Probability estimated above 50% but below 95%	Based on consideration of same pressures arising from similar activities, acting on the same type of receptor in comparable areas (i.e. UK) or similar pressures on receptor/similar receptor in other areas (i.e. outside UK). Previous studies indicate a possible range of magnitude of effect. There may be some limitations to scientific evidence base and/or construction information partially reducing certainty of assessment.
Unlikely	Probability estimated above 5% but less than 50%	Based on consideration of same pressures arising from similar activities, acting on the same type of receptor in comparable areas (i.e. UK) or similar pressures on the receptor /similar receptor in other areas (i.e. outside UK). Previous studies do not indicate consistent effect or range of magnitude. There may be considerable limitations to scientific evidence base and/or construction information considerably reducing certainty of assessment.

Likelihood	Guideline	Evidence base to evaluate likelihood of effects
Extremely unlikely	Probability estimated at less than 5%	Based on consideration of same pressures arising from similar activities, acting on the same type of receptor in comparable areas (i.e. UK) or based on similar pressures on the receptor /similar receptor in other areas (i.e. outside UK). Few if any previous studies to indicate any effect on the sensitive receptor.

Value and Sensitivity

13.40. Guidelines used to assign the value and sensitivity of the receptor are provided in **Table 13.4**a and **Table 13.5**a. It should be noted that high value and high sensitivity are not necessarily linked within a particular effect. A receptor could be of high value (e.g. an interest feature of a Special Area of Conservation (SAC) or Special Protection Area (SPA)) but have a low or negligible physical/ecological sensitivity to an effect and vice versa. The value of a receptor can be used where relevant as a modifier for the sensitivity (to the effect) already assigned to the receptor and the logic applied for the assessment will be clearly indicated in the assessment narrative.

Table 13.4a: Value Criteria for Terrestrial and Marine Ecology Assessment

Value	Definition
Very High	• An internationally designated site or candidate site (SPA, pSPA, SAC, cSAC, pSAC, Ramsar site etc.) or an area which the country agency has determined meets the published selection criteria for such designation, irrespective of whether or not it has yet been notified. • Internationally significant and viable areas of a habitat type listed in Annex 1 of the Habitats Directive. • Globally threatened species (i.e. Critically endangered or endangered on IUCN Red list) or species listed on Annex 1 of the Berne Convention. • Regularly occurring populations of internationally important species that are rare or threatened in the UK or of uncertain conservation status. • A regularly occurring, nationally significant population/number of any internationally important species. • Habitat/species are highly regarded for their important biodiversity, social/community value and / or economic value.
High	• A nationally designated site (SSSI, NNR, MNR, MCZ) or a discrete area, which the country conservation agency has determined meets the published selection criteria for national designation (e.g. SSSI selection guidelines) irrespective of whether or not it has yet been notified. • Regularly occurring, globally threatened species (i.e. Vulnerable or lower on IUCN Red list) or species listed on Annex 1 of the Berne Convention. • Previously UKBAP habitats and species; S41 species of NERC Act • Habitat/species possess important biodiversity, social/community value and / or economic value.
Medium	• Viable areas of key habitat identified in the Regional/County BAP or smaller areas of such habitat which are essential to maintain the viability of a larger whole. • Viable areas of key habitat identified as being of Regional value in the appropriate Natural Area profile. • Water Framework Directive biological element. • Any regularly occurring significant population that is listed in a Local Red Data Book. • Significant populations of a regionally/county important species. • Habitat/species possess moderate biodiversity, social / community value and / or economic value.

Value	Definition
Low	• Areas of habitat identified in a sub-County (District/Borough) BAP or in the relevant Natural Area profile. • District sites that the designating authority has determined meet the published ecological selection criteria for designation, including Local Nature Reserves selected on District/Borough ecological criteria (District sites, where they exist, will often have been identified in local plans). • Sites/features that are scarce within the District/Borough or which appreciably enrich the District/Borough habitat resource. • Species are abundant, common or widely distributed. • Habitat/species possess low biodiversity, social/community value and / or economic value.
Negligible	• There is no site designation for areas of habitat. • Species present are common and widespread. • Habitat/species are not considered particularly important for their biodiversity, social/community or economic value.

Table 13.5a: Sensitivity Criteria for Terrestrial and Marine Ecology Assessment

Sensitivity	Definition
Very High	• Species are under significant pressure and/or are highly sensitive to changing environments. • Species are intolerant of the effect with little or only slow recovery.
High	• Species may be under significant pressure and/or highly sensitive to changing environments. • Species may have a very low capacity to tolerate the effect with little or only slow recovery.
Medium	• Species may be currently under pressure or are slow to adapt to changing environments. • Species may have a low capacity to tolerate or recover from the effect.
Low	• Species are generally adaptable to changing environments. • Species may show some tolerance of the effect or recover quickly from the effect.
Negligible	• Species are highly tolerant of the effect.

Magnitude

13.41. Magnitude was assessed taking into account the application of any inherent mitigation design measures to be incorporated at the demolition and construction or operation phase. Where inherent mitigation design has been considered this has been clearly indicated in the likely effects below. Guidelines used to assign magnitude of the effect are provided in **Table 13.6**a.

Table 13.6a: Magnitude Criteria for Marine Ecology Assessment

Magnitude	Definition
Major	• Effect causes extensive changes to all or a significant proportion of the habitat resulting in loss of function of the habitat. Effects expected to extend beyond the Development Site. • Effect causes a change to all or a significant proportion of the population resulting in a decline in the abundance of the population, or other trophic levels, that will not be reversed through natural recruitment for several generations.
Moderate	• Effect causes a change to part of the habitat but does not result in long term effects on the function of the habitat. • Effect causes a substantial change in abundance, affecting a portion of a population that may last for more than two years but does not result in long term impacts to the population itself or other trophic levels.

Magnitude	Definition
Minor	• Effect causes a change to a small area of habitat, resulting in no loss of function of the habitat. • Effect causes a change to a small group of localised individuals of a population for a short period of time (up to two years) but does not affect the viability of the population or other trophic levels.
Negligible	• Effects on the habitat/population are undetectable or within the range of natural variation.
No Change	• The activity will have no interaction with the receptor.

Impact Significance

13.42. Following the identification of the receptor value and sensitivity and the determination of the magnitude of the effect, the significance of the effect was determined guided by the matrix presented in **Table 13.7a**. In line with CIEEM guidance[11], and therefore unlike the other technical chapters in this ES, only effects that are of moderate or major significance represent those with the potential to be 'significant' in EIA terms.

Table 13.7a: Matrix to Guide Determination of Effect Significance

Sensitivity/ Value	Magnitude of Effect				
	Major	Moderate	Minor	Negligible	No Change
Very High	Major	Major	Moderate or Major	Minor	Neutral
High	Major	Moderate or Major	Minor or Moderate	Minor	Neutral
Medium	Moderate or Major	Minor or Moderate	Minor	Negligible or Minor	Neutral
Low	Minor or Moderate	Minor	Negligible or Minor	Negligible	Neutral
Negligible	Minor	Negligible or Minor	Negligible	Negligible	Neutral

13.43. It is important that the matrix (and indeed the definitions of value/sensitivity and magnitude) is seen as a framework to aid understanding of how a judgement has been reached from the narrative of each effect assessment and it is not a prescriptive formulaic method. Professional judgement has been applied to the assessment of likelihood and ecological significance of a predicted effect and where required modifications have been made to the outputs of **Table 13.7**a with reasoning clearly indicated. For the purpose of this assessment CIEEM guidance[9] has been followed which states that an ecologically-significant effect is:

'an impact that has a negative, or positive, effect on the integrity of a site or ecosystem and/or the conservation objectives for habitats or species populations within a given geographical area. In this way significant impacts are distinguished from other, lesser (and, in the context of EIA, unimportant) effects'.

Mitigation Measures

13.44. The assessment assessed the likely significance of effects after consideration of inherent mitigation design. For any effects considered be of moderate or higher significance after the implementation of inherent mitigation design, further mitigation/enhancement measures have been proposed to reduce the significance of effect to minor or lower. In line with CIEEM

guidance[9], and therefore unlike the other technical chapters in this ES, effects of minor adverse significance do not require mitigation measures to be applied.

Likely Residual Effects

13.45. Residual effects on marine ecological and ornithology receptors (i.e. effects following implementation of specific mitigation measures) were then identified and their significance determined.

Limitations and Assumptions

13.46. The assessment is based on the information that has been provided to date in relation to methods for demolition and construction and operation detail. In many cases the information provided has been high level and various details (including for example the number of piles for the new suspended platform structure and expected months of work) have not yet been finalised. Where this is the case a precautionary worst-case scenario approach to the assessment has been adopted where appropriate, and it has been assumed that the Works could be conducted at any time of year.

13.47. Specific values for expected noise levels of piling at the Site are not available and the assessment has been based on noise level data reported from other comparable developments.

13.48. Conditions at or near to the Site can be subject to change over time with species movement moving both into or out of the study area. Therefore, this report and its recommendations reflect the conditions recorded at the time of the project-specific surveys and most recent desk study data available. For highly mobile species such as fish or marine mammals it has been assumed that individuals of any of the species that have been recorded previously in the lower Mersey Estuary could be present at the Site, although in terms of actual fish assemblages or marine mammals present this is not likely to not be the case and therefore this represents a precautionary approach to the assessment.

Existing Baseline Conditions

Designated Sites

European Sites and Ramsar Sites

13.49. European Sites are SACs and SPAs which form part of the European-wide Natura 2000 network of nature protection areas. A map of designated sites in the vicinity of the Site is provided in **Figure 13.1a** and due to the scale of the Development it has been considered appropriate to screen in European Sites and Ramsar sites within 5km of the Site for consideration in the assessment.

13.50. The protected sites within 5km of the Site are indicated in **Table 13.8**a. With the exception of the Dee Estuary SAC, the only protected features of these sites are birds, with no protected marine or terrestrial ecology features.

Sites of Special Scientific Interest

13.51. The location of Sites of Special Scientific Interest (SSSIs) within 5km of the Site is provided in **Figure 13.1a**.

13.52. The Mersey Estuary SSSI encompasses the Mersey Estuary Ramsar and SPA sites. The Mersey Narrows and North Wirral Foreshore SSSIs are component parts of the Liverpool Bay SPA and the Dee Estuary SAC.

13.53. Features of the Mersey Estuary, New Ferry, North Wirral Foreshore and Sefton Coast SSSIs of relevance to the marine ecology assessment are primarily the intertidal sand and mudflats which support large numbers of birds. Salt marsh is also an important habitat for birds which is a feature of the Mersey Estuary, Mersey Narrows and North Wirral Foreshore SSSI.

Table 13.8a: Protected sites, interest features and distance to the Site

Site	Nature Conservation Value	Interest features	Distance to Site (km)
Dee Estuary/Aber Dyfrdwy SAC	International	Annex I habitats that are a primary reason for selection of this site: • *Mudflats and sandflats not covered by seawater at low tide* • *Salicornia and other annuals colonizing mud and sand* • *Atlantic salt meadows (Glauco-Puccinellietalia maritimae)* Annex I habitats present as a qualifying feature, but not a primary reason for site selection: • *Seven habitats listed in SAC citation* No Annex II species are listed as a qualifying feature. Annex II species present as a qualifying feature, but not a primary reason for site selection: • *River lamprey, sea lamprey, petalwort*	4.2
Mersey Narrows & North Wirral Foreshore Ramsar site	International	Little gull, common tern, knot and bar-tailed godwit. Waterbird assemblage: cormorant, oystercatcher, grey plover, sanderling, dunlin and redshank.	0.8
Mersey Estuary Ramsar site	International	Shelduck, redshank, teal, pintail and dunlin. Waterbird assemblage: ringed plover, curlew, spotted redshank, greenshank and wigeon.	3.3
Liverpool Bay SPA	European	Red-throated diver and common scoter, little gull, common tern and little tern. Waterbird assemblage: Red-throated diver, common scoter, red-breasted merganser and cormorant.	0
Mersey Narrows & North Wirral Foreshore SPA.	European	Redshank and turnstone. Waterbird assemblage: dunlin, knot, grey plover, oystercatcher and cormorant.	0.8
Mersey Estuary SPA	European	Golden plover, dunlin, pintail, redshank, shelduck and ringed plover. Waterbird assemblage: curlew, black-tailed godwit, lapwing, grey plover, wigeon, great crested grebe and teal.	3.3
Mersey Estuary SSSI	National	Pintail, shelduck, wigeon, teal, dunlin, curlew, redshank and golden plover. Citation mentions intertidal sand and mudflats, marshland, salt marshes, brackish marshes and boulder clay cliffs with freshwater seepages.	4.3

Site	Nature Conservation Value	Interest features	Distance to Site (km)
Mersey Narrows SSSI	National	Turnstone, redshank and cormorant. Citation mentions intertidal sand and mudflats.	0.8
New Ferry SSSI	National	Pintail and black-tailed godwit. Citation mentions intertidal sand, mudflats and other habitats (shingle and cobbles, pioneer salt marsh).	3.3
North Wirral Foreshore SSSI	National	Knot, bar-tailed godwit, turnstone and dunlin. Citation mentions intertidal sand and mudflats, embryonic salt marsh.	4.2

Marine Ecology

Plankton

Phytoplankton

13.54. Phytoplankton are microscopic single-cell algae within the marine water column which utilise inorganic carbon and nitrogen sources and light energy for metabolic synthesis of organic molecules and growth[28]. Phytoplankton form the basis of marine food webs and are actively consumed by a wide range of herbivorous marine species[29]. Phytoplankton productivity is primarily influenced by variations in depth, temperature, light, water column mixing and availability of nutrients[30,31]. When productivity is particularly high, blooms can form, mainly within the shallower and more heavily mixed waters nearer the coastline where deep-water upwelling and runoff brings nutrient-rich waters to the well-illuminated surface layers of the water column[32].

13.55. Phytoplankton is one of the biological quality elements used to assess status of water bodies under the Water Framework Directive (WFD). The Development is within the Mersey WFD transitional water body and in the 2016 Cycle 2 round of WFD monitoring Phytoplankton was classed to be at Moderate potential, with a target of Good potential by 2027.

13.56. The Mersey Estuary is an extremely turbid environment due to the strong tidal currents which erode and rework bottom channels. The phytoplankton taxa present here are consequently likely to be well adapted to the considerable fluctuations in levels of suspended solids and associated high levels of turbidity.

13.57. The phytoplankton assemblages within the Mersey Estuary are influenced by tidal movements and vary over the tidal cycle. In addition, assemblage composition and biomass of these algae change considerably on a seasonal basis which is typical of dynamic environments such as the Estuary. Although site-specific data for phytoplankton are not available for the Prince's Jetty site, phytoplankton sampling at other locations indicates the range of phytoplankton and potential abundances of phytoplankton that could be present in the vicinity of the proposed Development.

28 Falkowski, P. G., Barber, R. T. & Smetacek, V., (1998). Biogeochemical controls and feedbacks on ocean primary production. Science, 281: 200-206.
29 Frederiksen, M., Edwards, M., Richardson, A. J., Halliday, N. C. & Wanless, S. (2006). From plankton to top predators: bottom-up control of a marine food web across four trophic levels. Journal of Animal Ecology, 75: 1259-1268.
30 Graziano, L. M., Geider, R. J., Li, W. K. W. & Olaizola, M. (1996). Nitrogen limitation of North Atlantic phytoplankton: analysis of physiological condition in nutrient enrichment experiments. Aquatic Microbial Ecology, 11: 53-64.
31 Leonardos, N. & Geider, R. J. (2004). Responses of elemental and biochemical composition of Caetoceros muelleri to growth under varying light and nitrate:phosphate supply ratios and their influence on critical N:P. Limnology and Oceanography, 49(6): 2105-2114.
32 Barnes, R. S. K. & Hughes, R. N. (1999). An introduction to marine ecology. Third Edition. Blackwell Publishing, Oxford. 286 pp.

13.58. Phytoplankton was sampled at 15 stations approximately 5 km upstream of the Site in summer 2007[33] as part of survey work for a proposed saline discharge to the Mersey Estuary. Altogether, 58 phytoplankton taxa were recorded in the samples and the dominant taxa were diatoms. The number of taxa present at each station ranged from 12 to 21 with a mean of 17 taxa per station. The total density of phytoplankton cells per site ranged from 893 cells ml^{-1} to 2123 cells ml^{-1}. The mean phytoplankton concentration across all sites was 1524 cells ml^{-1}.

13.59. Phytoplankton sampling was also conducted at fourteen stations throughout the Mersey Estuary for the proposed Mersey Tidal Power Scheme including stations upstream and downstream of the Site in autumn 2009[34] and spring 2010[35]. A total of 18 phytoplankton taxa were recorded across all stations in autumn 2009 and 25 taxa in spring 2010 and during both seasons samples were dominated by diatoms. At the station closest to the Site (coordinates: SJ 33400 91100) a total of four taxa were recorded in autumn 2009 and five taxa in spring 2010. Overall, across the survey between two and six taxa were recorded at each site in autumn 2009 and between two and 12 taxa were recorded at each site in spring 2010. Phytoplankton density in the spring 2010 survey was an order of magnitude greater (mean density of 1,740 cells ml^{-1}) than the autumn 2009 survey (mean density of 136 cells ml^{-1}) which is consistent with the increase in ambient light level and temperature that occurs during the spring months which triggers rapid growth of many phytoplankton taxa. Phytoplankton survey data from the Environment Agency between 2011 and 2017 were acquired. Data from the three closest survey stations in the Mersey (Buoy E1, New Brighton, Seacombe Ferry) to the project site were analysed. A total of 108 taxa were recorded across the three stations over the seven years and diatoms were found to be the most abundant taxon which is consistent with other data sources.

Zooplankton

13.60. Zooplankton are vital to the ecological function of marine ecosystems. Zooplankton consists of both permanent (holoplankton e.g. copepods) and temporary (meroplankton e.g. crustacean and fish larvae) members of the heterotrophic plankton community. Zooplankton feed on phytoplankton and smaller zooplankton, and in turn, provide an important food source for higher trophic levels. For example, copepods are important prey items for many fish larvae, including commercial gadoids such as cod *Gadus morhua*, haddock *Melanogrammus aeglefinus* and whiting *Merlangius merlangus*.

13.61. Site specific zooplankton data are not available; however, it is considered assemblages within the outer Mersey Estuary will be consistent with assemblages recorded within the eastern Irish Sea. Different zooplankton taxa peak in abundance at different times of year. Copepods (Subclass Copepoda) within the zooplankton of the Irish Sea are almost entirely calanoids (Order Calanoida), although a significant population of *Oithima* sp. (Order Cyclopoida) has also been recorded[36]. Copepod abundance is typically lower on the eastern side of the Irish Sea than on the western side (Kennington & Rowlands 2006).

13.62. Remaining zooplankton taxonomic groups recorded for the area, such as molluscs (larvae of sea snails, bivalves, squids and octopuses; Phylum Mollusca), cladocerans (water fleas; Order

[33] APEM (2007). King Street Gas Storage Project Aquatic Ecology Technical Report. Final report. APEM Ref: 410237. 70pp.
[34] APEM (2010). Mersey Tidal Power Feasibility Study: Stage 2A. Aquatic Ecology Surveys Autumn 2009 Baseline Report. 51pp.
[35] APEM (2010). Mersey Tidal Power Feasibility Study: Stage 2A. Aquatic Ecology Surveys Spring 2010 Baseline Report. 54pp.
[36] Kennington, K. & Rowlands, W. LI. (2006). *SEA area 6 technical report – plankton ecology of the Irish Sea*. University of Liverpool, Port Erin Marine Laboratory.

Cladocera) and echinoderm larvae (larvae of sea stars, sea urchins, sea cucumbers, and relatives; Phylum Echinodermata) are only present in very low abundances in the eastern areas of the Irish Sea[19].

13.63. Ichthyoplankton surveys conducted in the eastern Irish Sea between 2001 and 2003 identified fish eggs from 19 species and fish larvae from 30 species, a number of which were commercially important fish species including herring *Clupea harengus*, cod *G. morhua*, haddock *M. aeglefinus*, whiting *M. merlangus*, and dab *Limanda limanda*[37]. Peak numbers of fish eggs were recorded in March-April[20].

Benthic Macroinvertebrates

13.64. Benthic invertebrates is one of the biological quality elements used to asses status of water bodies under the WFD. The Development is within the Mersey WFD transitional water body and in the 2016 Cycle 2 round of WFD monitoring Benthic Invertebrates was classed to be at Good potential, with a target of Good potential by 2027.

Intertidal Invertebrates

13.65. The intertidal zone within the study area is primarily composed of manmade structures including the existing jetty, dock walls and other manmade structures. There is also a small area of intertidal sediment at the mouth Prince's Half Tide Dock immediately to the north of the Site (approx. 3000m^2). This area was difficult to access and it is anticipated that the benthic assemblages in this section would be impoverished (in common with the subtidal assemblages) and that species present would be widespread throughout the estuary.

13.66. The project-specific benthic survey collected wall scrape samples at four locations comprising locations within, and in the vicinity of, the existing jetty structure within the north section of the Site (refer to **Appendix 13.1a**). A total of seven taxa were recorded, with just one and two invertebrate individuals recorded from two of the scrapes and the non-native invasive barnacle *Austrominius modestus* was the most abundant taxon at the other two wall scrapes. The density of individuals varied from 1 to 570 individuals per 0.01m^2. It was not possible to sample the legs of the existing dilapidated wooden jetty structure due to Health and Safety considerations; however, the legs of the wooden jetty were noted to be encrusted with barnacles expected to be predominantly *A. modestus* and no macroalgae was observed. *A. modestus* was also noted to have a high density along the dock walls.

Subtidal Invertebrates

13.67. The Mersey is predominantly a sandy estuary, with fine sediment occurring in places along its inner margins[38]. Extensive background data for subtidal invertebrates in the wider Mersey Estuary have been collected for a number of projects in the Mersey Estuary including the Mersey Gateway Project. These surveys indicate an impoverished benthic fauna characteristic of dynamic estuarine environments.

13.68. As an example, subtidal invertebrate surveying was conducted throughout the Mersey Estuary for the proposed Mersey Tidal Power Scheme in autumn 2009[17] and spring 2010[18] at fourteen

37 Bunn, N., Fox, C. J. & Nash, R.D.M. (2004). Spring plankton surveys of the eastern Irish Sea in 2001, 2002 and 2003: hydrography and the distribution of fish eggs and larvae. Science Series Data Report. CEFAS, Lowestoft, 42: 214 pp.

38 Ridgway, J., Bee, E., Breward, N., Cave, M., Chenery, S., Gowing, C., Harrison, I., Hodgkinson, E., Humphreys, B., Ingham, M., Jarrow, A., Jenkins, G., Kim, A., Lister, R.T., Milodowski, A., Pearson, S., Rowlands, K., Spiro, B., Strutt, M., Turner, P. & Vane, C. (2012). The Mersey estuary: sediment geochemistry. British Geological Survey Research Report, RR/10/02. ISBN 978 0 85272 711 9.

stations from the mouth of the estuary to the Silver Jubilee Bridge. At the two stations nearest the Site (approx. 1 km from the Site with one upstream and the other downstream on the other side of the Mersey Estuary) the mean number of taxa per station was 9 to 13 taxa in autumn 2009 and 12 to 15 taxa in spring 2010. Mean density at these sites ranged from just 27 to 37 individuals m^{-2} in autumn 2009 and 287 to 967 individuals m^{-2} in spring 2010. In autumn 2009 the most abundant taxa at these two stations were juveniles of the blue mussel *Mytilus edulis* and nematoda, and in spring 2010 the most abundant taxa were *M. edulis* juveniles and *Nephtys* spp. Across the survey as a whole oligochaete worms comprised five of the ten most abundant taxa (enchytraeidae, *Heterochaeta costata*, *Tubificoides benedii*, *Paranais litoralis* and *T. pseudogaster* agg.) in autumn 2009 while the most abundant macrofaunal taxon in spring 2010 was juvenile *M. edulis* followed by *Tubificoides benedii*.

13.69. The Environment Agency (EA) was contacted to obtain monitoring data from the Mersey Estuary, however, no data were available beyond 2008.

13.70. To obtain more localised data to inform the ecological assessment for the Development a project-specific survey was conducted in June 2017 within the north section of the Site in the vicinity of the current jetty (refer to **Appendix 13.1a**). Across the nine stations sampled the survey found that the subtidal sediments were quite heterogeneous with three stations classified as Sand, another three stations classified as Sandy Mud, and one station each was classified as Muddy Sandy Gravel, Gravelly Muddy Sand and Slightly Gravelly Sand.

13.71. A total of 69 taxa were recorded during the benthic grab site characterisation survey. Species richness at stations varied from five to 30 taxa and the density of individuals varied from 600 per m^2 to 68,100 per m^2 (with the greatest density value due to a very high density of *M. edulis* juveniles at one of the stations). Across the survey the most abundant taxon was the blue mussel *M. edulis* followed by the acorn barnacle *Amphibalanus improvisus*. *A.improvisus* is considered by some sources to be a non-native species in Europe, introduced from east U.S.A. but conclusive evidence for this is lacking and historical records from Europe suggest that it could be native to Europe. We therefore currently consider it to be cryptogenic (i.e. a species that is neither demonstrably native, nor introduced)[39]. Despite variations in sediment type there was no significant difference in benthic assemblages across stations and all grab stations were assigned the biotope A5.43 'Sublittoral mixed sediment in variable salinity' (estuaries) (SS.SMx.SMxVS).

13.72. A single *Sabellaria alveolata* worm was found at one of the grab stations. This species can form dense reefs consisting of large numbers of worms. The reef habitat is an Annex I habitat under the EC Habitats Directive and this habitat is not present at the Development site.

13.73. Some non-native species were recorded within the subtidal grabs as follows:

- The Australian barnacle *A. modestus* which was found in three of the sediment grab samples. This species was first reported in Britain in 1946.
- The American piddock *Petricolaria pholadiformis* which was unintentionally introduced with the American oyster *Crassostrea virginica* by 1890. A single juvenile was recorded in one of the grab samples.
- Three specimens from this survey have been tentatively identified as the starlet sea anemone *Nematostella vectensis*. Identification of anemones from preserved benthic samples is very difficult, since they contract, hiding most of the useful identification features, and lose colour patterns. The specimens from these samples, however, resembled in overall appearance confirmed specimens from our reference collection and they have been assumed to be this

39 Carlton, J.T. 1996. Biological invasions and cryptogenic species. Ecology 77(6): 1653-1655.

species for the purposes of assessment. The starlet sea anemone is a non-native species that was introduced to the UK from the eastern U.S.A[40,41]. However, this species also remains classified as Vulnerable on the IUCN Red List, is protected under Schedule 5(9) of the Wildlife and Countryside Act (therefore the species receives full protection with both individuals and habitat protected), and is a Species of Principal Importance in England under Section 41 list of the NERC Act. The protected status of the species, was based on the then known distribution of the species being limited to a small number of lagoons in the south-east of England, a potentially vulnerable habitat itself. This protected status and its occurrence on the IUCN Red List both pre-date the recognition of the species as a widespread and widely introduced species. Furthermore, the Red List assessment was conducted in 1996 and bares a caveat that the species requires reassessment. Due to the potentially conflicting non-native and protected classifications, there has been discussion about whether the protected status for the species in England should be reconsidered[23,24]. Should the protection remain, it is understood that the primary aim of this protected status, in English populations at least, should be more to protect potentially vulnerable habitats (e.g. saline lagoons) in which it is a specialist rather than the species *per se*[23,24]. *N. vectensis* has been previously recorded from the south-east of England and, to our knowledge, the records in this survey are the first from the north-west of England. The records were made at two grab stations, both of which lie outside the red line boundary a short distance to the north of the Site but were not neighbouring grab stations (refer to **Appendix 13.1a**). Understanding of habitat preferences for this species in British waters has not encompassed full awareness of its natural range and the Marine Life Identification Network (MarLIN) account[42] acknowledges its non-native status and likely wider distribution, including its presence in estuaries. N. vectensis can no longer be considered a lagoon specialist but its preferred estuarine habitat is expected to mainly be in the more sheltered areas with stable sediments and in shallow water (usually <1m depth)[43] particularly near saltmarsh, where it may be present in high densities. The specimens found during the project-specific benthic survey were from an area of mobile sediment in relatively deep water with high tidal exposure and combined with the very low numbers recorded, this suggests that the area is outside the preferred environment for the species. On the basis of the habitat preferences of N. vectensis and the specific sediment type, tidal conditions and water depth at the two stations where the species was recorded, it is considered highly unlikely that the specimens indicate the centre of a viable population. Consequently, the findings indicate that this species could potentially be more widespread in the estuary, and could potentially have a patchy distribution. A technical note providing ecological information about *N. vectensis* and outlining relevant legislation was provided to the MMO in relation to the site investigation works at the Project site. In addition, detailed consultation was held with the MMO and NE in relation to the potential presence of *N. vectensis* at the site. A copy of this technical note is provided in **Appendix 13.8a**.

13.74. For some taxa it was not possible to identify individuals to species level but they could potentially include non-native species e.g. *Streblospio*, *Sessilia*, *Jassa*, *Ensis* and *Amathia*.

40 Reitzel, A.M., Darling, J.A., Sullivan, J.C. & Finnerty, J.R. (2008). Global population genetic structure of the starlet anemone Nematostella vectensis: multiple introductions and implications for conservation policy. Biological Invasions 10(8): 1197-1213. http://dx.doi.org/10.1007/s10530-007-9196-8

41 Barfield, P. (2016). The UK non-native species Nematostella vectensis (starlet sea anemone). Bulletin of the Porcupine Marine Natural History Society 5: 33-37.

42 Tyler-Walters H., Marshall C. E. & Jackson A. 2017. *Nematostella vectensis* Starlet sea anemone. In Tyler-Walters H. and Hiscock K. (eds) *Marine Life Information Network: Biology and Sensitivity Key Information Reviews*, [on-line]. Plymouth: Marine Biological Association of the United Kingdom. [cited 11-12-2017]. Available from: http://www.marlin.ac.uk/species/detail/1136.

43 Sheader M., Suwailem A.M. & Rowe G.A. 1997. The anemone, *Nematostella vectensis*, in Britain: considerations for conservation management. Aquatic Conservation: Marine and Freshwater Ecosystems 7: 13-25.

Fish

13.75. Fish is one of the biological quality elements used to assess status of water bodies under the WFD. The Development is within the Mersey WFD transitional water body and in the 2009 Cycle 1 round of WFD monitoring Fish was classed to be at Good potential, with no classification for the 2016 round of monitoring.

13.76. Estuaries are characterised by relatively few fish species which are well adapted to the estuarine environment[44]. The Mersey Estuary is a highly dynamic environment and fish species inhabiting the area must endure large fluctuations in salinity, temperature, turbidity, nutrient levels and water movement. A relatively small number of species dominate the assemblage and most species migrate into the estuary from coastal waters and can utilise the estuary a nursery area, as opposed to being resident within the estuary. Diadromous species, such as eel, lamprey and salmon, migrate through the Mersey Estuary to reach habitats in the Mersey Estuary and further upstream.

13.77. At least 46 fish species have been recorded within the Mersey Estuary (data collated from ERL[45], Hering[46], Potts and Swaby[47], Langston *et al*[48] and APEM[49,50] and EA monitoring data). Of particular note are eleven species of conservation importance:

- Atlantic salmon *Salmo salar*, river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* are Annex II species protected under the European Habitat and Species Directive (92/43/EEC). These species are not qualifying species for protection within the Mersey Estuary but they are qualifying features of the Dee Estuary/Aber Dyfrdwy SAC and there is potential for movement of these species from the Dee Estuary/Aber Dyfrdwy SAC into the Mersey Estuary. River and sea lamprey are also protected under Appendix III of the Convention on the Conservation of European Wildlife and Natural Habitats 1979 (the 'Bern Convention'; 82/72/EEC).
- European eel *Anguilla anguilla* are protected under European eel management plan legislation (Eel Recovery Plan, Council Regulation No 110/2007 implemented under The Eels (Wales and England) Regulations 2009. The North West River Basin District Eel Management Plan affords Eel protection within the Mersey Estuary.
- The following seven species were previously protected at a national level under the UK Biodiversity Action Plan (UKBAP) which has since been superseded and these species are now listed as Species of Principal Importance under Section 41 of the NERC Act:
  - sea trout *Salmo trutta*;
  - European smelt *Osmerus eperlanus*;
  - Atlantic cod *Gadus morhua*;

44 Potts, W. & Swaby, S.E. (1993). Review of the Status of Estuarine Fishes. English Nature Research Report No. 34. Marine Biological Association/ English Nature.
45 ERL. (1992). Stage IIIa Environmental Studies – E3 fish studies in the Mersey Estuary. Unpublished report prepared for the Mersey barrage Company by ERL Ltd.
46 Hering, R. (1998). The fish of the Mersey Estuary from 1981 to 1997 caught using a 2 m beam trawl; an analysis of results and review of sampling procedures. School of Pure and Applied Biology, Cardiff, University of Wales. M.Sc. thesis.
47 Potts, W. & Swaby, S.E. (1993). Review of the Status of Estuarine Fishes. English Nature Research Report No. 34. Marine Biological Association/ English Nature
48 Langston et al (2006)
49 APEM (2007). King Street Gas Storage Project Aquatic Ecology Technical Report. Final report. APEM Ref: 410237. 70pp.
50 APEM. (2011). Mersey Tidal Power Feasibility Study Stage 3: Intertidal Fish and Mobile Epifauna Baseline Survey Report (Report to Peel Energy Limited).

- herring *Clupea harengus*;
- plaice *Pleuronectes platessa*;
- common sole *Solea solea*; and
- whiting *Merlangius merlangus*.

13.78. Several species of fish use the Mersey Estuary as a spawning or nursery area. The likely seasonal presence of some of the key species of conservation interest and species that are known to have spawning or nursery areas within the Mersey Estuary is provided below in **Table 13.9**a.

13.79. Consultation with fisheries stakeholders for the project has indicated that commercial fishermen primarily target Atlantic cod, seabass and flatfish (flounder, plaice, common sole, dab, brill and turbot) within the Mersey Estuary whilst some potting for shellfish occurs beyond the river mouth. In addition to the aforementioned species, charter boats frequently catch species such as ling, conger eels, pollack, gurnard spp., rays, tope, whiting, bull huss, lesser spotted dogfish, smooth hound, mackerel and pouting.

13.80. Beam trawl surveys were conducted in the Mersey Estuary for the proposed Mersey Tidal Power project. No fish were recorded at the two sampling stations closest to the Site (approx. 1 km from the Site) in autumn 2009[17] and eight taxa were recorded in spring 2010[18] (common sole, dab, flounder, plaice, poor cod, sand goby, sprat, whiting) which included juvenile and adult plaice, and all of the flounder were juveniles. Sampling was conducted by beam trawl from the mouth of the estuary up to Runcorn and across the entire survey area (14 stations) only three taxa were recorded in autumn 2009; with 13 taxa recorded in spring 2010. All fish recorded were typical of estuarine demersal fish assemblages44.

13.81. Environment Agency (EA) monitoring data (including WDF TraC data) at stations within the Mersey Estuary (comprised of beam and otter trawl data from 1981 to 2009) indicated a total of 44 fish species were recorded over that period. Data were also available from 2007 to 2017 for the Mersey mouth and these sites were north of the North Wirral Foreshore some distance from the proposed LCT site. Sand goby, dab and whiting were recorded consistently each year throughout the estuary and estuary mouth area and were generally the most abundant of the species caught. Cod was only recorded in 2009, 2013, 2014 and 2015 and in very low densities of 2-15 individuals per survey (EA 2018)[51].

13.82. Monitoring of Atlantic salmon is conducted at the Woolston weir fish trap and commenced in 2001. Between 2001 and 2013 monitoring was mainly conducted across the months September to November. Survey effort varied between years ranging from 4 to 48 trapping days each year between 2001 and 2011, with 65 trapping days in 2012 and 64 in 2013. The highest number of salmon caught between 2001 and 2011 was 45 individuals (in 2008), A total of 17 individuals were caught in 2012 and 16 were caught in 2013. Numbers of fish caught in 2014 to 2016 were consistent with previous years and no data are available for 2017.

51 Environment Agency. 2018. National Fish Populations Database (NFPD): TraC Fish Counts for all Species for the Mersey Estuary.

Table 13.9a: Summary of the seasonal time of passage or residency of selected fish species in the Mersey Estuary.

Receptor	Residence and/or Transit	Life Stage	Residence and/or Transit Times
			J F M A M J J A S O N D
Atlantic salmon	Transit	Smolt d/s	
		Adult u/s	
River lamprey	Transit/ resides	Newly metamorphosed adults d/s	
		Adults u/s	
Sea lamprey	Transit	Newly metamorphosed adults d/s	
		Adults u/s	
European eel	Transit/ resides	Glass eel u/s	
		Silver eel d/s	
Sea trout	Transit/ resides	Smolt d/s	
		Adult u/s	
European smelt	Transit	Adult	
		Juvenile	
Sprat	Spawning		
Sandeel	Spawning/ nursery		
Mackerel	Spawning		
Tope shark	Nursery		
Thornback ray	Nursery		
Spotted ray	Nursery		
Anglerfish	Nursery		
Cod	Resides/ spawning/ nursery		
Herring	Resides/ nursery		
Plaice	Resides/ spawning/ nursery		
Sole	Resides/ spawning/ nursery		
Whiting	Resides/ spawning/ nursery		

Note: Based on information provided in Coull *et al*. (1998)[52] and Ellis *et al.* (2012)[53]. Green cells indicate periods of fish passage and blue cells indicate periods of potential residency within the Mersey Estuary. Direction of travel is indicated for some life stages as either upstream (u/s) or downstream (d/s)

Marine Mammals

13.83. A relatively small number of cetacean species have been recorded in the waters of Liverpool Bay and nearshore waters of the northern Irish Sea (i.e. within 60km of the coast) compared the UK as

52 Coull, K.A., Johnstone, R., and S.I. Rogers. (1998). Fisheries Sensitivity Maps in British Waters. Published and distributed by UKOOA Ltd.

53 Ellis, J.R., Milligan, S.P., Readdy, L., Taylor, N. and Brown, M.J. (2012). Spawning and nursery grounds of selected fish species in UK waters. Sci. Ser. Tech. Rep., Cefas Lowestoft, 147: 56pp.

a whole[54] with a total 15 species of cetaceans recorded since 1975[55,56]. (including species that are present at any time of the year, those recorded annually as seasonal visitors, and species that are recorded only casually in the region).

13.84. Few cetaceans have been observed within the Mersey Estuary with numbers of individuals sighted decreasing with increasing distance upstream along the estuary. The species most likely to be encountered within the study area are expected to be harbour porpoise and bottlenose dolphin[32, 57].

13.85. The Seawatch Foundation has a cetacean observer network and collates cetacean sightings submitted by members of the public around the UK. There were a hundred sightings of cetaceans recorded in the northwest of England between 2014 and 2017, only 16 sightings occurred within the Mersey with a total of 40 individuals[32]. Harbour porpoise was the most commonly sighted cetacean species (34 individuals from 12 separate sightings). The other sightings were of bottlenose dolphin (2 individuals from one sighting), unknown cetacean species (2 individuals from one sighting), one common dolphin and an unknown species.

13.86. There are also two species of pinniped that are regularly observed in small numbers in the eastern Irish Sea which are the grey seal *Halichoerus grypus* and the harbour seal *Phoca vitulina*. Grey seals are regularly observed in the summer months hauled out at Hilbre Island in Liverpool Bay but there are low numbers of sightings of seals within the Mersey Estuary[58].

13.87. Marine mammals found within the study area are afforded both national and international protection under a range of legislation and plans including the Bonn and Bern Conventions (including ASCOBANS), EC Habitats Directive, The Wildlife and Countryside Act, NERC Act and Conservation of Seals Act.

Ornithology

13.88. A full ornithology desk-based data review and screening exercise is provided in **Appendix 13.2a** with the main findings summarised here. Following consultation during the completion of the November 2017 ES it was agreed that a further programme of wintering bird surveys would be undertaken between October 2017 and January 2018 inclusive. These were completed with the results reported on separately (**Appendix 13.9a**) and provided to LCC and MEAS during the determination period of the planning application.

13.89. The Site is located in and adjacent to the Mersey Estuary, which is one of the UK's most important sites for non-breeding (wintering) birds, especially waders and wildfowl. The Study Area for this assessment focuses mainly on the species that reside within 750m of the Site, the species that are features of designated sites (SPAs and Ramsar sites) within up to 5km and other designated sites (SSSIs) within up to 1km, as listed within **Table 13.8**a.

54 Evans, P.G.H & Shepherd, B. (2001). Cetaceans in Liverpool Bay and Northern Irish Sea. Available from: http://seawatchfoundation.org.uk/wp-content/uploads/2012/08/33.-cetaceans-in-liverpool-bay-and-northern-irish-sea.pdf. Accessed: 11/09/17.
55 Evans, P.G.H. (1996). Whales, dolphins and porpoises. Chapter 5.15. Pp. 153-156. In: Coasts and Seas of the United Kingdom. Region 13. Northern Irish Sea: Colwyn Bay to Stranraer, including the Isle of Man. (Eds. J.H. Barne, C.F. Robson, S.S. Kaznowska & J.P. Doody). Joint Nature Conservation Committee, Peterborough.
56 Sea Watch Foundation (2017). National Cetaceans Sightings Database. Sea Watch Foundation, University of Oxford. http://www.seawatchfoundation.org.uk/recentsightings.php. Accessed: 08/09/17.
57 Reid, J. B., Evans, P. G. H., & Northridge, S. P. (2003). Atlas of Cetacean Distribution in north-west European Waters. Joint Nature Conservation Committee, Peterborough.
58 Cheshire Biodiversity. (undated). Atlantic Grey Seal Local Biodiversity Action Plan. 4pp. Available from: http://www.cheshirewildlifetrust.org.uk/sites/default/files/files/Atlantic%20grey%20seal.pdf. Accessed: 08/09/17.

13.90. The desk study for this assessment examined site-specific survey data, national survey databases and grey literature within County bird reports and County avifauna. The desk study considered a number of non-breeding and breeding waterbird species and described the occurrence of them within or in close proximity to the Site (refer to **Appendix 13.2a**), including; shelduck, cormorant, great crested grebe, oystercatcher, lapwing, curlew, turnstone, knot, dunlin, redshank, little tern, common tern, black-headed gull, little gull, lesser black-backed gull, herring gull, great black-backed gull and black-legged kittiwake. These birds feed and roost mostly on the saltmarshes and mudflats surrounding the Mersey Estuary. The desk study also confirmed that the Mersey Estuary also hosts a large colony of breeding terns during the breeding season (summer) and a small colony of black-legged kittiwakes, though not within close proximity to the Site. The majority of the birds associated with the Mersey Estuary are located outside the city of Liverpool's boundaries.

13.91. The wintering bird surveys undertaken for this assessment recorded and reported on non-breeding waterbird species and described the occurrence of them within or in close proximity to the Site (**Appendix 13.9a**) including; Canada goose, cormorant, oystercatcher, turnstone, redshank, black-headed gull, herring gull and great black-backed gull.

13.92. The key finding from the desk study was that the land within close proximity to the Site and in the surrounding docks on the urbanised eastern side of the Mersey Estuary within the City of Liverpool supports very few of the waterbirds during any season across the calendar year. These findings are further supported by additional site-specific evidence provided by the wintering bird surveys (**Appendix 13.9a**), which found no significant number of birds, either in national context or as interest features of protected sites within close proximity to the proposed development. Therefore, the Site was found to not be of importance for any particular bird species as a breeding location or as a non-breeding location used to nest, forage, loaf or roost. The Site is largely void of waterbirds, though some relatively common species do reside within it on occasion.

Terrestrial Ecology

13.93. As noted above, terrestrial ecology is not assessed within this chapter. Refer to **Appendix 13.4a** (Preliminary Ecological Appraisal) for further information.

Summary of the Baseline

Marine Ecology

13.94. The phytoplankton and zooplankton assemblages within the Site are expected to be typical of the Mersey Estuary and Liverpool Bay area. Assemblages will change and be redistributed across each tidal cycle. It is anticipated that taxa present at the Site would be well adapted to the extremely turbid environment and fluctuating tide levels of the Mersey Estuary.

13.95. There is a very small section of intertidal sediment (approx. 3000m^2) at the mouth of Prince's Half Tide Dock immediately the north of the Site red line boundary. There are also intertidal habitats within the Site on man-made structures including the existing jetty and dock walls. These structures were colonised by species including the non-native barnacle *Austrominius modestus*, macroalgae and small numbers of periwinkle.

13.96. The subtidal sampling within the Site indicated that the sediments were quite heterogenous. However, the subtidal assemblage was relatively impoverished. The subtidal macroinvertebrate assemblage was dominated by juvenile blue mussel *M. edulis* and the cryptogenic acorn barnacle *A. improvisus*. Several non-native species were recorded. Three individuals of the starlet sea anemone *N. vectensis* were recorded at stations north of the Site red line boundary. As far as we

are aware, this is the first record of this species in North West England. The species is non-native but is also currently a protected species although it is understood this is primarily associated with the protection of vulnerable habitats within which it is a specialist (e.g. saline lagoons). It is, however protected under Schedule 5(9) of the Wildlife and Countryside Act (therefore the species receives full protection with both individuals and habitat protected). Saline lagoons themselves are also protected as a Habitat of Principal Importance on the S41 list under the NERC act, and Coastal Lagoons are an Annex I habitat under the Habitats Directive. It should be reiterated, however, that there are no saline lagoons in the immediate vicinity of the proposed project site.

13.97. There are at least 46 fish species within the Mersey Estuary of which eleven are species of conservation importance. These include the migratory (diadromous) species: Atlantic salmon; river lamprey; sea lamprey; and European eel which are protected under Annex II of the Habitats Directive as well as seven species that are protected under Section 41 of the NERC Act: sea trout (also a migratory species); sea trout, European smelt; Atlantic cod; herring; plaice; common sole; and whiting.

13.98. The number of marine mammals recorded within the Estuary is low; however, there are occasional sightings of harbour porpoise and bottlenose dolphin, and the pinnipeds grey and harbour seal.

Ornithology

13.99. The Site offers very few opportunities for terrestrial bird species with regards to nesting sites or suitable food resources for foraging and doesn't have opportunities for any of the bird species associated with the protected sites listed in **Table 13.8**a. A small number of common bird species, such as blackbirds and robins, may occur on the Site but not in any significant numbers. The wintering bird surveys recorded a small number of species in low abundances (one to two individuals per visit) including; woodpigeon, raven, carrion crow, magpie, pied wagtail and a maximum of five starling on one occasion (**Appendix 13.9a**). This is to be expected, as the Site has very few plants or shrubs and no old warehouses or sheds.

13.100. In addition to common species, two protected bird species are known to have bred close to the Site; peregrine falcon and black redstart, which were included within the desk study to inform the baseline; however, there are no records for either species on the Site. Neither peregrine falcon or black redstart were recorded in the site-specific surveys undertaken by APEM between October 2017 and January 2018 (**Appendix 13.9a**). This may be explained by the lack of tall structures for peregrines within the Site, which would mean that they are highly unlikely to select this location for nesting. Similarly, a lack of old warehouses and nesting ledges mean that the habitat is not preferable for black redstart for breeding, but as it is a species that is notoriously difficult to locate unless singing, it could be frequenting the Site to forage.

Evaluation to Identify Receptors to be Assessed

Marine Ecology

13.101. The range of potential key receptors present at the Site was considered with relevant receptors screened into the assessment. Value categories for receptors screened into the assessment are summarised in **Table 13.10**a.

Table 13.10a: Value of receptors expected to be potentially present within the Site.

Value	Receptor	Reasoning
Very High	Fish (Diadromous species)	There is potential for several migratory species to pass through the Development area that are protected under Annex II of the Habitats Directive (river and sea lamprey and Atlantic salmon) and European eel is protected under Council Regulation No 1100/2007/EC.
	Marine mammals	A number of marine mammal species are protected by a range of international policy / legislation including the Habitats Directive.
High	Fish (Section 41 species)	There are several species protected within the UK including former UK BAP species, and priority species listed in Section 41 of the NERC Act (2006).
	Starlet sea anemone *Nematostella vectensis*	Protected under the Wildlife and Countryside Act, is a Species of principal importance in England under the NERC Section 41 list. Listed as Vulnerable on the IUCN Red list.
Medium	Phytoplankton	Phytoplankton is a WFD biological element
	Intertidal species and habitats	Benthic invertebrates is a WFD biological element
	Subtidal species and habitats	Benthic invertebrates is a WFD biological element
	Fish (species not protected by specific conservation policy/legislation)	Fish is a WFD biological element
Low	Zooplankton	Zooplankton within the Development area are not protected and are expected to be typical of the Mersey Estuary and Liverpool Bay area. Zooplankton can provide a food resource for other species of conservation and commercial importance, and the larvae of species of conservation and commercial importance form a component of zooplankton.
Negligible	No receptors allocated to this category.	N/A

Ornithology

13.102. The full ornithology receptor screening process is provided in **Appendix 13.2a**.

13.103. Of the bird species accounted for in the desk study (refer to **Appendix 13.2a**) four were valued at the level of regional importance (oystercatcher, turnstone, redshank and common tern). Although none of these four species are known to reside within the Site in significant numbers the three wader species are known to reside within the Mersey Narrows on the opposite side of the Mersey Estuary and common tern is known to utilise coastal waters all along the Estuary. These four species are also interest features of designated sites in the vicinity of the Site. The screening was updated following the results of the site-specific wintering bird surveys undertaken between October 2017 and January 2018 (**Appendix 13.9a**) in order to capture any further data of relevance to bird species of interest.

13.104. The screening, carried out on all relevant bird species, is based on the source-pathway-receptor method (refer to **Appendix 13.2a**). This considers the Site and any proposed development

activities associated with it as a potential source of adverse effects on birds, the route by which that potential adverse effect might reach those birds (the 'pathway', which in many cases is dependent on distance) and the presence of a designated site or the presence of the species in significant numbers.

13.105. The outcome of the screening is summarised in **Table 13.11**a with five species screened in for consideration within this assessment; oystercatcher, turnstone, redshank, common tern and black redstart. The following passages describe, in summary, their occurrence within the Site or in close proximity to the Site.

Oystercatcher

13.106. Oystercatchers residing within the Mersey Narrows and North Wirral Foreshore are mostly confined to the north Wirral coastline, with only relatively low numbers within the Mersey Narrows[59]. WeBS count data collected over five wintering periods between 2011/12 to 2015/16 also provide evidence that only low numbers of birds utilise the Mersey Narrows, with a maximum count of 400 birds recorded in this count sector in April 2015 (and it should be noted that this site is on the opposite side of the Mersey Estuary to that of the Development). Few birds were recorded in the wintering bird surveys[60] with birds recorded in three count sectors in the winter surveys with a maximum count of 14 in West Waterloo Dock immediately to the north of the Site. Records of one to two birds were recorded at three different count sectors in the spring, whilst none were recorded in the autumn close to the Site. Oystercatchers were recorded on land within or in close proximity to the Site in 3 of the 18 site-specific wintering surveys (**Appendix 13.9a**). The peak count was of 16 individuals recorded perched on the sea wall adjacent to Prince's Half Tide Dock to the north of the Site in January. Due to this species being cited as an assemblage species of nearby designated sites, but only being found in low numbers close to the Site it is considered to be of regional importance, with an associated receptor value of **medium**.

Turnstone

13.107. Turnstone residing within the Mersey Narrows and North Wirral Foreshore are mostly confined to the north Wirral coastline, particularly at Leasowe, with only relatively low numbers within the Mersey Narrows[35]. However, the last five years of WeBS count data collected over the wintering periods between 2011/12 to 2015/16 provide maximum winter counts of between 12 and 164 birds in the Mersey Narrows count sector. Turnstone were recorded in two count sectors within, or close to, the Site during the wintering bird surveys[36], with a maximum of 11 birds in West Waterloo Dock and 20 at Canning Hall Tide Dock. No birds were recorded within close to the Site during the spring and autumn surveys. Turnstones were recorded during eight of the 18 site-specific wintering surveys (**Appendix 13.9a**) feeding (during a falling tide) or roosting (during a rising tide) on the substructure of the Prince's Jetty. The peak count was of eight individuals recorded feeding over low tide in January. Due to this species being a cited interest feature of the nearest designated site and as it is only found in numbers of regional significance within close proximity to the Site it is considered to be of regional importance, with an associated receptor value of **medium**.

59 Ross-Smith, V.H., Calbrade, N.A., Wright, L.J. & Austin, G.E. (2015) Waterbird population trend analysis of the Mersey Estuary SPA, Mersey Narrows & North Wirral Foreshore pSPA and Ribble & Alt Estuaries SPA. Natural England commissioned report NECR172. BTO Research Report No. 640.

60 TEP (2015). Assessment of Supporting Habitat (Docks) for Use by Qualifying Features of Natura 2000 Sites in the Liverpool City Region: Ornithology Report (Ref 4157.005 August 2015). TEP, Warrington.

Redshank

13.108. The number of redshank residing within the Mersey Narrows and North Wirral Foreshore has increased in importance in a regional context over the last 10-15 years[35]. The last five years of WeBS count data collected over the wintering periods between 2011/12 to 2015/16 also provides evidence that this area has become more important for this species, with maximum winter counts increasing from 22 birds in the Mersey Narrows count sector in November 2011 to 400 in April 2015. Redshank were not recorded in any of the count sectors within, or close to the Site during the winter, spring or autumn bird surveys[36]. Redshank was recorded on one occasion on land during the 18 site-specific wintering surveys (**Appendix 13.9a**). The single record was of a lone individual in January, perched on the substructure of the Prince's Jetty. Due to this species being a cited interest feature of nearby designated sites and being found in reasonable numbers close to the Site it is considered to be of regional importance, with an associated receptor value of **medium**.

Common Tern

13.109. Common tern residing within the Mersey Narrows and North Wirral Foreshore are mostly confined to coastline with sandy beaches, with very few birds recorded within the Mersey Narrows[35]. WeBS count data collected over the years between 2011 and 2016 also provides evidence that only low numbers of birds utilise the Mersey Narrows (though the focus is predominantly during the non-breeding period), with a maximum count of four birds in September 2015. No common terns were recorded in the bird surveys close to the Site[36]. However, this species is a cited interest feature of a nearby designated site and despite only being found in low numbers close to the Site it is considered to be of regional importance, with an associated receptor value of **medium**.

Black Redstart

13.110. Black redstarts are not known to breed on any of the structures within the Site (*pers. comm.* County Bird Recorder). A male was recorded in song at Clarence Dock in 2014[61], which is approximately 750 m to the north of the Site. However, due to the secretive nature of this species, its preference to spend time on roof tops and its ability to forage over wide areas that are often private with no right of access for people, it is possible that this species may be present in some capacity. Although this is a Schedule 1 species it is not known to be nesting or foraging in the Site, so is considered to be of local importance, with an associated receptor value of **low**.

Table 13.11a: Value of receptors (bird species) and summary of screening for impact assessment

Receptor	Value	Occurs in or adjacent to Site	Feature of designated site within 1 km	Screened in / out
Shelduck	Low	No	No	Out
Cormorant	Low	Yes	Yes	Out
Gt crested grebe	Low	No	No	Out
Peregrine falcon	Low	No	No	Out
Oystercatcher	Medium	Yes	Yes	In
Lapwing	Low	No	No	Out
Curlew	Low	No	No	Out

61 White, S.J. (Ed), Bickerton, D.A., Breaks, M., Dunstan, S., Fairclough, K., Godden, N., Harris, R., McCarthy, B., Marsh, P.J., Martin, S.J., Vaughan, T. & Wright, J.F. (2016) Lancashire Bird Report 2015 – The Birds of Lancashire and North Merseyside. Lancashire & Cheshire Fauna Society, Publication No. 120.

Receptor	Value	Occurs in or adjacent to Site	Feature of designated site within 1 km	Screened in / out
Turnstone	Medium	Yes	Yes	In
Knot	Low	No	Yes	Out
Dunlin	Low	No	Yes	Out
Redshank	Medium	Yes	Yes	In
Little tern	Low	No	Yes	Out
Common tern	Medium	No	Yes	In
Black-hdd gull	Low	Yes	No	Out
Little gull	Low	No	Yes	Out
Lssr black-bd gull	Low	Yes	No	Out
Herring gull	Low	Yes	No	Out
Gt black-bd gull	Low	Yes	No	Out
Black-lg kittiwake	Low	No	No	Out
Black redstart	Medium	Yes	No	In

Likely Significant Effects

Demolition and Construction

13.111. The following assumptions have been made for the purposes of this assessment:

- The existing jetty has in the region of 140 wooden posts, each 0.6m in diameter[39], giving an overall footprint on the estuary bed of 39.6m^2. During demolition of the jetty structure, the existing wooden piles would be extracted from floating barges using crane-mounted equipment;
- One or more jack-up barges are expected to be used to remove the wooden jetty piles. These barges place spud legs on the estuary bed to anchor the vessel. It is anticipated that the barges would have four spud legs each; however, the footprint of such spud legs is considered to be minimal in relation to the subtidal area of the Site; and
- The overall design for the new suspended deck structure has not been finalised. However, for the purposes of assessment it is considered that the number of piles would be as follows:
  - 156 piles supporting the Suspended deck (in the water column)
  - Potentially 24 landward piles
  - 8 linkspan bankseat piles (in the water column)
  - 2 piles for replacement mooring dolphins (in the water column)
  - 1 restraint pile for Pontoon E (in the water column)
- The diameter of the 167 piles in the water column would be approximately 965mm in diameter, giving an overall footprint on the estuary bed for the new jetty of approximately 120m^2. The diameter of the landward piles would be approximately 1300 mm. It should be noted that the number of piles and their locations could be subject to change once the design is finalised.

13.112. The main pathways by which the Development is considered to potentially have an effect on marine ecology and ornithology during demolition and construction phases have been outlined in

Table 13.1a and **Table 13.2**a and are listed below. Each is considered in more detail within the text below where appropriate:

- Loss of habitat;
- Physical disturbance and displacement (disturbance of bottom sediments);
- Physical disturbance and displacement (visual);
- Airborne noise and vibration;
- Underwater noise and vibration;
- Changes to water quality (suspended solids and release of contaminants from sediments);
- Pollution (direct e.g. oil);
- Collision risk due to vessel movements;
- Spread of non-native species; and
- Physical disturbance and displacement (indirect i.e. through the food chain).

Loss of Habitat

13.113. Receptors potentially affected by this effect are intertidal habitats and species, subtidal habitats and species, and birds.

Intertidal Habitats and Species

13.114. During demolition and removal of the existing jetty, species encrusting the existing wooden jetty structure and the supporting habitat would be permanently removed. The wooden pile habitat would be replaced via the installation of metal piles for the new Cruise Liner Terminal, so the replacement structures would not be like for like. However, wall scrapes and observations from project-specific survey indicate that over time metal piles would be expected to be colonised by barnacles and other organisms currently on the wooden jetty (refer to **Appendix 13.1a**). It should be noted, however, that the dominant encrusting organisms on the current structures which would be expected to colonise the new structures would include the non-native barnacle *Austrominius modestus*.

13.115. The effect has been assessed to be local and permanent due to the loss of individuals on the current structure. However, the new structures to be installed would be expected to be colonised by the same main taxa that are currently present. Overall, the magnitude of the effect is considered to be minor. The value and sensitivity of the intertidal species/habitats is assessed to be medium and any effect is assessed likely to be **permanent, local and of minor adverse significance**.

Subtidal Habitats and Species

13.116. Removal of the jetty structures would result in the loss of subtidal invertebrates and algae that have colonised them but these species are widespread on other structures in the vicinity of the Works including the walls at the waterfront and these taxa would be expected to colonise new jetty structures introduced for the Development.

13.117. During construction of the new suspended deck structure for the Cruise Liner Terminal there would also be loss of habitat due to installation of piles. The area of the estuary bed that will be lost due to the installation of new piles is small (footprint of approximately 120m^2) which also represents a small proportion of the available subtidal habitat within the Site. Small areas of subtidal sediment habitat will also be gained from removal of the existing wooden piles.

13.118. Any effect on subtidal invertebrates on the jetty structures due to demolition/removal, and in the subtidal sediments due to construction works would be local and loss of the existing sediment habitat due to introduction of new piles would be permanent**.** New structures would provide new artificial subtidal habitat to be colonised by organisms that currently colonise subtidal sections of the existing jetty structure. With the very small area of subtidal sediment habitat that could be lost due to the Development there is not expected to be any effect on the integrity of the populations of subtidal invertebrates within the Site and within the wider Mersey Estuary, and invertebrates are likely to be able to recolonise any disturbed areas from the wider population. Consequently, the magnitude of the effect is considered to be minor**.** The value of the subtidal species/habitats is assessed to be high (due to the potential presence of the Section 41 list species *N. vectensis*) and sensitivity is considered to be medium**.**

13.119. Based on the above considerations it is considered likely that any effects would be **permanent, local and of minor adverse significance**.

Birds

13.120. The species of waders screened in for assessment (oystercatcher, turnstone and redshank) are not known to reside on the Site in significant numbers as they are mostly found on the opposite side of the Mersey Estuary to the Site, so would not be subject to any habitat loss as a consequence of this Development. Common tern also do not reside on the Site, so the Development would not cause any loss of habitat to this species, as it nests at Seaforth to the north and is not known to forage significantly in waters adjacent to the Site. Despite the loss of habitat being permanent the construction works would only be local, so consequently regardless of the level of sensitivity of all three waders and common tern the magnitude of effect is deemed to be 'no change', therefore the significance of effect would be **neutral** for all four bird species.

13.121. Black redstarts have a medium sensitivity to habitat loss, based on their preference to specific urban habitats in the UK[62]. However, they are not known to forage on the Site and the demolition plans do not involve the destruction or removal of any known nesting locations. Despite the loss of habitat being permanent the construction works would only be local, as the footprint of the Site is limited in size and would not constitute a significant loss of foraging space for this species, should it be present during the breeding season. Consequently, the magnitude of effect is deemed to be negligible and the significance of effect is considered to be **negligible**.

Physical Disturbance and Displacement (Disturbance of Bottom Sediments)

13.122. Receptors potentially affected by this effect are subtidal habitats/species and fish.

13.123. In addition to the potential mortality of individuals within the footprint of new piles there could be displacement of subtidal invertebrates or fish within areas immediately outside the pile footprints due to physical disturbance of sediment in the area including during removal of the existing wooden piles. This could include the smothering of individuals by sediment settling out of solution.

13.124. Once the jetty is removed sediment transport modelling has indicated the overall effect would be to reduce the potential for fine sediment accretion particularly in the area north of the structure, around the Prince's Half Tide Dock approaches[63].

13.125. Predicted effects would be limited to approximately 1km from the existing jetty. The reduction in accretion in these areas would result in other areas experiencing a small increase in the potential

62 BirdGuides (2003-2006). BWPi: Birds of the Western Palearctic interactive (version 2.0). BirdGuides Ltd., Norfolk.
63 HR Wallingford (2017). *Hydrodynamic and coastal process studies, Liverpool cruise terminal, RT001 R01- 00*. Report produced for Waterman Infrastructure and Environment Ltd.

for fine sediment accumulation as material which would have settled further towards the channel would now be able to settle nearer the bank line[39].

Subtidal Habitats and Species

13.126. The area of subtidal sediment potentially affected by this disturbance would be larger than the area within the pile footprints but would still be very small in relation to the availability of similar habitats within the Site boundary and wider Estuary. Any disturbed/displaced benthic invertebrates would only be displaced a short distance and would be expected to survive such disturbance. The effects of changes in sediment transport regime would be gradual and sediments would likely be recolonised with recruitment from the wider populations following disturbance.

13.127. Any effects would be local and temporary and the magnitude of the effect is considered to be negligible**.** The value of the subtidal species/habitats is assessed to be high (due to the potential presence of *N. vectensis*) and sensitivity is considered to be low. Therefore any effects would be **temporary, local and of minor adverse significance**.

Fish

13.128. Fish are highly mobile and any fish physically disturbed by the work due to sediment movement/changes in habitat would be able to avoid the area during periods of disturbance and return to the area if required once disturbance has ceased. The type of habitat potentially disturbed is widespread within the Site boundary and wider Estuary so fish would not have to move far to find similar habitat.

13.129. Any effects would be local and temporary and the magnitude of the effect is considered to be negligible. The value of fish potentially present at the Site is assessed to be very high for diadromous fish, high for other protected fish species, and medium for other fish species and sensitivity to the effect is considered to be low. Overall any effects are considered likely to be **temporary, local and of minor adverse significance**.

Physical Disturbance and Displacement (Visual)

13.130. Receptors potentially affected by this effect are fish, marine mammals and birds.

13.131. Visual disturbance could occur as a result of movements of vehicles such as excavators, piling rigs, dump trucks, cranes, tractors and trailers at or within close proximity to the Site and workmen walking on or close to the Site. Within the aquatic environment visual disturbance could be associated with the presence of barges during construction. There is also potential for visual disturbance due to the artificial lighting that will be used during the demolition and construction works.

Fish

13.132. Fish are highly mobile and are also well habituated to the presence of vessels in the Mersey Estuary. They could avoid the area due to any visual disturbance if required. Any effects would be local and temporary and the magnitude of the effect is considered to be negligible. The value of fish at the Development site is assessed to be very high for diadromous fish, high for other protected fish species, and medium for other fish species and sensitivity to the effect is considered to be negligible. Overall any effects are considered likely to be of **negligible** significance.

Marine Mammals

13.133. Marine mammals in the area would be expected to be well habituated to the presence of vessels. In particular, seals would be able to detect sources of light during construction if works were conducted at night. However, the Mersey Narrows is a built-up area and marine mammals present would be habituated to the presence of light from a wide range of sources. In addition, the numbers of marine mammals frequenting the Mersey Estuary is very low. Any effects would be local and temporary and the magnitude of the effect is considered to be negligible. The value of marine mammals is assessed to be very high and sensitivity to the effect is considered to be negligible. Overall any effects are considered likely to be of **negligible** significance.

Birds

13.134. Physical disturbance as a consequence of machinery, vehicles / vessels and workmen at the Site or travelling to and from it could potentially cause temporary or permanent displacement of bird species feeding and / or roosting within a preferred area. At the lowest degree, a species may be too far from the activities to be influenced by any associated machinery or people or they may become habituated to these or other disturbance stimuli, thereby not reacting to or moving away from activities associated with disturbance. At the highest degree, a species may react to the presence of machinery, vehicles / vessels or workmen by vacating a preferred area for feeding or roosting and not return until such disturbances are no longer present.

13.135. The species of waders screened in for assessment (oystercatcher, turnstone and redshank) are not known to reside on the Site in significant numbers as they are mostly found on the opposite side of the Mersey Estuary to the Development. The distance between the Site and the closest area of suitable sand/mudflats on the Wirral side is approximately 850m. Demolition and construction works carried out by machinery, vehicles and workmen on the Site are too far from these three species to pose a potential disturbance stimuli. In addition, the presence of one or more jack-up barges which would be adjacent to the Site in the Mersey Estuary would also be too far from any birds on the opposite side of the estuary to be subject to disturbance. Any effects would be local and temporary, and regardless of the level of sensitivity of all three wader species to visual disturbance stimuli the magnitude of effect is considered to be 'no change', therefore the significance of effect would be **neutral** for these species.

13.136. Common tern do not reside on the Site and do not regularly forage in waters close to it, so would not be subject to disturbance visually. The main nesting location for this species is at Seaforth Dock, which is approximately 7km to the north, meaning that none of the machinery, vehicles, vessels or workmen would be visible to them when they may be at their most sensitive. Any effects would be local and temporary, and regardless of the level of sensitivity of common tern to visual disturbance stimuli the magnitude of effect is considered to be 'no change', therefore the significance of effect would be **neutral** for this species.

13.137. Black redstarts have a negligible sensitivity to physical disturbance, as in the UK they predominantly reside within urban areas that are subjected to the potential sources of disturbance in the form of machinery, vehicles, vessels and workmen[38]. As they are not known to forage on the Site the physical presence of machinery, vehicles, vessels and workmen would be unlikely to cause significant disturbance to this species. However, if they do reside at the Site then they would already be subject to current levels of traffic from cars moving along the road on to the Princes Dock and from regular cruise vessels docking nearby so any effects would be local and temporary and the magnitude of the effect is considered to be negligible. Overall, the significance of effect is considered to be **negligible**.

Airborne Noise and Vibration

13.138. The receptor potentially affected by this effect is birds.

13.139. The sources of above water noise and vibration from the demolition and construction activities associated with this Development include the movement and operation of plant vehicles, machinery and workmen on the Site, and vessels with machinery on the water adjacent to the Site. In addition, there is the requirement to extract the current jetty piles and install piles in the estuary bed for the new suspended platform structure. Many of these activities are localised within the Site or close to the Site (e.g. vessels or terrestrial vehicles approaching or leaving the Site).

13.140. Modern demolition methods would be used to minimise noise and vibration and ensure demolition materials are recovered and separated for recycling.

13.141. To minimise potential noise and vibration, Site-specific best practice measures would be implemented and adhered to by Contractors. A summary of such measures includes:

- Careful selection of Works methods and plant to be used to minimise noise and vibration at source as far as reasonably practicable;
- Switching off plant and vehicle engines when not in use;
- Regular maintenance and servicing of vehicles, equipment and plant;
- Adhering to operational hours;
- The use of hoarding around the perimeter of the Site and temporary acoustic barriers, where appropriate; and
- Breaking out of concrete structures would be undertaken using low noise and vibration techniques where possible.

Birds

13.142. The sources of noise and vibration from the mobilisation activities associated with this Development include the movement and operation of plant vehicles, vessels and machinery on the Site and adjacent to it on the water. The biggest potential source of noise and vibration is from;

- The pile extraction phase to remove the existing wooden piles. The exact methods for removal have not yet been finalised but could involve jacking-out the piles, mechanical extraction or by vibro-extraction or a combination of all three. Vibro-extraction would be expected to generate the highest noise and vibration levels and is the least desirable method and will be avoided where possible. The worst-case scenario of use of vibro-extraction has been assumed for the purposes of assessment although it is expected that this will only be required for 50% of the piles or less; and
- Drilling activities associated with the construction phase for the new jetty steel piles installed by rotary auger piling.

13.143. The worst-case scenario assumes vibro-extraction is used for pile extraction (which may not be the case). It has not been finalised at this stage what make and power output of vibro-hammer head would be attached to a crawler crane to undertake the pile removal part of the demolition works. The noise levels primarily considered in this assessment would be those generated by the vibro-hammer head on the crane (which would be greater than noise generated by the crane itself), and the crane would be mostly stationary on the dockside or the barge whilst the removal of piles by vibro-extraction would be ongoing. The current standard acoustic data available for the use of such machinery relates to driving steel piles into substrate with a vibro-piling head into soft

substrate, rather than to remove wooden piles from bottom substrate. Consequently, the use of noise levels for the installation of piles is considered to be a precautionary worst-case scenario approach to assessment as it is expected the noise levels during pile extraction would not be greater than the noise generated when piling into sediment.

13.144. It has also not been finalised at this stage which of two different types of rotary auger would be used to insert the new jetty piles or the exact method of deployment which would be used during the construction period. As a precautionary worst-case scenario, for the purposes of assessing the potential effects of noise and vibration it has been assumed that a large rotary auger would be used to install tubular steel piles of approximately 965mm in diameter in the water column (landward piles (up to 24 of them) would have a diameter of approximately 1300mm).

13.145. The vibro-extraction (based on noise levels available for vibro-piling) and rotary auger drilling are estimated to produce maximum noise levels of 88dB and 83dB at 10m from the source[64], respectively. Approximately 140 wooden piles would be removed from the estuary bed. It is estimated that there would be a maximum of five months of pile excavation works and the worst case scenario for birds is to consider this coinciding with the more sensitive non-breeding season (winter) months between November and March. The outline programme of works for the demolition phase indicates that pile excavation works would take place within the window 1st May and 18th October (approx. 24 week duration), so the most sensitive period for birds would be avoided. For the purposes of assessment of the construction phase, it has been assumed that a total of 167 piles would be driven into the estuary bed and there could be up to 24 landward piles. It is estimated that there would be a maximum of just over 11 months of piling (encompassing land and marine based piling). The marine piling would be within a window of just over 9 months (8th October 2019 – 23rd July 2020; approx. 36 weeks duration).and the worst case scenario for birds is to consider this coinciding with the more sensitive non-breeding season (winter) months between November and March. Based on the outline programme of works for the construction phase any influence would be over a single winter period only.

13.146. Pile extraction and rotary auger drilling activities are both sources of noise and vibration that have the potential, should it be of a nature and loud enough when it reaches the location where a receptor of concern occurs, to disturb bird species that are interest features of designated sites. There are a number of factors that affect the level of noise and vibration that reaches the receptors of concern. The principal factors are the level at source, the distance, the presence of any barrier and the nature of the ground between source and receptor. With regard to distance, for a point source of sound (i.e. a machine) a doubling of the distance results in a 6dB(A) fall in level. With regard to the nature of the ground, if it is a hard-reflecting surface (e.g. asphalt, paving, water) it can increase noise levels by up to 3dB(A) (this is because the noise that has travelled directly and the reflected noise is combined).

13.147. The sound pressure levels (SPL) for vibro-piling (assumed for the purposes of assessment to determine worst-case noise levels during pile extraction) and rotary auger drilling being proposed for use in this Development have been sourced from Defra (2005)[40]. Attenuation with distance has been calculated using a proprietary noise attenuation calculator[65], with conversion to sound power level (SWL) at source and the results presented for 850m in **Table 13.12**a, the distance to the closest point on the opposite side of the Mersey Estuary that accommodates species screened in for this assessment.

64 Department for Environment, Food and Rural Affairs (Defra) (2005). Update of Noise Database for Prediction of Noise on Construction and Open Sites. DEFRA, London.
65 MAS Environmental Ltd, Cambridge http://www.masenv.co.uk/noisecalculator2

Table 13.12a: Attenuation of noise with distance

Source	SPL at 10m (dB) (Defra, 2005)	SWL (dB)	SPL at distances relevant to this study
			850m
Vibro-hammer	88	119	51.8
Large Rotary Auger	83	114	46.8

13.148. To assess the response levels of the waterbirds close to the proposed works from acoustic influence associated with those Works, the IECS Estuarine Bird Assessment Tool Kit (IECS Tool Kit)[66] has been used for guidance. For birds in the intertidal environment different types of disturbance stimuli can be characterised by the reactions that different bird species have to such stimuli (as listed in the IECS Tool Kit). This could be as a result of noise and vibrations from multiple vehicle movements and/or the installation and operation of heavy machinery. In such circumstances waterbirds feeding and/or roosting on the intertidal area may, at the highest degree, move to areas in excess of 300m from the source of disturbance (strong escape behaviour, at a large response distance). At the lowest degree, a species may become habituated to noise and vibration disturbance stimuli, thereby not reacting to or moving away from activities associated with disturbance (hardly any escape behaviour and very short flight distance when approached).

13.149. The noise from any vibro-extraction and rotary auger drilling activities are anticipated to be 88 db(A) and 83 db(A) at 10 m from the source, respectively, and reducing to 51.8db(A) and 46.8dB(A) within 850m, respectively (**Table 13.12**a). Works undertaken during the non-breeding period, including the months of November through to March would coincide with waterbirds being present on the opposite side of the Mersey Estuary. Based on AQTAG09 noise thresholds and guidance[67], it is recommended that noise levels would be restricted to below 55 dB for periods of work extending over one hour and, where possible, noise above 80 dB would be avoided as that is a maximum disturbance factor. In addition to noise thresholds in Ormerod *et al* (2004)[42] this assessment has used disturbance distances from the IECS Tool Kit[41] to determine the potential effects of noise and vibration on different species of birds in the intertidal area.

13.150. The species of waders screened in for assessment have differing levels of sensitivity regarding noise and vibration disturbance, with oystercatcher having a low sensitivity, turnstone having a negligible sensitivity and redshank having a very high sensitivity. However, these three species of waders are not known to reside on the Site in significant numbers as they are mostly found on the opposite side of the Mersey Estuary to that which the Development is located. The distance between the Site and the closest area of suitable sand / mud flats on the Wirral side is approximately 850 m away. Accounting for the maximum dB level from vibro-hammer and rotary auger drilling activities on the Site of 88dB and 83dB, respectively, at 10 m from the source and the combination of a noise decay rate over distance, noise levels would fall to 51.8dB and 46.8dB at 850 m. Any effects would be local and temporary and regardless of the level of sensitivity of all three wader species to noise and vibration disturbance stimuli the magnitude of effect is deemed to be 'no change'. Therefore, the significance of effect is considered to be **neutral** for these species.

66 Institute of Estuarine and Coastal Studies (2013). Waterbird Disturbance Mitigation Toolkit: Informing Estuarine Planning & Construction Projects [Version 3.2]. Institute of Estuarine and Coastal Studies (IECS), University of Hull.
67 Ormerod, L., Goodlad, N. & Horton, K. (2004). Guidance on the effects of industrial noise on wildlife (Note AQTAG09), advice to SPGs, Inspectors, AHDCs and RHDCs.

13.151. Common tern have a low sensitivity regarding noise and vibration disturbance, but as they do not reside on the Site and do not regularly forage in waters near to the Site they would not be subject to noise and vibration disturbance. The main nesting location for this species is at Seaforth Dock, which is approximately 7 km to the north, meaning that noise and vibration emitted from pile excavation activity or piling would not reach them when they may be at their most sensitive. In addition, any potential effects would be local and temporary and regardless of the level of sensitivity of common tern to noise and vibration disturbance stimuli the magnitude of effect is deemed to be 'no change'. Therefore, the significance of effect would be **neutral** for this species.

13.152. Black redstarts have a **negligible** sensitivity to noise and vibration disturbance and are known to prefer urban areas in the UK that may be subjected to regular and high levels of noise and vibration such as building sites, power plants and busy city centres. As they are not known to forage on the Site any noise and vibration emitted from piling would be unlikely to cause significant disturbance to this species. However, if they do reside at the Site then they would already be subject to current levels of noise and vibration from cars moving along the road on to the Princes Dock and from regular cruise vessels docking nearby so any effects from pile excavation activity or piling would be local and temporary and the magnitude of the effect is considered to be minor at most. Consequently, if the magnitude of effect is deemed to be negligible, then the significance of effect would be **negligible**.

Underwater Noise and Vibration

13.153. The receptors potentially affected by this effect are fish and marine mammals.

13.154. Noise and vibration could be generated by the barges and other boats utilised to remove the Princes Jetty structure. The number of barges to be operating in the area has not yet been finalised; however, it is understood that barges would be used extensively during demolition. It is anticipated that tugs may be used to move the barges to Site and the barges would be stationary during demolition and removal operations and there may also be movements of crew boats in the area. Some indicative underwater noise levels for the operation of these vehicles (i.e. during transit) are indicated in **Table 13.13**a.

Table 13.13a: Typical Source Noise Levels for expected Construction Vessels

Vessel	Vessel Details	Frequency Range (kHz)	Extrapolated Source Noise Level (dB re 1 µ Pa, peak-peak)	Reference
Tug	Manoeuvring sealift barge in shallow water	0.01 to 20	170 (based on measurement of 144 dB RMS re 1 µPa @ 60 m)	Richardson (2006)[68]; Patterson & Blackwell (2007)[69]
Crew Boat	8.5 m long underway at 13 knots	0.01 to 20	175 (based on measurement of 166 dB RMS re 1 µPa @ 1 m)	Zykov & Hannay (2006)[70]

[68] Richardson W.J. (2006). Monitoring of Industrial Sounds, Seals, and Bowhead Whales near BP's Northstar Oil Development, Alaskan Beaufort Sea, 2005: Annual Summary Report. W.J. Richardson, BP Exploration (Alaska) Inc.

[69] Patterson, H., Blackwell, S.B., Haley, B., Hunter, A., Jankowski, M., Rodrigues, R., Ireland, D. & Funk, D. W. (2007). Marine mammal monitoring and mitigation during open water seismic exploration by Shell Offshore Inc. in the Chukchi and Beaufort Seas, July–September 2006: 90–day report. LGL Draft Rep. P891–1. Rep. from LGL Alaska Research Associates Inc., Anchorage, AK, LGL Ltd., King City, Ont., and Greeneridge Sciences Inc., Goleta, CA, for Shell Offshore Inc, Houston, TX, and Nat. Mar. Fish. Serv., Silver Spring, MD. 199 p.

[70] Zykov, M. & Hannay, D. (2006). Underwater measurements of vessel noise in the nearshore Alaskan Beaufort Sea. Pioneer Natural Resources Alaska Inc and Flex LP. 34 pp.

13.155. During demolition the piles from the existing Princes Jetty will be removed (for the purposes of assessment it is assumed extraction would be by vibro-extraction although other methods could be deployed such as 'jacking out' or mechanical pulling). It is expected that vibro-extraction would not generate greater noise and vibration levels than installation of piles by vibro-piling. Consequently, as a worst case, this assessment has been conducted based on source noise levels for installation of piles by vibro-piling.

13.156. It is understood the jetty piles currently in place are approximately 0.3 m in diameter. Vibro-piling of a 0.30 m diameter steel pipe pile in less than 5 m of water has been recorded to generate noise levels of 171 dB re 1 µPa (Peak), 155 dB re 1 µPa (RMS) and 155 dB re 1 µPa^2·s (SEL)[71]. Consequently, these underwater noise levels have been assumed for pile extraction as worst case noise levels that could be experienced based on piling installation source noise levels. It should be noted, however, that although the assessment is based on an assumption of vibro-extraction this is only anticipated to be used for 50% of the piles or less.

13.157. The other source of underwater noise and vibration is from rotary auger drilling of the steel tubular piles for the new Cruise Liner Terminal. This construction method is much quieter than either percussion piling or vibro-piling and the use of rotary auger drilling has been implemented as an inherent mitigation measure for the Development to minimise the levels of noise and vibration generated during construction works. Recordings made of a 209 kW Wirth B5 rotary drilling rig (of lower power than those proposed for this Development) recorded underwater noise levels at just over 50m away from source of 127 to 133dB re 1µPa RMS[72] and the mean RMS during this period was equivalent to a one second Sound Exposure Level (SEL) of 130dB re 1µPa^{2}s[73]. For the proposed construction works for the LCT hydraulic piling machines suitable for drilling the proposed rock sockets are the Casagrande B360XP, Soilmec SR95 or the Bauer BG40 (all of which have torque ratings of around 40Tm) which have been calculated to generate a noise level at source of 163.3 dB re 1 µPa[74]. The use of one of these machines and the generation of a noise level at source of 163.3 dB re 1 µPa has been assumed for the purposes of assessment.

13.158. For the purposes of assessment, it has been assumed that approximately 140 piles would be removed using pile extraction equipment and removal of piles would occur within a window of 1st May 2019 and 18th October 2020 (24 weeks). In addition, a total of 167 piles would be drilled into the estuary bed. It is estimated that there would be approximately 9 months of drilling expected to occur between 28th October and 23rd July 2020 (36 weeks). Works will be tidal and although the plan is to complete the works during the hours 0700-1900hrs over a 7-day working week, these hours may need to change to make best use of the tides and complete the work in a reasonable timeframe. During the demolition phase of the works over the course of a working day it is expected that approximately 25% of the day would involve active pile extraction (and associated noise) and only 50% or less of the piles would be expected to be removed via vibro-extraction (with noise generated using the other proposed methods being a lot lower). During the pile installation phase it is expected that approximately 40% of the day would involve active pile installation (and associated noise). It is anticipated that works generating low levels of noise and vibration will be required outside these hours in preparation for demolition works and piling works the following day.

71 Caltrans (2007). Compendium of Pile Driving Sound Data. Prepared for the California Department of Transportation by Illinworth & Rodkin. 129pp.
72 Root Mean Squared (RMS) sound pressure was averaged over 1 second.
73 Barham, R. (2017). Wylfa Newydd Project. 6.4.91 ES Volume D - WNDA Development App. D13-09 - Underwater noise baseline and modelling. PINS Reference Number: EN010007. Subacoustech Report E522R0704.
74 Hobbs Associates (2018) Noise and vibration impact assessment of piling work at the new Liverpool Cruise Terminal.

Fish

13.159. Underwater noise and vibration may cause the following effects in fish:

- Behavioural effects (e.g. changes in swimming behaviour and orientation, communication between conspecifics and detection of predators/prey);
- Masking effects (i.e. the reduction in the detectability of a given sound as a result of the simultaneous occurrence of another sound);
- Temporary threshold shift in hearing (short or long term changes in hearing sensitivity that may or may not reduce fitness);
- Recoverable tissue injury (injuries, including hair cell damage, minor internal or external hematoma etc. None of these injuries are likely to result in mortality); and
- Mortality and potential mortal injury (immediate or delayed death).

13.160. Hearing abilities of fish can vary in relation to morphological adaptations of the acoustico-lateralis apparatus, in particular the distance of the swim bladder to the inner ear[75,76,77]. Species with no swim bladder (e.g. flatfish) have a lower hearing ability than many other fish species and rely on detection of particle motion (the oscillatory displacement of fluid particles in a sound field)[78]. Those with a swim bladder but no connection to the inner ear (e.g. salmon) have better hearing but can also only detect particle motion. Species with an extension of the swim bladder that terminates within the inner ear (e.g. herring) can hear sounds over a far greater range than other species[79,80], and can detect both particle motion and sound pressure (a form of stress measured in term of force/unit area).

13.161. Due to the different hearing abilities of marine species, numerous assessments of the potential impacts of underwater noise and vibration in the UK have used the dB_{ht} (*Species*) concept[81]. The dB_{ht} (*Species*) scale provides an equivalent to the dB(A) scale used for human noise exposure in air as it models the noise level that a specific species would experience. There are a number of limitations with this approach, however, including difficulties associated with deriving the required data for individual species and consideration of issues inherent with utilising audiogram data for the approach[26].

13.162. As an alternative approach Popper *et al*. (2014)[26] provides criteria that can be applied to assess the potential effects of noise on fish from different marine activities such as piling and vessel noise. The criteria set out by Popper *et al.* (2014) is currently the standard best-practice guidance used for impact assessments of underwater noise on fish from anthropogenic noise sources such as percussive piling, vessel noise and other continuous noises such as vibro-piling and rotary drilling. The approach assesses the potential effects of underwater noise on fish based on grouping species according to their hearing apparatus, specifically whether they have no swim

[75] Bone Q., Marshall N. B. & Blaxter J. H. S. (1995). Biology of Fishes (2nd edn). Chapman & Hall Publishers.
[76] Hastings M.C. & Popper A. (2005). Effects of sound on fish. Report for the California Department of Transportation.
[77] Mason T. (2013). Modeling of subsea noise during the proposed piling operations at the Dudgeon Wind Farm. Subacoustech Report E438R0106.
[78] Popper A. N., Hawkins A. D., Fay R. R., Mann D. A., Bartol S., Carlson T. J., Coombs S. Ellison W. T. · Gentry R. L., Halvorsen M. B., Løkkeborg S., Rogers P. H., Southall B., Zeddies D. G. and Tavolga W. N. (2014). Asa S3/Sc1.4 Tr-2014 Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report Prepared by ANSI-Accredited Standards Committee S3/Sc1 a (Springerbriefs in Oceanography).
[79] Higgs D.M., Plachta D.T.T., Rollo A.K., Singheiser M., Hastings M.C. & Popper A.N. (2004). Development of ultrasound detection in American shad (*Alosa sapidissima*), Journal of Experimental Biology. 207: 155-163.
[80] Gill, A. B., Bartlett, M. & Thomsen, F. (2012). Potential interactions between diadromous fishes of U.K. conservation importance and the electromagnetic fields and subsea noise from marine renewable energy developments. Journal of Fish Biology: 81, 664–695.
[81] Nedwell, J. & Howell, D. (2004). A review of offshore windfarm related underwater noise sources. Report No. 544 R 0308.

bladder, they have a swim bladder but it is not involved in hearing, or they have a swim bladder which is involved in hearing[26].

13.163. The noise levels are based on consideration of peak noise (the maximum absolute value of the instantaneous sound pressure (or motion) during a specified time interval), and cumulative Sound Exposure Level (SEL_{cum}) which is the linear summation of the individual sound events over the time period of interest and can be calculated as[26]:

SEL_{ss} +10log 10 (N)

where SEL_{ss} is the Sound Exposure Level for a single strike and N is the number of impulsive events.

13.164. Insufficient data exist to make a recommendation for guidelines in relation to masking effects (i.e. the reduction in the detectability of a given sound as a result of the simultaneous occurrence of another sound) or behavioural effects of noise and vibration (e.g. changes in swimming behaviour and orientation, communication between conspecifics and detection of predators/prey). Consequently, in Popper *et al*, 2014[26] a subjective approach was adopted in which the relative risk of an effect was placed in order of rank at three distances from the source – near (e.g. tens of meters from the source), intermediate (e.g. hundreds of meters from the source), and far (e.g. thousands of meters from the source) which has been applied for the purposes of this assessment[26](refer to **Table 13.14a**). Risk has been defined in relative terms as low, moderate or high but are not based on specific source or received noise levels because there are insufficient data available to provide this level of detail. In general, however, the nearer the fish is to the noise source the higher the likelihood of high energy and a resultant effect. The relative risk rankings in **Table 13.14a** were determined and agreed by a working group of 15 scientists specialising in the effects of underwater noise on fish and sea turtles and are based on their expert judgement[26].

13.165. Effects on behaviour are considered in **Table 13.14a**, and the term 'behaviour' can be applied to a range of actions including swimming behaviour, orientation and startle reactions. The action of actively swimming away from a noise source to avoid the noise would be categorised as behaviour. For example, a high risk of behavioural effects can be considered to equate to a high risk that some individuals may move upstream, downstream or further out into the channel away from the noise source. As noise levels attenuate rapidly with increased distance from the source the risk of fish actively swimming away from the noise will similarly decrease.

Table 13.14a: Proposed mortality, potential injury, temporary threshold shift, masking and behaviour criteria for fish (from Popper *et al*. 2014)

Fish grouping	Mortality and potential mortal injury	Impairment			
		Recoverable injury	Temporary Threshold Shift	Masking	Behaviour
Shipping and Continuous Sounds (including vibro-piling and rotary drilling)					
No swim bladder (particle motion detection)	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) High (I) High (F) Moderate	(N) Moderate (I) Moderate (F) Low
Swim bladder is not involved in hearing (particle motion detection)	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) High (I) High (F) Moderate	(N) Moderate (I) Moderate (F) Low

Fish grouping	Mortality and potential mortal injury	Impairment			
		Recoverable injury	Temporary Threshold Shift	Masking	Behaviour
Swim bladder is involved in hearing (primarily pressure detection)	(N) Low (I) Low (F) Low	170 dB rms for 48 hrs	158 dB rms for 12 hrs	(N) High (I) High (F) High	(N) High (I) Moderate (F) Low

Notes: peak and rms sound pressure levels dB re 1 µPa; SEL dB re 1 µPa2·s. All criteria are presented as sound pressure even for fish without swim bladders since no data for particle motion exist. Relative risk (high, moderate, low) is given for animals at three distances from the source defined in relative terms as near (N; tens of metres from source), intermediate (I; hundreds of metres from source), and far (F; thousands of metres from source).

13.166. This assessment focusses on the key fish species of conservation and commercial importance potentially present in the Mersey Estuary (Paragraph 13.76 to 13.82) with the hearing groups for each provided (**Table 13.14a**).

Table 13.15a: Hearing groups for key fish species within the Mersey Estuary.

Hearing group		
No Swim Bladder	**Swim Bladder is Not Involved in Hearing**	**Swim Bladder is Involved in Hearing**
Brill Bull huss Common sole Dab Flounder Lamprey (river/sea) Lesser spotted dogfish Mackerel Plaice Rays (all species) Sand goby Smooth hound Turbot	Atlantic salmon European smelt Gurnard spp. Seabass Sea trout	Atlantic cod Conger eel European eel Herring Sprat Ling Pollack Pouting

No Swim Bladder

13.167. Lamprey lack a swim bladder and otolith organs but feature statoliths or labyrinth organs, which are anatomical structures thought to detect underwater noise and vibration (particle velocity). In addition, flatfish such as plaice and sole do not have a swim bladder and are also considered within the category 'No swim bladder (particle motion detection)'. A list of fish species in this category is provided in **Table 13.14a**.

13.168. For vibro-extraction pile removal, rotary drilling for pile installation and vessel noise and vibration it is considered there would be a likely risk of individuals within hundreds of metres experiencing masking effects (i.e. the reduction in the detectability of a given sound as a result of the simultaneous occurrence of another sound) with a moderate risk of masking effects beyond this distance (see **Table 13.14a**), There would be a moderate risk of behavioural effects (e.g. some individuals swimming upstream, downstream or across the channel away from the noise source) at distances of tens or hundreds of metres from the source (**Table 13.14a**) and a low risk at distances over a thousand metres from the source, however, these effects are not expected to affect survival of individuals. There would be a moderate risk of temporary threshold shift within tens of metres of vibro-extraction, rotary drilling and vessels producing continuous noise, but

noise-generating activity at the site would be highly intermittent (e.g. approximately 25% of the working day would involve noise generating activity for vibro-extraction, and during the subsequent work phase 40% of the working day would involve noise generating activity for rotary drilling during pile installation).

13.169. As the vibro-extraction works and drilling would occur along the east bank of the Mersey Estuary individuals would be able to easily move out of the area where temporary physiological effects could occur (within tens of metres of vibro-extraction activities) towards the west bank (the Mersey is approximately 970 m wide at the Development site) or further upstream or downstream away from the noise and vibration source. In addition, as noise generating pile removal and drilling activity would be limited during each working day as indicated above, and would not occur for extended periods (at least 12 hours) each night, there would be extensive windows of no pile extraction works or drilling activity when fish could move either upstream or downstream past the area. Consequently, fish would be expected to readily pass the area during periods of no activity and as the risk of behavioural effects would be reduced at the western bank of the estuary with increased distance away from the source, some fish would also likely be able to pass downstream or upstream along the estuary even during periods of pile extraction or pile installation activity.

13.170. Magnitude of effect is considered to be negligible for these receptors based on the expected levels of noise and vibration generated by the pile extraction works, pile installation and vessel activity; the relatively short distances over which these effects would likely occur; the very low sensitivity of these species to underwater noise; the fact that there will be numerous windows of no extraction or piling activity during the construction period (e.g. during periods of pile extraction and pile installation inactivity during the working day and when piling ceases overnight), and the fact that fish are mobile and can move away from the source of the noise and return when it has ceased. Basing the assessment on lamprey which has the highest value of these species, the value of the receptor is considered to be very high and sensitivity is negligible. Overall, with consideration of **Table 13.7a**, any effects are considered likely to be of **negligible** significance.

Swim Bladder is Not Involved in Hearing

13.171. Although salmon have a swim bladder it has been found that fish only respond to low frequency tones (below 380 Hz) with particle motion being the stimulus[82,26]. This species is, therefore, primarily a kinetic detector and hearing is poor compared to other species that can detect sound pressure changes. In common with Atlantic salmon and other salmonids, sea trout have a swim bladder but do not possess specialised hearing structures and do not have a wide hearing bandwidth or sensitivity to sound pressure levels. It is considered that they rely on particle motion for hearing[83]. In addition, European smelt has a similar peak hearing threshold to these species. Consequently, it is considered that these three species belong to the category 'Swim bladder is not involved in hearing (particle motion detection)'. A list of fish species in this category is provided in **Table 13.14a**.

13.172. For vibro-extraction pile removal, rotary drilling pile installation and vessel noise, the potential risks and the distances over which effects could occur are the same as indicated above for fish in the category 'No swim bladder (particle motion detection)'.

13.173. As the vibro-extraction works and drilling would occur along the east bank of the Mersey Estuary, individuals would be able to easily move out of the area where temporary physiological effects

[82] Hawkins, A., & Johnstone, A. D. F. (1978). "The hearing of the Atlantic salmon, Salmo salar," Journal of Fish Biology 13, 655673.

[83] Davidson J., Bebak J. & Mazik P. (2009). The effects of aquaculture production noise on the growth, condition factor, feed conversion, and survival of rainbow trout, *Oncorhynchus mykiss*. Aquaculture 288 (2009) 337–343

could occur (within tens of metres of vibro-extraction activities) towards the west bank (the Mersey is approximately 970 m wide at the Development site) or further upstream or downstream away from the noise and vibration source. In addition, as noise generating pile removal and drilling activity would be limited during each working day as indicated above, and would not occur for extended periods (at least 12 hours) each night, there would be extensive windows of no pile extraction works or drilling activity when fish could move either upstream or downstream past the area. Consequently, fish would be expected to readily pass the area during periods of no activity and as the risk of behavioural effects would be reduced at the western bank of the estuary with increased distance away from the source, some fish would also likely be able to pass downstream or upstream along the estuary even during periods of pile extraction or pile installation activity.

13.174. There would be times of year during which there could be increased sensitivity of different migratory species to the effects of noise and vibration as indicated in **Table 13.9a**, some of the works could correspond to sensitive periods for fish migration including Atlantic salmon.

13.175. Overall, however, taking account of the noise levels expected to be generated by vibro-extraction pile removal (e.g. 171 dB re 1 µPa (Peak)) and rotary drilling (e.g. 163.3 dB re 1 µPa) indicated in Paragraphs 13.154 to 13.157; the relatively short distances over which effects on fish would likely occur; the fact that there will be numerous windows of no extraction or piling activity during the construction period (e.g. during periods of pile extraction and pile installation inactivity during the working day and when piling ceases overnight); and as fish are mobile and can move away from the source of the noise and return when it has ceased, the magnitude of effect is considered to be negligible. Basing the assessment on Atlantic salmon which has the highest value of these species, the value of the receptor is considered to be very high and sensitivity of these species to underwater noise and vibration is medium. Overall, with consideration of **Table 13.7a**, any effects are considered likely to be of **negligible** significance.

Swim Bladder is Involved in Hearing

13.176. Herring (and in general other Clupeids) have a swim bladder with special anatomical adaptations which enables them to detect noise pressure and provides enhanced hearing capabilities increasing the sensitivity of this species to underwater noise[26]. In Atlantic cod the swim bladder plays an accessory role in hearing and cod are sound pressure-sensitive at higher frequencies[26] and whiting, which is also a gadoid fish is considered to have similar hearing capabilities. European eel are able to detect sound pressure as well as particle motion which increases their hearing sensitivity and hearing bandwidth[26]. It has been found that at low frequencies the relevant stimulus parameter is particle motion, with no involvement of the swim bladder, while at the higher frequencies the swim bladder can convey an auditory advantage enabling the detection of pressure[84], however, specialised anatomical adaptations are lacking[60]. Although the hearing sensitivity varies considerably across these species with herring being the most sensitive, they each belong to the category 'Swim bladder is involved in hearing (primarily pressure detection)'. A list of fish species in this category is provided in **Table 13.14a**.

13.177. For pile extraction, rotary drilling pile installation and vessel noise it is considered that there is a likely risk that individuals within thousands of metres of the noise source could experience masking effects (i.e. the reduction in the detectability of a given sound as a result of the simultaneous occurrence of another sound). There is a high risk of behavioural effects (e.g. some individuals swimming upstream, downstream or across the channel away from the noise source) within tens of metres of the source, a moderate risk of behavioural effects within hundreds of

[84] Jerkø H., Turunen-Rise I., Enge, P.S. & Sand O. (1989). Hearing in the eel (*Anguilla anguilla*) *Journal of Comparative Physiology* 165 pp. 455 – 459.

meters and a low risk of such effects beyond this distance, however, these effects are not expected to affect survival of individuals (see **Table 13.14a**). The noise levels at which there are risks of temporary threshold shift or recoverable injury (Table 13.4) could potentially be generated by vessels (Paragraphs 13.154), however, these effects are associated with continuous exposure for 12 to 48 hours and any vessel noise associated with demolition or construction works would be expected to be far more intermittent. Similarly, if noise levels in **Table 13.14a** were reached during pile extraction the noise and vibration generated would only be intermittent (as indicated above it is anticipated that noise generating pile extraction activity would likely occur for approximately 25% of the working day). Noise levels calculated at source for rotary drilling of 163.3 dB re 1 µPa (Paragraph 13.157) are slightly higher than the 158 dB re 1 µPa (RMS) for 12 hrs indicated in **Table 13.14a** to potentially cause a temporary threshold shift. As indicated above, however, these values are based on continual 12 hour exposure and piling activity would be conducted within far smaller windows of activity during the day (approximately 40% of the working day would involve noise-generating pile installation activity). In addition, noise levels would be expected to attenuate rapidly with distance and would be expected to fall below the 158 dB (RMS) within tens of metres of the noise source.

13.178. Fish are highly mobie and as the pile extraction works and drilling would occur along the east bank of the Mersey Estuary, individuals would be able to easily move towards the west bank or further upstream or downstream away from the noise and vibration source and return when the noise has ceased. In addition, as pile removal and drilling hours would be restricted there would be extensive windows of no vibro-extraction or drilling activity when fish could move past the area (e.g. during periods of pile extraction and pile installation inactivity during the working day and when piling ceases overnight). European eels have increased sensitivity to the effects of noise and vibration during migration with glass eels migrating between March and May and silver eels migrating between September and November as indicated in **Table 13.9**a. Consequently, glass eels could potentially be passing the area at the start of the pile extraction works window (1st May 2019 to 18th October) and adult silver eel could potentially be passing the area during the latter period of the pile extraction works window and during the initial phase of the rotary drilling works window (28th October to 23rd July 2020). The noise levels resulting in a potential temporary threshold shift would not be reached for a 12 hour continuous period during the proposed works with noise generating activity expected to be highly intermittent and it is expected that noise levels would be below those indicated in **Table 13.14a** within tens of metres of the noise source. As indicated above the main potential effects would likely be behavioural effects for individuals within tens of metres of the noise source, with lesser likelihood of behavioural effects beyond this distance (**Table 13.14a).**

13.179. Overall, considering the potential effects associated with the expected levels of noise and vibration generated by the pile extraction works, pile installation and vessel activity; the relatively short distances over which these effects would likely occur; and the intermittent nature of activities generating underwater noise and vibration (e.g. there will be numerous windows of no extraction or piling activity during the construction period such as during periods of pile extraction and pile installation inactivity during the working day and when piling ceases overnight); and as fish are mobile and can move away from the source of the noise and return when it has ceased the magnitude of effect is considered to be negligible. Basing the assessment on European eel which has the highest value of these species, the value of the receptor is considered to be very high and sensitivity of these species to underwater noise and vibration is high. Overall, with consideration of **Table 13.7a**, any effects are considered likely to be of **negligible** significance.

Marine Mammals

13.180. Underwater noise and vibration can have physical and behavioural effects on marine mammals. Physical injury can include permanent threshold shift (i.e. permanent hearing damage caused by very intensive noise or by prolonged exposure to noise) or a temporary threshold shift, and behavioural effects can include avoidance of an area subject to noise and vibration disturbance.

13.181. The National Marine Fisheries Service[85], which is part of the National Oceanic and Atmospheric Administration (NOAA) in the USA, provides a set of criteria to assess the noise levels at which there could be physical injury to marine mammals for low-, mid- and high-frequency cetaceans (based on hearing ability) and phocids (true seals). The main marine mammals that could potentially be present in the vicinity of the Site have been allocated to these hearing groups and the assessment has focussed on these species:

- harbour porpoise – high frequency hearing cetacean;
- bottlenose dolphin – mid frequency hearing cetacean; and
- grey seal and harbour seals – phocid pinnipeds.

13.182. NMFS (2018)[85] provides noise level thresholds for these hearing groups for non-impulsive sounds (e.g. noise from vibro-extraction, rotary drilling and vessels) and impulsive sounds (e.g. pile driving activity) above which there could be PTS or TTS. Noise level thresholds for non-impulsive sounds only are provided in **Table 13.16a** as there will be no percussive piling during the works.

13.183. Marine mammal individuals could potentially be affected if the noise levels indicated in **Table 13.16a** are reached during the proposed construction works. It is considered that the noise levels generated by rotary drilling would not be expected to be high enough to cause injury to marine mammals (see Paragraphs 13.154 to 13.157). Noise levels from vibro-extraction pile removal (if utilised) or vessels could potentially result in TTS effects on high frequency hearing cetaceans in the immediate vicinity of the piling extraction works (within a few metres). Behaviour effects may occur as a result of lower noise levels, however, currently there are no standard guideline thresholds to assess this effect against. It is possible that noise from construction works and vessels may cause a small number of individuals to avoid the area, however, the Mersey Estuary is a busy waterway with considerable vessel traffic and it would be expected that any individuals within the estuary would likely be habituated to vessel noise.

13.184. Using the source noise levels for installation of piles by vibro-piling as a proxy for noise levels generated during removal of the existing wooden jetty piles as a worst case scenario, there is potential for some TTS effects on high frequency hearing cetaceans in the immediate vicinity of the piling extraction works (i.e. within a few metres). However, this noise level will rapidly attenuate away from the noise source. In addition, it is unlikely that harbour porpoise (the only high frequency hearing cetacean potentially present) will be close to the site during construction and individuals could readily move away from the source of the noise if required.

85 National Marine Fisheries Service. (2018). 2018 Revision to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts. U.S. Dept. of Commer., NOAA. NOAA Technical Memorandum NMFS-OPR-59, 167 pp.

Table 13.16a: Proposed injury criteria for mid and high frequency cetaceans and pinnipeds in water (from NMFS 2016)

Marine Mammal Hearing Group	Non-impulsive sounds (SEL (weighted), (dB re 1 µPa^{2}s))	
	TTS Threshold	PTS Threshold
Mid frequency cetaceans	178	198
High frequency cetaceans	153	173
Phocid pinnipeds in water	181	201

13.185. Marine mammals are only occasionally recorded in the Mersey Estuary. however, pile removal would be undertaken across a window of approx. 24 weeks, and marine works involving vessels could potentially be undertaken across a 14 month period. Consequently, for the purposes of assessment a precautionary approach has been undertaken and it is assumed that at some point during the marine works programme marine mammals could potentially be in the vicinity of the pile removal works or active vessels associated with the demolition or construction works.

13.186. Overall, however, taking account of the points indicated above in this section the magnitude of effect is considered to be negligible. The value of the receptor is considered to be very high and sensitivity to underwater noise and vibration is high. Overall, with consideration of **Table 13.7a**, any effects are considered likely to be of **minor adverse** significance.

Changes to Water Quality (Suspended Solids and Release of Sediment Chemicals)

13.187. Receptors potentially affected by this effect are plankton, subtidal habitats and species and birds.

13.188. Changes to water quality may occur as a result of activities disturbing the estuary bed which could lead to an increase in turbidity, and resuspension of bottom substrates could potentially result in the release of chemicals locked in the sediments to the water column (e.g. trace metals, hydrocarbons). Direct pollution of the water from other sources is considered separately below.

13.189. Site-specific survey indicated that there were exceedances of chemical standards primarily at stations within the sampled areas of the Site, with lower chemical concentrations at the stations a short distance north of the red line boundary. The station with greatest exceedances was located immediately next to the current jetty footprint with exceedances for a number of heavy metals and PAHs. The specific exceedances against different standards are covered in further detail in **Appendix 13.1a**.

Phytoplankton and Zooplankton

13.190. Increases in suspended solids can inhibit photosynthesis of phytoplankton and can clog the feeding apparatus of zooplankton, however, the Site is naturally turbid and phytoplankton and zooplankton assemblages present at the Ste would be dispersed on each flood and ebb tide. For the reasons indicated above any changes to suspended solids levels or chemical concentrations that could affect phytoplankton would be local and temporary and the magnitude of the effect is considered to be negligible. The value is assessed to be medium (based on the higher value of phytoplankton) and sensitivity is assessed to be negligible and any effects would be of **negligible** significance.

Subtidal Habitats and Species

13.191. As indicated above the area of sediment expected to be resuspended due to demolition and construction works is expected to be small in relation to availability of similar habitat in the area. In

terms of increases in suspended solids any resuspended solids are expected to quickly settle back out of the water column and organisms present in the area are expected to be well adapted to the naturally high levels of suspended solids within the estuarine waters at the Site. There is potential for concentrations of chemical to increase over the short term during the demolition and construction works, however, tidal movements would rapidly disperse any chemicals within the water column. Overall, any effects would be local and temporary and the magnitude of the effect is considered to be negligible. The value and sensitivity of subtidal species/habitats at the Development site is assessed to be high (due to the potential presence of the Section 41 list species *N. vectensis)*, however, sensitivity to the effect is low and any effects would be of **negligible** significance.

Birds

13.192. Changes to water quality may occur as a result of activities disturbing the estuary bed which could lead to a resuspension of bottom substrates that could potentially result in the release of chemicals locked in the sediments to the water column (e.g. trace metals, hydrocarbons). For four out of five species screened for assessment (oystercatcher, turnstone, redshank and black redstart) as they do not reside in the waters potentially effected then they would not be subjected to this. As common tern may be present in small numbers and forage within the water adjacent to the Site they may be subjected to this potential effect, however, any such changes in water quality would only be temporary and localised and the magnitude of effect would only be negligible. Consequently, regardless of the level of sensitivity for all five bird species as a result of any changes in water quality, the resulting significance of effect would be **negligible**.

Pollution Direct (e.g. Oil)

13.193. Receptors potentially affected by this effect are plankton, intertidal and subtidal habitats and species, fish, marine mammals and birds.

13.194. As part of the Works, a Construction Environmental Management Plan (CEMP) would be implemented and would provide inherent mitigation against potential pollution from activities at the Site.

13.195. The CEMP would include the following standard mitigation measures:

- Surface drainage would pass via settlement and oil interception facilities, where required, and discharge arrangements would be agreed with the utility provider;
- Stockpiling of contaminated materials would be avoided, wherever possible. Stockpiles would be located on areas of hard standing or on plastic sheeting to prevent mobile contaminants infiltrating into the underlying ground; and
- Potentially hazardous liquids on the Site such as fuels and chemicals would be managed and stored in accordance with best practice guidance, such as that published by the Environment Agency. Storage tank and container facilities would be appropriately bunded within designated areas and located away from surface water drains, docks and the Mersey Estuary.

13.196. An Emergency Incident Plan would be in place to deal with any spillages and/or pollution incidents. This would include the provision of on-site equipment for containing spillages, such as emergency booms and chemicals to soak up spillages. Any pollution incidents would be reported immediately to the appropriate regulatory bodies such as the Environment Agency.

Phytoplankton and Zooplankton

13.197. With the inherent mitigation design indicated above it is considered that introduction of pollutants to the water column from the works such as oils would largely be avoided, and with the Emergency Incident Plan in place any effects would be local and temporary and the magnitude of the effect is considered to be negligible. The value is assessed to be medium (based on the higher value of phytoplankton) and sensitivity is assessed to be negligible and any effects would be of **negligible** significance.

Intertidal and Subtidal Habitats and Species

13.198. With the inherent mitigation design indicated above it is considered that introduction of pollutants to the water column from the works such as oils would largely be avoided, and with the Emergency Incident Plan in place any effects would be local and temporary and the magnitude of the effect is considered to be negligible. The value and sensitivity of subtidal species/habitats at the Development site is assessed to be high (due to the potential presence of the Section 41 list species *N. vectensis)* and sensitivity to the effect is medium. Overall any effects would be of **minor adverse** significance.

Fish

13.199. In addition to the considerations above fish are mobile and individuals would be expected to be able to move away from any areas of pollution if required. Any effects would be local and temporary and the magnitude of the effect is considered to be negligible. The value and of fish at the Development site is assessed to be very high for diadromous fish, high for other protected fish species, and medium for other fish species and sensitivity to the effect is medium. Overall any effects are considered likely to be of **minor adverse** significance.

Marine Mammals

13.200. In addition to the considerations above marine mammals are mobile and individuals would be expected to be able to move away from any areas of pollution if required. Any effects would be local and temporary and the magnitude of the effect is considered to be negligible. The value and sensitivity of marine mammals is assessed to be very high and sensitivity to the effect is medium. Overall effects are considered likely to be of **minor adverse** significance.

Birds

13.201. Very few of the activities proposed to be undertaken for the construction of the Development involve the use of dangerous or polluting chemicals or substances. The main potential effect could derive from an oil spill on to the water. However, despite many bird species being **highly sensitive** to oil pollution incidents, if individuals come into direct contact with pollutants, the embedded mitigation provided in the CEMP reduces the potential for this to occur and any such incident would only be considered to be small scale, localised and temporary in nature. Consequently, regardless of the level of sensitivity for terrestrial and waterbird species it is deemed to be a negligible magnitude of effect as a result of any oil spills, with the resulting significance of effect being **negligible** or **minor adverse** in nature.

Collision Risk due to Vessel Movements

13.202. The receptor potentially affected by this effect is marine mammals.

13.203. Demolition and removal of the existing Princes Jetty would be conducted by barge. The number of barges to be operating in the area has not yet been finalised. However, it is understood that

barges would be used extensively during demolition and construction. It is anticipated that tugs may be used to move the barges to Site and the barges would be stationary during demolition and removal operations and there may also be movements of crew boats in the area.

Marine Mammals

13.204. Collision of marine mammals with vessel propellers can lead to physical injury and in some cases fatalities. As indicated in the Existing Baseline section, the main marine mammal species potentially present within the vicinity of the Site are harbour porpoise, bottlenose dolphin and grey seal. These species and other marine mammals are agile and have fast swimming speeds which can help them evade collision with vessels.

13.205. Between 2005 and 2010, a total of 52 stranded bottlenose dolphins were reported to the UK Cetacean Strandings Investigation Programme (CSIP)[86]. A post mortem examination was conducted on 18 individuals and none of these were considered to have been a result of vessel strike[63]. Incidents of mortality or injury of harbour porpoise caused by vessels remain a very rare occurrence in UK waters, and out of 478 post mortem examinations carried out on harbour porpoises in the UK from 2005-2010 only four (0.8%) were attributed to probable effect from a ship or boat.

13.206. Despite being fast and agile, grey seals can collide with anthropogenic structures such as fishing gear and vessels[87]. Reduced perception levels of a collision threat through distraction, whilst undertaking other activities such as foraging and social interactions, are possible reasons for collisions[88] and seals can also be very curious of new foreign objects placed in their environment which could also increase the risk of collision. Seals are relatively robust to potential strikes, however, as they have a thick sub-dermal layer of blubber which would defend their vital organs from the worst of any blows[65]. In general, incidents of mortality or injury of grey seals caused by vessels remain a very rare occurrence in UK waters, although numerous instances are expected to remain unreported[89,63].

13.207. To evade a strike, marine mammals tend to require acoustic information to be able to determine in which direction and at what speed a vessel is moving. Where there is erratic movement of watercraft the risk of collision with personal water craft is considerably greater than that associated with other watercraft (e.g. a barge or ferry) travelling on a direct course. The vessels involved in the Development would be anticipated to transit relatively slowly and would travel in a direct course as far as possible.

13.208. The barges involved in the demolition of the existing jetty and construction of the new Cruise Liner Terminal would be small and once towed to Site are expected to remain relatively stationary just moving short distances as required, consequently the risk of a collision with marine mammals is considered to be extremely unlikely. Any effects would be local and temporary at the population level. Taking account of the points indicated above and the low numbers of marine mammals that are observed within the Mersey Estuary, the magnitude of effect is considered to be negligible.

[86] CSIP (Cetacean Strandings Investigation Programme). (2011). UK Cetacean Strandings Investigation Programme. Final Report for the period 1st January 2005 – 31st December 2010. 98pp.
[87] Scottish Government. (2013). Habitats Regulations Appraisal of the Sectoral Marine Plans for Offshore Renewable Energy in Scottish Waters: Draft Appropriate Assessment Information Review
[88] Wilson, B. Batty, R. S., Daunt, F. & Carter, C., (2007). Collision risks between marine renewable energy devices and mammals, fish and diving birds. Report to the Scottish Executive. Scottish Association for Marine Science, Oban, Scotland, PA37 1QA
[89] Thompson D., Hall A.J., Lonergan M., McConnell B. & Northridge S. (2013). Current status of knowledge of effects of offshore renewable energy generation devices on marine mammals and research requirements. Edinburgh: Scottish Government.

The value of the receptor is considered to be very high and sensitivity to the effect is considered to be low and any effects are considered likely to be of **negligible** significance.

Spread of Non-Native Species

13.209. The receptors potentially affected are plankton and intertidal and subtidal habitats and species.

13.210. Demolition and removal of the existing Princes Jetty would be conducted by barge. These barges are expected to remain within the Mersey Estuary for the entire demolition phase.

13.211. Within the UK, pathways of introduction involving vessel movements (fouling of hulls and ballast water) have been identified as the highest potential risk routes for the introduction of non-native species[90,91].This could either be from discharge of ballast water at site or via transportation on vessel hulls. During the construction phase the main vessels in operation would be barges, tugs and pilot vessels as indicated above for the 'Underwater Noise and Vibration' construction detail.

13.212. Once non-native species become established and disperse within a new habitat they can out-compete local species for space and resources, prey directly on local species, or introduce pathogens[92]. Consequently, the introduction of non-native species could potentially affect the ecological functioning of communities in the intertidal and subtidal zones.

13.213. The main non-native species recorded during the site-specific benthic survey were the invasive barnacle *A. modestus,* the starlet sea anemone *N. vectensis* and the American piddock *P. pholadiformis*.

13.214. A project-specific Biosecurity Risk Assessment would be produced which outlines numerous inherent mitigation design measures which would be incorporated into construction methods to limit the risk of introduction of invasive non-native species (INNS). Best practice guidelines would be followed and a standard INNS protocol would be implemented by the contractor. Biosecurity assessments would be undertaken for all vessels and further measures taken would include consideration of the following:

- Management of vehicles and vessels during demolition and construction including:
  - Biofouling
  - Ballast water
  - Movement of slow or stationary vehicles
  - Use of small vessels
- Ports and Harbour protocol:
  - Adherence to legislative guidance for specific port and harbour authorities
- Conforming to industry guidelines:
  - Follow best practice guidance, apply Best Available Technology (BAT)
- Conforming to guidelines on marine biosecurity planning as advised by Natural England:

90 Carlton J. T. (1992). Marine species introductions by ships' ballast water: an overview. In: Proceedings of the conference and workshop on introductions and transfers of marine species: achieving a balance between economic development and resource protection, Hilton Head Island, South Carolina October 30 - November 2, 1991, ed. by M.R. De Voe. pp. 23-25. South Carolina Sea Grant Consortium.

91 Pearce F., Peeler E. & Stebbing P. (2012). Modelling the risk of the introduction and spread of non-indigenous species in the UK and Ireland. Project report for E5405W.

92 Roy H. E., Bacon J., Beckmann B., Harrower C. A., Hill M. O., Isaac N. J. B., Preston C. D., Rathod B., Rorke S. L., Marchant J. H., Musgrove A., Noble D., Sewell J., Seeley B., Sweet N., Adams L., Bishop J., Jukes A. R., Walker K. J & Pearman D. (2012). Non-Native Species in Great Britain: establishment, detection and reporting to inform effective decision making. Report to Defra WC0738.

- Follow best practice guidance as set out in the Natural England and Natural Resources Wales Biosecurity Planning guidance[93].

Phytoplankton and Zooplankton

13.215. Site-specific survey has indicated that non-native species may be present in the area and larvae of individuals may be dispersed into the water column as a result of the Works and form part of the zooplankton present or consume phytoplankton present. Such changes, however, would not be expected to influence the plankton assemblage as a whole.

13.216. Any effects would be local and temporary at the population level and with the inherent mitigation design indicated above magnitude of effect is expected to be negligible. The value of the receptor is considered to be medium (based on the higher value of phytoplankton) and sensitivity is low, and any effects are considered likely to be of **negligible** significance.

Intertidal Habitats and Species

13.217. As determined by the site-specific survey *A. modestus* is already widespread on physical structures at the Development site including the walls and pile structures of the current jetty. Removing the current structures would result in removal of individuals from the Site, however, as this species is widespread in the Mersey Estuary and individuals would remain on the walls and would readily colonise the area and any new structures introduced.

13.218. Any effects would be local or national and permanent at the population level and with the inherent mitigation design indicated above magnitude of effect is expected to be minor. The value and sensitivity of the receptor is considered to be medium and any effects are considered likely to be of **minor adverse** significance.

Subtidal Habitats and Species

13.219. *A. modestus, N. vectensis* and *P. pholadiformis* were recorded within grab samples collected at the Development site. *A. modestus* was recorded within and outside the Site, *N. vectensis* was recorded at two stations outside the Site, while one juvenile *P. pholadiformis* was recorded within the Site. As indicated above, *A. modestus* is already widespread on physical structures at the Site and the Works could potentially lead to movement of any individuals of *P. pholadiformis* within the area.

13.220. *N. vectensis* is unusual in that it is a protected species which is usually characteristic of lagoon environments. The fact that it was recorded outside the Site indicates that its ability to colonise the area would not likely be affected by any aspect of the construction works.

13.221. If any effects did occur and new non-native species were introduced to the area it is considered effects would be local or national and permanent at the population level, however, with the inherent mitigation design indicated above magnitude of effect is expected to be minor. The value and sensitivity of the receptor is assessed to be medium (i.e. value of subtidal species and habitats without *N. vectensis*) and any effects are considered likely to be of **minor adverse** significance.

93 Cook, E.J., Macleod, A. Payne, R.D. & Brown, S. (2014) edited by Natural England and Natural Resources Wales (2015). Marine Biosecurity Planning – Guidance for producing site and operation-based plans for preventing the introduction and spread of non-native species in England and Wales.

Physical Disturbance and Displacement (Indirect i.e. through the Food Chain)

13.222. Receptors potentially affected by this effect are fish and birds.

13.223. Where there are significant effects on invertebrates and fish, there is the potential for indirect effects on fish and birds via reduction in their food resources.

Fish

13.224. Fish are mobile and individuals would be able to move to different areas to forage as required. Effects identified for benthic plankton / benthic invertebrates have all been assessed to be of negligible or minor significance. Any effects would be local and temporary and the magnitude of the effect is considered to be negligible. The value of fish at the Development site is assessed to be very high for diadromous fish, high for other protected fish species, and medium for other fish species and sensitivity to the effect is low. Overall any effects are considered likely to be of **negligible** significance.

Birds

13.225. Activities could lead to underwater noise and vibration sources disturbing underwater bird prey species such as fish. This in itself may indirectly affect bird species being able to find prey items due to the influence of noise on fish. Four out of five species screened for assessment (oystercatcher, turnstone, redshank and black redstart) do not rely on foraging for fish or in the waters potentially affected and would consequently not be subjected to this effect. Common tern are the only species of bird screened in for assessment that are reliant on fish species as prey items, and may be present in small numbers foraging within the water adjacent to the Site and may be subjected to this potential effect. The effect of underwater noise and vibration on local fish populations has been assessed to be of moderate significance before mitigation, however, any effect would be local and temporary and birds would be able to forage away from the Site if required and any potential effect would be of negligible magnitude for common terns. Consequently, regardless of sensitivity to any effect it is considered that the significance of effect would be **negligible** in nature.

Completed Development

13.226. The main pathways by which the Development is considered to potentially have an effect on marine ecology and ornithology during the operational phase have been outlined in **Table 13.1**a and **Table 13.2**a and are listed below. Each is considered in more detail within the text below where appropriate:

- Physical disturbance and displacement (sediment accretion);
- Physical disturbance and displacement (visual);
- Airborne noise and vibration;
- Underwater noise and vibration;
- Pollution (direct e.g. oil);
- Collision Risk Due to Vessel Movements; and
- Spread of Invasive Non-Native Species.

Physical Disturbance and Displacement (Sediment Accretion)

13.227. Receptors potentially affected by this effect are intertidal and subtidal habitats and species and fish.

13.228. As indicated by flow modelling the introduction of the piled structure associated with the cruise terminal counters some of the effect of removing the existing structure in terms of sediment accretion[39]. The change in the extent of the piled structure would result in a small area with increased potential for accretion underneath the proposed piled structure[39]. All the predicted accretion effects would be limited to approximately 1 km from the existing jetty.

Intertidal and Subtidal Habitats and Species

13.229. The area of subtidal sediment potentially affected by this disturbance/change would occur upstream and downstream of the Site (but within a distance of 1 km)[39] and the area affected would still be very small in relation to the availability of similar habitats within the Site red line boundary and wider estuary. There could be a small change in the area of intertidal habitat due to accretion. Changes would be gradual and any disturbed/displaced benthic invertebrates would be expected to survive such changes. Any effects would be local and temporary and the magnitude of the effect is considered to be negligible. The value and sensitivity of the subtidal species/habitats is assessed to be high (due to the potential presence of *N. vectensis*) and sensitivity is considered to be low. Overall, it is considered that any effects would be of **negligible** significance.

Fish

Fish are highly mobile and any fish physically disturbed due to sediment movement/changes in habitat would be able to avoid the area and return to the area if required once any disturbance has ceased. The type of habitat potentially disturbed is widespread within the Site boundary and wider Estuary so fish would not have to move far to find similar habitat. Changes would be gradual and any effects would be local and temporary and the magnitude of the effect is considered to be negligible. The value and sensitivity of fish at the Development site is assessed to be very high for diadromous fish, high for other protected fish species, and medium for other fish species, however, sensitivity to this effect is considered to be negligible. Overall, it is considered that any effects would be of **negligible** significance.

Physical Disturbance and Displacement (Visual)

13.230. Receptors potentially affected by this effect are marine mammals and birds.

13.231. During the operational phase the main source of direct visual disturbance would be any increase in vessel traffic as a result of the Development.

13.232. The existing Liverpool Cruise Terminal has been estimated to have been used by 62 cruise liners during the 2017 summer season (comprising 42 transit and 20 turnaround vessels). This is considered likely to equate to 12 or 13 cruise ships in the busiest months.

13.233. The predicted vessel usage for future years is indicated in **Table 13.17**a with 2020 being the opening year. It is predicted that for the opening year there would be a 'worst case' of 14 cruise ships in the busiest month which is just two more cruise ships than currently use the existing terminal. In 2027, there is predicted to be a slight increase to 16 cruise ships in the busiest month. It should be noted that the new Cruise Terminal would replace the existing temporary Cruise Terminal, which would close when the new facility becomes operational.

Table 13.17a: Predicted vessel usage of the new ferry terminal between 2018 and 2027. Medium vessel = 900 pax, large vessel = 1500 pax, extra large vessel = 2500 pax.

Year	Target Transit Vessels	Target Turnaround Vessels (Medium)	Target Turnaround Vessels (Large)	Target Turnaround Vessels (Extra Large)	Target Total
2018	36	23	1	1	**61**
2019	36	24	1	1	**62**
2020	37	10	19	1	**67**
2021	38	8	19	4	**69**
2022	39	8	20	4	**71**
2023	39	8	22	5	**74**
2024	40	8	24	6	**78**
2025	42	8	24	6	**80**
2026	42	8	24	6	**80**
2027	42	8	24	6	**80**

Note: Medium vessel = 900 passengers, large vessel = 1500 passengers, extra-large vessel = 2500 passengers.

Marine Mammals and Birds

13.234. It is considered that marine mammals and birds in the area are already habituated to regular movement of large vessels and associated visual disturbance within the Mersey Estuary. The predicted increase in vessel use of approximately an extra four cruise ships per month in the busiest months by 2027 would represent approximately a 33% increase during the busiest months in the number vessel using the existing terminal (which is currently approximately 12 per month).

13.235. Any effects would be local and temporary at the population level. Due to the relatively small increase in the numbers of cruise ships likely to be using the new cruise terminal per month the magnitude of effect is considered to be negligible. Considering the highest receptor value for these groupings the value of the receptor is considered to be very high, however, sensitivity to the effect is considered to be negligible. Overall, any effects are considered likely to be of **negligible** significance.

Airborne Noise and Vibration

13.236. Receptors potentially affected by this effect are birds.

13.237. The main potential increase in airborne noise and vibration during operation would be associated with an increased number of cruise ships transiting through the area and noise effects from operation of permanent sources associated with the Development in-particular fixed external plant;

13.238. As indicated above, however, the number of additional vessel movements per month would be relatively small and birds would be habituated to vessel movements in the area. Noise and vibration levels generated by fixed external plant at the Site are expected to be low.

Birds

13.239. The highest receptor value for any of the five bird species screened in for this assessment is considered to be medium. Any effects would be local and temporary and the magnitude of effect is considered to be negligible. Consequently, regardless of the sensitivity of any of the five receptors any effects are considered likely to be of **negligible** significance.

Underwater Noise and Vibration

13.240. Receptors potentially affected by this effect are fish and marine mammals.

13.241. The main potential increase in underwater noise and vibration during operation would be associated with an increased number of cruise ships transiting through the area and hoteling. The additional increase in cruise ships is mainly due to the growth in cruise industry rather than due to the new Cruise Terminal. As indicated above, however, the number of additional vessel movements per month would be relatively small and fish and marine mammals would be habituated to vessel movements in the area and associated underwater noise and vibration.

Fish and Marine Mammals

13.242. Any effects would be local and temporary at the population level and the magnitude of effect is considered to be negligible. Receptor value is considered to be very high and sensitivity to the effect is considered to be negligible. Consequently, any effects are considered likely to be of **negligible** significance.

Pollution (Direct e.g. Oil)

13.243. Receptors potentially affected by this effect are plankton, intertidal and subtidal habitats and species, fish, marine mammals and birds.

13.244. Strict protocols would be in place to minimise risks associated with oil spillages from the cruise ships utilising the new Cruise Terminal, as are currently in place for cruise ships currently using the area. The increase in the annual number of cruise ships using the new terminal compared to the existing terminal would be small.

Plankton, Intertidal and Subtidal Habitats and Species, Fish, Marine Mammals and Birds

13.245. Overall, this effect is expected to be 'no change' so any effects are **neutral** for all receptors.

Collision Risk due to Vessel Movements

13.246. The receptor potentially affected by this effect is marine mammals.

13.247. As indicated above there would be a small increase in the number of cruise ships frequenting the area of the new Cruise Terminal, however, in relation to the wider Estuary environment the projected number of cruise ships per month is only slightly more than the number currently using the existing terminal.

Marine Mammals

13.248. The information considered previously when assessing this affect for the demolition and construction phase of the Development is relevant here. Marine mammals potentially present in the Mersey Estuary are expected to be habituated to the presence of vessels within the Estuary and Liverpool Bay and changes in the numbers of cruise ships transiting through the estuary are small with only a slight increase in the potential for collision to occur.

13.249. Any effects would be local and temporary at the population level and the magnitude of effect is considered to be negligible. Receptor value is considered to be very high and sensitivity to the effect is low. Consequently, any effects are considered likely to be of **minor adverse** significance.

Spread of Non-Native Species

13.250. The receptors potentially affected are plankton and intertidal and subtidal habitats and species.

13.251. Cruise liners using the new Cruise Liner Terminal would arrive from locations worldwide. Non-native species can be present within ballast water used to maintain stability of the vessel and non-native species could be transferred via the hulls of vessels.

13.252. The inherent mitigation design indicated for the demolition and construction phase is expected to be applied to the operational phase. The potential effect of spread and introduction of non-native species on zooplankton, intertidal and subtidal species has been assessed in the construction phase section above. It is considered that the assessment for the demolition and construction phase is applicable to the operational phase, although potential effects would be restricted to the potential introduction of non-native species via cruise ships.

Phytoplankton and Zooplankton

13.253. If any effects did occur and new non-native species were introduced to the plankton it is considered effects would be local and temporary at the population level and with the inherent mitigation design indicated above magnitude of effect is expected to be minor. The value of the receptor is considered to be medium (based on the higher value of phytoplankton) and sensitivity is low. Overall, any effects are considered likely to be of **negligible** significance.

Intertidal Habitats and Species

13.254. As indicated for the demolition and construction phase any effects would be local or national and permanent at the population level, and with the inherent mitigation design indicated above magnitude of effect is expected to be minor. The value and sensitivity of the receptor is considered to be medium. Overall, any effects are considered likely to be of **minor adverse** significance.

Subtidal Habitats and Species

13.255. If any effects did occur and new non-native species were introduced to the area it is considered effects would be local or national and permanent at the population level, and with the inherent mitigation design indicated above magnitude of effect is expected to be minor. The value and sensitivity of the receptor is assessed to be medium (i.e. value of subtidal species and habitats without *N. vectensis*) and any effects are considered likely to be of **minor adverse** significance.

Combined Effects of the Operation of the Development and Climate Change on the Environment

13.256. Given the anticipated operational lifetime of the Development (approximately 50 years for the main building and 100 years for the heavy civil engineering elements) there is the potential that species populations or ranges may change due to climate change. Species with a natural range that does not currently extend as far north as the Mersey Estuary may colonise the estuary in future decades as mean water temperatures increase and species already at the southern extent of their range may decline or even disappear from the west coast of the UK.

13.257. It is anticipated that the effects of the Development in combination with increases in water temperature as a result of climate change would not be significantly greater than those effects assessed for the Development alone. As such, the Development in combination with the effects of climate change is not expected to have a significant effect on the wider marine environment and

consequently it is considered that it would not hinder Defra's efforts to improve biodiversity as set out in the Defra biodiversity strategy[94].

Mitigation Measures and Likely Residual Effects

Inherent Mitigation Measures

Airborne Noise and Vibration

13.258. Modern demolition methods would be used to minimise noise and vibration and ensure demolition materials are recovered and separated for recycling.

13.259. To minimise potential noise and vibration, Site-specific best practice measures would be implemented and adhered to by Contractors. A summary of such measures includes:

- Careful selection of Works methods and plant to be used to minimise noise and vibration at source as far as reasonably practicable;
- Switching off plant and vehicle engines when not in use;
- Regular maintenance and servicing of vehicles, equipment and plant;
- Adhering to operational hours;
- The use of hoarding around the perimeter of the Site and temporary acoustic barriers, where appropriate; and
- Breaking out of concrete structures would be undertaken using low noise and vibration techniques where possible.

Underwater Noise and Vibration

13.260. The piles for the jetty will be installed using rotary drilling instead of percussive piling which is an inherent mitigation measure that greatly reduces the noise and vibration that will be generated during construction.

Pollution Direct

13.261. As part of the Works, a Construction Environmental Management Plan (CEMP) would be implemented and would provide inherent mitigation against potential pollution from activities at the Site.

13.262. The CEMP would include the following standard mitigation measures:

- Surface drainage would pass via settlement and oil interception facilities, where required, and discharge arrangements would be agreed with the utility provider;
- Stockpiling of contaminated materials would be avoided, wherever possible. Stockpiles would be located on areas of hard standing or on plastic sheeting to prevent mobile contaminants infiltrating into the underlying ground; and
- Potentially hazardous liquids on the Site such as fuels and chemicals would be managed and stored in accordance with best practice guidance, such as that published by the Environment Agency. Storage tank and container facilities would be appropriately bunded within designated areas and located away from surface water drains, docks and the Mersey Estuary.

94 Defra. (2011). Biodiversity 2020: A strategy for England's wildlife and ecosystem services. 48pp.

13.263. An Emergency Incident Plan would be in place to deal with any spillages and/or pollution incidents. This would include the provision of on-site equipment for containing spillages, such as emergency booms and chemicals to soak up spillages. Any pollution incidents would be reported immediately to the appropriate regulatory bodies such as the Environment Agency.

Spread of Non-Native Species

13.264. A project-specific Biosecurity Risk Assessment would be produced which outlines numerous inherent mitigation design measures which would be incorporated into construction methods to limit the risk of introduction of invasive non-native species (INNS). Best practice guidelines would be followed and a standard INNS protocol would be implemented by the contractor. Biosecurity assessments would be undertaken for all vessels and further measures taken would include consideration of the following:

- Management of vehicles and vessels during demolition and construction including:
  - Biofouling
  - Ballast water
  - Movement of slow or stationary vehicles
  - Use of small vessels
- Ports and Harbour protocol:
  - Adherence to legislative guidance for specific port and harbour authorities
- Conforming to industry guidelines:
  - Follow best practice guidance, apply Best Available Technology (BAT)
- Conforming to guidelines on marine biosecurity planning as advised by Natural England:
  - Follow best practice guidance as set out in the Natural England and Natural Resources Wales Biosecurity Planning guidance[95].

Additional Mitigation

Demolition and Construction

13.265. For all of the effects assessed for demolition of the existing jetty and construction of the Development, significance of effect was considered to be minor adverse significance or lower for all receptors. Consequently, no additional mitigation measures to the inherent mitigation measures indicated above are proposed for the completed Development.

13.266. Although no mitigation is proposed, as best practice, it is intended that a soft start approach to pile removal or rotary drilling is conducted where possible.

13.267. The soft-start piling approach will be implemented in order to reduce potential adverse effects to fish and marine mammals. This involves gradually increasing the force of piling, thereby steadily increasing the sound power levels generated over a period of time. This would alert individuals within the area, without exposing them to more intense sound power levels, and provide an opportunity for them to move away from the noise source. This technique is recommended as

95 Cook, E.J., Macleod, A. Payne, R.D. & Brown, S. (2014) edited by Natural England and Natural Resources Wales (2015). Marine Biosecurity Planning – Guidance for producing site and operation-based plans for preventing the introduction and spread of non-native species in England and Wales.

best practice by the Joint Nature Conservation Committee for pile driving operations and is considered appropriate for the proposed Development.

Completed Development

13.268. For all of the effects assessed for the completed Development, significance of effect was considered to be minor adverse significance or lower for all receptors. Consequently, no additional mitigation measures to the inherent mitigation measures indicated above are proposed for the completed Development.

Summary

13.269. It has been assessed that there would be no effects more than minor significance to marine ecology, ornithology or terrestrial ecology as a result of the demolition and construction phase, or during the operational phase of the Development.

14. Coastal Processes, Sediment Transport and Sediment Contamination

Introduction

14.1. This chapter replaces the November 2017 ES Chapter 14: Coastal Processes, Sediment Transport and Sediment Contamination and the July 2018 ES Addendum Chapter 14: Coastal Processes, Sediment Transport and Sediment Contamination.

14.2. This chapter, which was prepared by HR Wallingford Ltd, presents an assessment of the likely coastal processes, sediment transport and sediment contamination. In particular, consideration is given in the assessment to tidal flows, waves, sediment transport and sediment quality.

14.3. This chapter provides a description of the methods used in the assessment. This is followed by a description of the relevant baseline conditions of the Site and surrounding area, together with an assessment of the likely potential significant effects of the Development during the Site preparation and construction works and once the Development is completed and operational. Mitigation measures are identified where appropriate to avoid, reduce or offset any adverse effects identified and / or enhance likely beneficial effects. Taking account of the mitigation measures, the nature and significance of the likely residual effects are described.

14.4. The chapter is accompanied by the following appendices:

- **Appendix 14.1a:** Hydrodynamic and Coastal Process Studies, November 2018;
- **Appendix 14.2a:** Hydrodynamic and Coastal Process Legislation and Guidance; and
- **Appendix 14.3a:** Water Framework Directive Scoping Report.

Assessment Methodology and Significance Criteria

Data Collection Methods

Field Survey

14.5. A survey was undertaken in the Mersey Estuary by APEM to acquire sediment and water quality samples. The results of the sediment and water sample analysis are used to provide information on the status of potentially contaminated sediments at the Site and in the Mersey Estuary

14.6. The sediment and water samples were analysed for numerous physico-chemical parameters including heavy and trace metals, hydrocarbons (polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs)).

14.7. The analysis results are compared to the following standards and action levels to assess the level of potential contamination:

- CEFAS Action Levels 1 and 2;
- CCME thresholds; and
- OSPAR 2012 threshold.

Additional Data Sources

14.8. For the offshore boundary, data were extracted from the TOPEX/Poseidon Cross-Over Global Inverse Solution model (TPXO). The three tidal level series (Llandudno, Heysham and TPXO data) were all corrected to the same vertical datum as the model (Chart Datum at Liverpool).

14.9. The existing tidal model was previously calibrated using ADCP transect measurements during a spring tide in October 1995 and validated for a neap tide during January 1996[96]. The ADCP measurements are described in Wither *et al*[97].

14.10. TruDepth Grid data purchased from Seazone Ltd in 2016 was used to provide the model bathymetry data. These data represented the most up-to-date survey information that was available at the time. The data was available on a 10m grid. Due to the dynamic nature of the bed in the Mersey, there will unavoidably be some differences in detail between the present day bathymetry and the model due to movement of sand banks and the low water channel in the upper reaches of the estuary. Overall, however, the tidal volume and general circulation patterns in the area of interest are likely to be similar.

14.11. As for the flow model the best available data for sediment transport was from the ADCP transect survey in 1995 undertaken across the Mersey Narrows. During the survey the data from regular water sampling was used to convert the ADCP backscatter to suspended sediment concentration. Combination of the suspended sediment concentration with the water discharge taken from the ADCP data allowed calculation of the total sediment flux through the observed transect.

Forecasting Methods

14.12. Forecasting of wave, tidal flow and sediment transport was undertaken as part of the EIA process. The forecasting process included both numerical models and specialist desk studies:

1. **Wave desk study:** A desk study assessing the effect of the proposed Development. The assessment was based on previous work conducted in the area and included reactivating an existing model to allow data to be extracted from the Princes Jetty area. However, no specific modelling has been undertaken for the Site as part of this assessment as the effect of the proposed Development on waves was found to be small.
2. **Tidal flow modelling:** The TELEMAC-3D flow model is used for the tidal flow modelling due to the presence of a known longitudinal salinity gradient which would not be captured by a 2D model.

   Also for sediment transport modelling and predictions of channel infill it is important to have a 3D flow model as the highest sediment concentrations are typically near the bed and therefore accurate modelling of near bed currents is key.
3. **Sediment transport modelling:** For the estuarine sediment transport model the 3D mud transport module of TELEMAC-3D, namely SEDI-3D, was applied. This model couples the sediment transport directly with the 3D flow modelling which allows the increased density caused by the sediment to be included in the hydrodynamic modelling. This effect is important in a highly turbid estuarine area such as the Mersey.

14.13. The mean sea level is anticipated to rise in the Mersey Estuary over the lifetime of the proposed Development due to climate change effects. The sensitivity of the predicted effects of the Development to increased mean sea level (i.e. whether the predicted effects would be significantly altered once climate change effects are factored-in) has been tested in the tidal model.

[96] HR Wallingford (2014). WID dredging at the Seaforth Triangle, Detailed water and sediment quality modelling. Report DDR5376-RT002

[97] Wither, A.W., Land, J., Jarvis C.C., Jones, P.D. (1998), A new Technique for Contaminant flux measurements in estuaries. Proceedings of Conference on Estuarine Research and Management in Developed and Developing Countries. University of Port Elizabeth, South Africa, July 1998.

Wave Desk Study

14.14. For the majority of the time, wave conditions at the Site would be due to waves generated within the estuary by local winds. The locally generated wave conditions are largest when the wind is blowing along the estuary, either from the north and northwest or from the south and southeast.

14.15. HR Wallingford has carried out a number of wave studies in the Mersey Estuary. This includes a study in 2011[98] at a site on the Birkenhead shore using the numerical wave model, SWAN. This wave model was restored and wave conditions extracted for the Site at Princes Jetty. Note that the model was created for a different site and has not been revised for this study so the wave conditions are indicative only and hence not suitable for detailed design of the structure.

14.16. The desk study included the calculation of indicative extreme wave conditions for four wind directions, and for return periods of 1 year, 10 years and 50 years. The calculations were run with water levels of 9.3 mCD, equivalent to MHWS, and 1.1 m, equivalent to MLWS.

Tidal Flow Modelling

Choice of Model

14.17. A 3D flow model has been used for the modelling because the known influence of a longitudinal salinity gradient tends to create variation in the current magnitude in the water column which would not be captured by a 2D, depth averaged model. Also for sediment transport modelling and predictions of channel infill it is important to have a 3D flow model as the highest sediment concentrations are typically near the bed and therefore accurate modelling of near bed currents is required.

14.18. The TELEMAC-3D flow model was used. It is based on a completely flexible grid made of triangles and runs on parallel high performance computers so provides high resolution results with a reasonable timeframe. HR Wallingford has 25 years' experience of using the TELEMAC suite of models, including the Mersey Estuary.

14.19. The flexible triangular grid employed by TELEMAC-3D allows accurate representation of complex coastlines and seabed features such as the jetty, pontoons and other existing nearby features. The grid also provides complete control on the level of detail to be modelled such that particular features can be modelled in detail whilst using a larger grid to keep any imposed boundary conditions distant. This process focusses the computational effort where it is needed to maintain practicable run times and file sizes.

Model Mesh

14.20. The applied TELEMAC-3D model covered the Mersey Estuary from approximately the tidal limit extending to the estuary mouth and out into Liverpool Bay. The full extent of the model mesh is shown in **Figure 14.1a**. The horizontal extent of the mesh from the estuary mouth is around 45km in both the west and north directions, encompassing both the Dee and Ribble estuaries. The western flow boundary is at about the same longitude as Llandudno and the northern boundary is at Fleetwood (south of Heysham).

14.21. The flexible grid system, once established, can be further refined in additional areas of interest whilst keeping the mesh the same elsewhere and hence maintaining the accuracy of the calibrated model. This method was particularly suitable for the needs of the study for the proposed Development as the calibrated model could be further refined at the study Site.

[98] HR Wallingford (2011), Gwynt y Mor Offshore Wind Farm – Crew Transfer Vessel Pontoon, Report EX6583.

14.22. The model mesh was refined to accurately include the form of the existing pontoons, the existing Princes Jetty and the proposed piled platform for the cruise terminal. To enable an accurate representation of the structures the smallest model mesh size was in the range 2-5 m.

14.23. To provide a practical tool the individual piles were not modelled, rather the drag force of the complied piles was calculated based on the size, shape and number of piles.

14.24. For the study, the TELEMAC-3D model used a sigma layer system to represent variation in currents in the vertical. Sigma layers divide the vertical into a user defined number of layers at each model node. For the present case, seven equally spaced vertical layers were used for the model simulations.

Model Layout

14.25. Three layouts were modelled;

1. The existing layout with Princes Jetty in place as well as the nearby pontoons and other structures (**Figure 14.2a**),
2. The layout with Princes Jetty removed,
3. The layout with the piled platform for the cruise terminal added (**Figure 14.3a**).

Boundary Conditions

14.26. The sea boundary data on the coast were taken from tidal predictions at Llandudno and Heysham. For the north tidal boundary, the Heysham predicted tidal levels were scaled by 5% since the model boundary was at Fleetwood. For the offshore boundary, data were extracted from the TOPEX/Poseidon Cross-Over Global Inverse Solution model (TPXO). The three tidal level series (Llandudno, Heysham and TPXO data) were all corrected to the same vertical datum as the model (Chart Datum at Liverpool). The tidal levels were then linearly interpolated to each model node along the tidal boundaries.

14.27. The model was run for a one month duration, including a period of approximately average range spring tides (based on April 2007 data). Freshwater runoff during this period was assumed to be constant with discharges of 11 and 19 m^3 per second (equivalent to the mean daily gauged flow) applied at the Weaver and Mersey River boundaries respectively. No wind or wave forcing was included in the model as the tides are the main driving factor for currents at the Site.

14.28. To test the sensitivity of the modelled results to mean sea level rise associated with climate change the mean sea level in the imposed model boundary conditions was raised by 0.54m, This value is the predicted case for the end of the design life of the Development (2087) based on the climate change allowances published by the Environment Agency[99].

Model Calibration

14.29. The existing model was previously calibrated using ADCP transect measurements during a spring tide in October 1995 and validated for a neap tide during January 1996[1]. The accuracy of the model following its refinements at the Princes Jetty study site was confirmed by comparison with the same data. **Figure 14.4a** shows the comparison of the total discharge though the Mersey Narrows as observed in 1995 and as simulated by the model.

[99] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Sediment Transport Modelling

Choice of Model

14.30. For the estuarine sediment transport model, the 3D mud transport module of TELEMAC-3D (SEDI-3D) was applied. This model couples the sediment transport directly with the 3D flow modelling which allows the increased density caused by the sediment to be included in the hydrodynamic modelling. This effect is considered to be important in a highly turbid estuarine area such as the Mersey.

14.31. The mud transport model of the Mersey was first set up for the Liverpool2 container terminal studies[1] which describes the process of choosing the main parameter settings.

14.32. Settling of the suspended mud was parameterised using a constant settling velocity of 1 mm/s.

14.33. A two layer bed model was used for modelling the bed exchange processes in the model. Such an approach has been used previously by HR Wallingford for numerous studies of estuary mud transport and has been found to give robust results.

14.34. In the bed model, the uppermost sediment layer represents the mobile sediment that is picked up, advected and deposited each tide. Deposition is assumed to occur continuously into this top layer using a settling velocity of 1 mm/s multiplied by the near bed suspended concentration. Net erosion occurs in the model if the erosion flux from the bed is greater than the deposition flux. A critical shear stress value for erosion was set at 0.2 N/m^2 for the top bed layer. When this threshold is exceeded by the flows, erosion is initiated and material erodes from the top bed layer at a rate predefined by the erosion rate constant[100]. In this case the erosion rate constant was calibrated iteratively to a value of $5x10^{-5}$ $kg/m^2/s$. This value is within the range used by other researchers generally found in the literature[101].

14.35. The underlying bed layer represents the in situ sediment that has experienced previous consolidation and bed armouring. The critical shear stress for erosion for this layer was parameterised with spatially varied values. The values were calculated as the average of the shear stress experienced at each node during a set of mean spring tides. The minimum value was then limited to at least 0.4 N/m^2. The erosion rate for the lower bed layer was set to the same value as the top layer (5e-5 $kg/m^2/s$). The dry density for both of the bed layers was assumed to be 500 kg/m^3.

14.36. The Mersey Estuary and Liverpool Bay rarely experience completely calm conditions and therefore waves were included in the modelling. Waves are important for increasing the bed shear stresses and thus mobilising settled sediment and preventing deposition. A representative, though schematic, wave condition was applied throughout the model domain comprising a constant wave height of 0.5m with a 4s period applied to the model everywhere in the offshore region, reducing through the Narrows over a distance of 5 km to a value of 0.1 m within the estuary. These wave conditions are lower than the annual median wave height of 0.7 m predicted at the end of Queens Channel[102]. Additional wave data from a wave buoy at New Brighton over the period July 2013 to June 2014 shows a long term average wave height of 0.26 m with variation from summer to winter of +/- 30%.

100 Partheniades, E. (1965). “Erosion and deposition of cohesive soils.” J. of the Hydraulics Division, ASCE, 91(1), 105-138.

101 Whitehouse, RJS., Soulsby, RL., Roberts, W. and Mitchener, HJ. (2000). Dynamics of Estuarine Muds: a manual for practical applications. Thomas Telford, London, ISBN 0-7277-2864-4.

102 HR Wallingford (2007). Liverpool Landing Stage – Wave Modelling. Report EX5587

Initial and Boundary Conditions

14.37. At the start of each model run, mud deposits were initialised everywhere except in shallow areas higher than -1m CD in the offshore area. These regions were assumed to be predominantly sandy and therefore unlikely to be a source of much fine sediment. In the other areas, for the upper and lower bed layer thicknesses were set to 0.01m and 0.2m respectively.

14.38. The suspended concentration in the model was initialised to zero everywhere. The time taken for the concentrations to "spin up" was observed to be of the order of two or three tidal cycles.

Model Calibration

14.39. As for the flow model the best available data for sediment transport was from the ADCP transect survey in 1995 undertaken across the Mersey Narrows. During the survey the data from regular water sampling was used to convert the ADCP backscatter to suspended sediment concentration. Combination of the suspended sediment concentration with the water discharge taken from the ADCP data allowed calculation of the total sediment flux through the observed transect.

14.40. **Figure 14.5a** shows the comparison of the total sediment flux though the Mersey Narrows as observed in October 1995 and as simulated by the model. The comparison confirms that the model accurately represents the total amount of fine sediment passing the study site.

Assessment Methodology and Significance Criteria

14.41. The assessment methodology broadly follows the process outlined in BSI Standard PD 6900:2015[103]. The process was guided by the procedures set out in **Figure 14.6a**.

Identifying Receptors

14.42. The process starts by identifying both the features of interest that could be affected and the environmental changes resulting from the proposed activities.

14.43. The response by the Merseyside Environmental Advisory Service to the EIA Scoping Report submitted by Waterman (refer to **Chapter 2: EIA Methodology**) stated that "*The physical and chemical composition of the dock sediments to be removed and/or disturbed by the proposed development will need to be known to inform impact assessment and mitigation, re-use potential and disposal options e.g. environmental permit requirements*".

14.44. For that reason, in addition to the assessment of sediment transport effects, the levels of potential sediment contamination have also been considered as part of the assessment and included in the baseline environment.

14.45. Therefore, the receptors identified for assessment in this chapter are as follows:

- Changes in tidal flow regime;
- Transport of estuarine sediments, including:
  - Deposition of sediments within the river;
  - Presence of potentially contaminated sediment;
- Effects of waves on the Development.

[103] British Standards Institution (BSI) (2015). Environmental impact assessment for offshore renewable energy projects – Guide.

14.46. Assessment of effects on tidal flow, waves and sediment transport is a quantitative process; however, there are no established thresholds for determining significance. Therefore the significance assessment process is considered to be qualitative and based on expert judgement.

14.47. Assessment of the level of sediment contamination is quantitative as there are both site specific data on potential contaminant levels available, and established environmental thresholds from nature conservation bodies both within the UK and internationally.

Receptor Sensitivity

14.48. Once the receptors are identified the nature of environmental changes in terms of the natural conditions of the system (i.e. the baseline environment), level of environmental change and the sensitivity of the specific receptors must be understood. This provides a sensitivity assessment for the receptor.

Table 14.1a: Receptor Sensitivity

Sensitivity	Description
Negligible	Peak tidal flow velocities at the Site exceed 1.5ms^{-1} The significant wave heights at the Site exceed 1.5m There is a high level of either erosion or accretion occurring at the Site Concentrations of sediment contamination do not exceed 1st tier thresholds (e.g. Cefas Action Level 1 or CCME Temporary Effect Levels)
Minor	Peak tidal flow velocities at the Site vary between 1.5 and 1.0ms^{-1} The significant wave heights at the Site lie between 1.5 and 1.0m There is a moderate level of either erosion or accretion occurring at the Site Concentrations of sediment contamination may exceed 1st tier thresholds (e.g. Cefas Action Level 1 or CCME Temporary Effect Levels) in some areas, but predominantly remain below these thresholds.
Moderate	Peak tidal flow velocities at the Site vary between 1.0 and 0.5ms^{-1} The significant wave heights at the Site lie between 1.0 and 0.5m There is a low level of either erosion or accretion occurring at the Site Concentrations of sediment contamination across the site all lie between the 1st and 2nd tier thresholds (e.g. Cefas Action Level 2 or CCME Permanent Effect Levels).
Major	Peak tidal flow velocities at the Site lie below 0.5ms^{-1} The significant wave heights at the Site lie below 0.5m There is a negligible level of either erosion or accretion occurring at the Site Levels of sediment contamination substantially exceed all 2nd tier thresholds (e.g. Cefas Action Level 2 or CCME Permanent Effect Levels)

14.49. The sensitivity of receptors assumes that those with a high level of natural temporal variation are implicitly less susceptible to effects from the Development.

Assessment of Significance

14.50. The potential environmental change has been assessed in terms of magnitude and the probability of the change occurring. Magnitude considers both temporal and spatial aspects (**Table 14.2**a). These terms will also be used to describe the initial and residual effects associated with the Development.

14.51. The probability and magnitude of the effect form a matrix (

14.52. **Table** 14.3**a**) that is used to determine the level of change perceived by the receptor. The sensitivity and environmental change inform the assessment of the significance of the effect. The significance of the effect was determined by the matrix presented in **Table 14.4a**. In line with CIEEM guidance[104], and therefore unlike the other technical chapters in this ES, only effects that are of moderate or major significance represent those with the potential to be 'significant' in EIA terms. Significance descriptions used in this chapter are provided in **Table 14.5a**.

Table 14.2a: Temporal and spatial terminology

Term	Description
Reversibility	• **Temporary** effects are those associated with the Site preparation and construction works; • **Permanent** effects are those associated with the completed and operational Development;
Scale	• **Site-wide** effects are those affecting receptors within the Site only; • **Local** effects are those affecting neighbouring receptors; • **District** effects are those which are likely to occur to receptors beyond the immediate neighbouring receptors, i.e. within central Liverpool; • **Regional** effects are those affecting receptors within the wider Liverpool area

Table 14.3a: Environmental change combining magnitude and probability

Probability of Occurrence	Magnitude			
	Negligible	Minor	Moderate	Major
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Minor	Minor	Minor
Moderate	Negligible	Minor	Moderate	Moderate
High	Negligible	Minor	Moderate	Major

Table 14.4a: Assessment of Significance

Sensitivity	Environmental Change			
	Negligible	Minor	Moderate	Major
Negligible	Minor	Minor	Minor	Minor
Minor	Minor	Minor	Moderate	Moderate
Moderate	Minor	Moderate	Moderate	Moderate
Major	Minor	Moderate	Moderate	Major

[104] CIEEM (Chartered Institute of Ecology and Environmental Management). (2010). The CIEEM Guidelines for Ecological Impact Assessment in Britain and Ireland: Marine and Coastal

Table 14.5a: Significance Criteria

Term	Description	Mitigation Recommended?
Beneficial effect	Major significance	No
	Moderate significance	No
	Minor significance	No
Negligible effect	No significant effect (either adverse or beneficial) to an environmental resource or receptor	No
Adverse effect	Minor significance	No
	Moderate significance	Yes
	Major significance	Yes

Assumptions and Limitations

14.53. There are a number of assumptions and limitations inherent in the assessment process. These are detailed below:

- Numerical modelling does not take into account sea level rise associated with climate change (although, separately, the tidal model has tested the sensitivity of the Development to increased mean sea levels);
- It is assumed that the final Development design will incorporate technical consideration relating to aspects such as:
  - Scour (e.g. depth and dimensions of piles);
  - Sediment accretion; and
  - Emergency plans to reduce the potential for pollution from the Development.
- Cruise ships utilising the Development would be of various lengths, sizes, drafts and power ratings; and
- Qualitative assessment of significant effects is based on expert judgement.

Baseline Conditions

14.54. This section describes the existing aspects of the marine environment at the Site in the Mersey Estuary. This covers bathymetry, tidal flows, waves, sediment transport and sediment quality aspects relevant to this project

Bathymetry

General

14.55. The River Mersey flows west towards Liverpool and becomes tidal at Howley Weir. The River Weaver also enters at the head of the estuary.

14.56. The estuary has a total area of approximately 8,900 ha, 5,600 ha of which are intertidal sandflats and mudflats[105].

14.57. The estuary can be divided into four separate areas:

- Upper Estuary: A narrow (<1.5 km wide) upper estuary section between Howley Weir and Hale Head. This section is characterised by two main channels that meander through highly mobile intertidal sandflats and mudflats which are exposed at low tide. Areas of saltmarsh fringe both the north and south banks along the majority of this section[106];
- Middle Estuary: A wide inner estuary basin that extends from Hale head to Dingle point. This section is predominantly characterised by shifting sand banks and three meandering channels: the Garston Channel (along the north bank); the Eastham Channel (along the south bank) and the Middle Deep Channel;
- The Narrows: This section of the estuary extends from Dingle Point to New Brighton. The area is comprised of a narrow (1.5 km wide) entrance channel which is bounded by Permo-Triassic sandstone outcrops at New Brighton and Liverpool. The Narrows stretch for a distance of approximately 10km with a mean depth of 15m, although it may exceed 20m in certain areas[107]. The Site is located in this section of the estuary; and
- The Outer Estuary: This area extends seaward from New Brighton and includes large areas of inter-tidal sand and mud banks in Liverpool Bay on the Irish Sea.

14.58. Bathymetric changes within the Mersey have been subject to detailed monitoring for many years in relation to navigation. The effort has focussed on the major estuary channel and associated banks, with less attention given to the intertidal areas[108].

14.59. Dredging has been, and continues to be, required to maintain water depths in the navigation channels and docks[109,110]

14.60. Tidal propagation is affected by changes in bathymetry and, to a lesser degree, to variations in bed-roughness determined by surficial sediments. Sediment transport patterns modulate this response providing a longer term broad balance.

The Site

14.61. The Site is located within The Narrows section of the Mersey Estuary, on the north-eastern bank.

14.62. The water depths in the immediate vicinity of the river bank are less than 10m. This includes the area proposed for the Development footprint (**Figure 14.7a**).

14.63. Towards the main estuary channel, the water depth increases rapidly to between 10 and 11m immediately offshore of the Site. The water depths continue to increase to between 11 and 15m water depth in the centre of the navigational channel.

[105] ABPmer and HR Wallingford, 2007. The Estuary-Guide: A website based overview of how to identify and predict morphological change within estuaries. Website prepared for the joint Defra/EA Flood and Coastal Erosion Risk Management R&D Programme, November 2007. http://www.estuary-guide.net/

[106] Halcrow (2010). North West England and North Wales Shoreline Management Plan SMP2. Supporting Studies. Cell Eleven Tide and Sediment transport Study (CETaSS) Phase 2 (ii). Appendix E – Potential Implications of Future Sea Level Rise for Estuarine Sediment Budgets and Morphology in Northwest England and North Wales

[107] ABPMer (2004). New Mersey Crossing: Morphology Desk Study. Report No. B4027/TR03/03

[108] CH2M Hill (2013). North West Estuaries Processes Reports, Overall Report. Report prepared by CH2M Hill for the North West and North Wales Coastal Group.

[109] Thomas, C.G., Spearman, J.R. and Turnbull, M.J. (2002) Historical morphological change in the Mersey Estuary. Continental Shelf Research 22, 1775-1794.

[110] Blott., S. J., Pye, K., van der Wal., D. and Neal, A. (2006). Long-term morphological change and its causes in the Mersey Estuary, NW England. Geomorphology, Vol. 81, 185-206pp.

Tidal Flow

Tidal Cycle and Range

14.64. The River Mersey is subject to a semi-diurnal macrotidal (range >4 m) regime. The tidal range in the estuary can vary from 4m at neap tides to approximately 10m during spring tides (**Table 14.6a**). The largest ranges occur at the seaward end of the Upper Estuary[111].

Table 14.6a: Example tidal heights and ranges in the Mersey estuary

	Metres above Liverpool Bay Datum								
Station	**Mean Springs**			**Mean**			**Mean Neaps**		
	HW	**LW**	**Range**	**HW**	**LW**	**Range**	**HW**	**LW**	**Range**
Gladstone Dock	8.7	0.5	8.2	7.9	1.4	6.4	7.0	2.3	4.6
Princes Pier	8.8	0.5	8.4	7.9	1.4	6.5	7.0	2.3	4.7
Eastham	9.1	0.3	8.9	8.2	1.3	6.9	7.3	2.3	5.0
Widnes	9.5	5.0	4.5	8.5	4.9	3.6	7.5	4.8	2.7
Fiddler's Ferry	9.8	6.9	2.9	8.7	6.9	1.8	7.6	6.8	0.8

14.65. The flow velocities (as measured at Gladstone Dock) during the spring tides can vary from 0.46 to 2.26 ms^{-1}. Neap tide velocities are lower, at between 0.26 and 1.23 ms^{-1} (**Table 14.7a**).

14.66. The main tidal flows are located in the centre of the river channel at Dingle Point (in the vicinity of the Site). Recorded velocities of approximately 1.65 ms^{-1} have been measured[13]. The flow velocities were observed to decrease closer to the bank.

Table 14.7a: Example tidal velocities in the Mersey Estuary

	Gladstone Dock		
Hours	**Direction**	**Spring**	**Neap**
-6	319	0.46	0.26
-5	No data	No data	165
-4	146	0.98	0.51
-3	146	2.26	1.23
-2	145	1.95	1.08
-1	145	1.65	0.93
0	136	0.51	0.26
1	324	1.23	0.67
2	327	2.16	1.18
3	331	1.7	0.93
4	329	1.34	0.72
5	328	0.98	0.51
6	325	0.62	0.31

[111] Ridgway, J, Bee, E, Breward, N, Cave, M, Chenery, S, Gowing, C, Harrison, I, Hodgkinson, E, Humphreys, B, Ingham, M, Jarrow, A, Jenkins, G, Kim, A. Lister R, Milodowski, A, Pearson, S, Rowlands, K, Spiro, B, Strutt, M, Turner, P and Vane, C. (2012). The Mersey estuary: sediment geochemistry. British Geological Survey Research Report, RR/10/02.

14.67. The Estuary is generally flood dominant with the ebb having a slightly longer phase compared to the flood. At Liverpool, the ebb tide duration is 6.75 hours, whilst the flood tide duration is 5.5 hours. The ebb and flood currents follow different courses within the estuary, resulting in complex and dynamic channels and sandbanks.

Tidal Excursion and Flushing

14.68. Sediment (coarse fraction) movement within the estuary is driven by the peak velocities on flood and ebb tides[112]. This movement of a water body between high and low waters is known as the tidal excursion, the magnitude of which can be calculated from bathymetric and tidal height and time data.

14.69. Tidal flushing refers to the systematic replacement of water in a bay or estuary as a result of tidal flow and the extents of the tidal excursion. The seaward movement of water in an estuary is governed by the input of fresh water at its head, from tributaries entering along its length and from effluent outfalls.

14.70. The flushing time of the whole of the Mersey estuary has been estimated at between 20 and 50 days[113]. However, the flushing time for the area around the Site (The Narrows) has been estimated at approximately 5 days[13,114] indicating a high tidal flow rate.

14.71. The existing current flows for the flood and ebb tide are shown in **Figure 14.9a** and **Figure 14.10a**, respectively. The figures also show tidal current vectors indicating the direction.

Extreme Events

14.72. Some of the highest storm surges in the UK are found on the West Coast in Liverpool Bay. Such surges can reach around 2m in height and can increase tidal currents by up to 0.6m/s[115]. Such surges are likely to lead to increases in water levels and currents in the Mersey Estuary.

14.73. The tidal bore on the Mersey River may occur during very high spring tides (above 10 metres CD at Liverpool). These conditions only occur a few days each year. However, lower tides can produce tidal bores if other factors are favourable such as a period of dry weather reducing fresh water flow in the rivers.

14.74. The River bore may be seen opposite Hale Point about 2hr 25 min before HW Liverpool. From the park at Widnes West Bank it may be seen passing under the Runcorn road and rail bridges about 1hr 50 min before HW Liverpool. Under good conditions the bore may be seen as far as Warrington passing under the rail bridge south of Bank Quay station about 20 min before HW Liverpool. It passes rapidly upstream and arrives at Howley Weir just before HW Liverpool[116].

Sensitive Receptors

14.75. The tidal streams in The Narrows regularly exceed 1.5ms^{-1} during periods of peak flow (**Table 14.7a**). The assessment of the sensitivity of the changes in tidal flow regime (receptor) are

[112] ABPMer (2008). http://www.estuary-guide.net/pdfs/tidal_asymmetry_analysis.pdf
[113] Watts, S.J. (2004). Recovery of the Mersey Estuary from Metal Contamination. PhD Thesis. School of Earth, Ocean and Environmental Science, University of Plymouth.
[114] Bruner de Miranda, L., Kjerfve, B., Andutta, F.P. and Mendes de Castro Filho, B. (2017). Fundamentals of Estuarine Physical Oceanography. Springer Nature Singapore Pte Ltd.
[115] ABPmer, 2001. Futurecoast - Macro review of coastal processes around England and Wales. Report No. R.920.
[116] National Tidal and Sea Level Facility (NTSLF). (2017). About tides – Tidal river bores. Accessible at http://www.ntslf.org/about-tides/tidal-river-bores

presented in **Table 14.8a**. The assessment demonstrates that tidal flows, as a receptor, have a negligible sensitivity.

Table 14.8a: Sensitivity assessment for changes in tidal flow regime

Parameter	Description
Receptor	Changes in tidal flow regime
Features of interest	Current speeds and direction within the estuary
Temporal variability	High level of temporal variability due to the tidal cycle
Sensitivity	**Negligible**

Wave Effects

Wave Environment

14.76. The Site is located in The Narrows area of the Mersey estuary, approximately 4.5km south of the entrance.

14.77. Due to the shape (narrow entrance) and macrotidal nature of the estuary, there is a strong tidal influence on the wave regime in the estuary. At low tide the banks outside the Mersey entrance, e.g. Great Burbo Bank and Brazil Bank, are very shallow and dry in some areas and so will shelter the Site from most of the wave energy entering from Liverpool Bay and the Irish Sea.

14.78. The ebb tide is expected to block waves entering the estuary from the Irish Sea. It is likely to be only at high tide and with a wind from the northwest that some wave energy from the Irish Sea may reach the Site[117].

14.79. The existing wave heights within the estuary will be limited by the fetch length, as well as the bathymetric shape or features and the tidal range. The longest fetch distance will be along an axis orientated northwest-southeast.

14.80. For the majority of the time, wave conditions at the Site will be due to waves generated within the estuary by local wind conditions. The locally generated wave conditions will be largest when the wind is blowing along the estuary, either from the north and northwest or from the south and southeast.

14.81. Indicative extreme wave conditions for four wind directions and return periods of 1 year, 10 years and 50 years at the Site are presented in **Table 14.9a**. The model was run with water levels of 9.3 mCD, equivalent to MHWS, and 1.1 m, equivalent to MLWS.

14.82. The largest waves occur under winds from 300°N, where waves generated within the estuary combine with some wave energy from the Irish Sea. The next largest waves in the sample are caused by waves from 180°N.

14.83. Water level has a strong effect on wave conditions. The largest predicted wave height at MLWS, 1.1 m, is just more than half that at MHWS, 2.0 m. MHWS and MLWS occur at slack tide. Note that the effect of tidal currents was not included in the modelling.

[117] HR Wallingford (2017). Hydrodynamic and coastal process studies, Liverpool cruise terminal, RT001 R01-00. Report produced for Waterman Infrastructure and Environment Ltd.

Table 14.9a: Indicative wave conditions at site of proposed cruise terminal.

Return Period (years)	Wind Direction (°N)	MHWS			MLWS		
		Hs (m)	Tp (s)	Dir (°N)	Hs (m)	Tp (s)	Dir (°N)
1	150	1.1	3.9	148	0.7	3.0	162
	180	1.2	3.9	153	0.8	3.1	169
	300	1.5	4.9	322	0.8	3.2	317
	330	1.2	4.4	326	0.6	3.2	327
10	150	1.3	4.1	149	0.8	3.3	164
	180	1.5	4.3	154	0.9	3.4	171
	300	1.8	5.2	321	1.0	3.6	314
	330	1.4	4.8	326	0.7	3.5	325
50	150	1.4	4.3	149	0.8	3.4	165
	180	1.7	4.4	154	1.0	3.6	172
	300	2.0	5.4	321	1.1	3.7	312
	330	1.6	5.0	326	0.8	3.6	324

Note: These calculations are not to be used for detailed design

Wind Environment

14.84. Wind speed and direction data was acquired from a meteorological station at Liverpool Airport. The dominant wind direction showed strong north-western and south-eastern components.

14.85. Maximum annual wind speeds in the vicinity of Liverpool were recorded at up to 27 knots, although the wind speeds could exceed 40 knots during storm events. Light to moderate winds (7 to 16 knots) predominate throughout the year, although winds are stronger during the winter months.

Table 14.10a: Wind speed statistics at John Lennon Airport. Jan 1991 to Jan 20112

Wind Speed (Knots)	Wind Direction Degrees True											
	346 to 15	16 to 45	46 to 75	76 to 105	106 to 135	136 to 165	166 to 195	196 to 225	226 to 255	256 to 285	286 to 315	316 to 345
0	0	0	1	3	0	0	0	0	0	0	0	0
1 to 3	560	658	1175	1261	1571	2063	1409	995	934	780	1008	1021
4 to 6	2173	1925	3061	2677	3771	5373	3965	2724	2487	2713	3404	3096
7 to 10	2930	1602	2974	2445	3582	6824	6304	3927	4250	4142	6243	4485
11 to 16	1116	608	1827	1651	2035	4636	4615	3427	4874	5354	7821	3010
17 to 21	111	67	307	303	275	824	947	833	1705	2682	2296	551
22 to 27	11	2	23	29	24	128	183	219	569	1448	797	130
28 to 33	0	0	2	0	3	9	14	18	110	374	173	7
34 to 40	0	1	0	0	1	0	1	2	23	79	27	1
41 to 47	0	0	0	1	0	0	1	0	2	7	2	0
48 to 55	0	0	0	1	0	0	0	0	1	2	5	0
56 to 63	0	0	0	0	0	0	0	0	0	0	0	0

Wind Speed (Knots)	Wind Direction Degrees True											
	346 to 15	16 to 45	46 to 75	76 to 105	106 to 135	136 to 165	166 to 195	196 to 225	226 to 255	256 to 285	286 to 315	316 to 345
64 to 999	0	0	0	0	0	0	0	0	0	0	0	0
ALL OBS	**6901**	**4863**	**9370**	**8371**	**11262**	**19857**	**17439**	**12145**	**14955**	**17581**	**21776**	**12301**

14.86. As a result of the bathymetry and shape of the estuary, there is almost no penetration of open sea waves into the Mersey estuary and internally-generated waves are fetch limited. However, waves are capable of eroding soft sediment that do not have sufficient shoreline protection.

14.87. The existing Princes Jetty consists of an open structure including vertical and horizontal timber and concrete beams and other components such as decks and staircases. As the structure is relatively open, the majority of wave energy is likely to pass through the structure. Some scattering and dissipation is likely to occur and will depend on the water level, significant height and wavelength of the waves.

Sensitive Receptors

14.88. The assessment of the sensitivity of the changes in wave regime (receptor) is presented in **Table 14.11a**. Significant wave heights (Hs) of between 1.1 and 1.5 m were observed for a 1 year return period, although larger significant wave heights were observed for longer return periods (**Table 14.9a**). This suggests that the sensitivity of the receptor is minor.

Table 14.11a: Sensitivity assessment for changes in wave heights and directions

Parameter	Description
Receptor	Wave regime within the estuary
Features of interest	Wave heights and directions
Temporal variability	High levels of temporal variability due to the influence of tides and wind speed
Sensitivity	**Minor**

Transport of Estuarine Sediments

Sediment Sources within the Estuary

14.89. As previously established, the Mersey estuary is flood dominant. The Mersey experiences stronger velocities on the flood tide causing net movement of sediment into the estuary. The net direction of sediment transport is determined by the direction of peak tidal current and its velocity.

14.90. The Mersey estuary is constricted near its mouth, leading to local tidal scour. The banks of the Mersey are formed of low till slopes, with a few bedrock outcrops. Much of the Mersey coastline is defended in some places by bank protection and seawalls. As a result, the natural sediment transport processes have been altered.

14.91. There are large areas of the Mersey Estuary that are predominantly sandy, with fine sediment occurring in places along its inner margins towards the Upper Estuary. Sediment in the Mersey Estuary has two main sources, these are:

- Marine sources: Sediment moved into the estuary from the glacial and fluvio-glacial deposits found across Liverpool Bay and large parts of the eastern Irish seabed; and
- Fluvial sources: Riverine input from the River Mersey and River Weaver at the head of the estuary.

Offshore in Liverpool Bay the seabed is largely sandy with tide and wave action preventing the long term accumulation of muddy deposits.

14.92. The clay fraction of the estuarine sediments has a broadly similar mineralogical assemblage to that seen in the tributary rivers (River Mersey and River Weaver)[13]. However, there are differences between the fluvial and estuarine sediments in terms of the relative proportions of the different clay mineral species[13]:

- Estuarine clay sediments were found to contain different levels of clay minerals (e.g. chlorite) compared to river sediments.
- Estuarine sediments also differ from those found in tributary rivers draining the Carboniferous terrain in that kaolinite is not the most abundant clay mineral.

14.93. Although the fluvial sources are believed to be small compared with offshore sources, the magnitude and duration of freshwater inputs may affect the lateral migration of low water channels within the estuary[118].

14.94. The Mersey estuary sediments have a broadly similar clay mineral assemblage to that reported from the Irish Sea seabed sediments. These observations would therefore be consistent with the movement of sediment from the Irish Sea into the Mersey estuary.

14.95. Price & Kendrick[119] concluded that the mechanism for sediment transport from these offshore sources is via density stratification, which causes a net inland movement along the bed. Studies of other estuaries in the Irish Sea area (West Cumbria[120] and Cardigan Bay[121]) also concluded that their sediments were largely derived from the Irish Sea, rather than being contributed by rivers draining into these estuaries.

Sediment Transport and Suspended Sediment

14.96. The tidal velocities drive the sediment transport in the Mersey Estuary. They are responsible for the patterns of erosion, and subsequent accretion of fine grained sediment within the estuary.

14.97. As a result of the shape of the estuary, the sea bed within The Narrows is largely swept clear of sediments by strong tidal currents. However the current speeds are less along the margins of the estuary (**Figure 14.9a** and **Figure 14.10a**) which leads to the accretion of both sand and mud[11].

14.98. Measurements made by Dredging Research in the winter of 1995/96[122] showed that suspended sediment concentrations in the Narrows were in the range 20-300 mg/l and that the fluxes of material passing through the Narrows on spring tides were in the region of 70,000 to 80,000 tonnes per tide. Approximately 50% of this mass was exchanged per tide on neap tides. Peak

[118] McDowell and O'Connor (1977). Hydraulic Behaviour of Estuaries. Macmillan. London.
[119] Price, W A, and Kendrick, M P. (1963). Field and model investigations into the reasons for siltation in the Mersey estuary. Proceedings of the Institution of Civil Engineers, Vol. 24, 413–517.
[120] Kelly, M, and Emptage, M. (1992). Distribution of radioactivity in the Esk Estuary and its relationship to sedimentary processes. Department of the Environment, DoE/HMIP/RR/92/015.
[121] Moore, J R. (1968) Recent sedimentation in northern Cardigan Bay, Wales. Bulletin of the British Museum (Natural History), Mineralogy, Vol. 2, 19–31.
[122] HR Wallingford (2014). Liverpool 2 - WID dredging for removal of soft sediments. Technical Report DDM7002-RT001-R02-00

instantaneous fluxes were approximately 8,000 kg/s on spring tides and 3,000 kg/s on neap tides[25].

14.99. The Narrows of the Mersey Estuary are highly dynamic and any fine material disturbed in this area is expected to be dispersed rapidly by the strong tidal currents. It can be anticipated that any fine material introduced to the system through the Development would contribute to the background levels of suspended sediment in the system and would initially accumulate in the temporary locations of muddy material throughout the estuary and offshore region.

14.100. The baseline distribution of fine sediment deposition is shown in **Figure 14.11a**. The baseline numerical modelling was run over an initial 30 day period to assess potential sediment accretion. This shows that there is no accumulation of fine sediment in the channel due to the high currents. There is a potential for sediment accumulation to the north and south of the study Site, particularly in the approaches to Princes Half Tide Dock.

14.101. The baseline scenario indicated a potential for fine sediment accumulation in and around the existing Princes Jetty which would be expected to be disturbed during the removal of the jetty structure.

Sensitive Receptors

14.102. The assessment of the sensitivity for sediment transport (receptor) is presented in **Table 14.12a**. The assessment demonstrates that the Site is in an area of moderate accretion due to the location on the banks of the estuary. Therefore the receptor is assessed as having a minor sensitivity.

Table 14.12a: Sensitivity assessment for the transport of estuarine sediments

Parameter	Description
Receptor	Transport of estuarine sediments
Features of interest	Levels of accretion and deposition within the estuary
Temporal variability	Moderate levels of variability due to tidal flows and long-term accretion and erosion processes within the wider estuary
Sensitivity	**Minor**

Sediment Quality

Background

14.103. A marine ecology study was undertaken by APEM to describe baseline conditions for fish, plankton, marine mammals, benthic communities and river wall habitats. This involved grab sampling at selected locations, along with surveys of the walls (refer to **Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology**).

14.104. A site survey investigation was conducted by APEM in 2017[123] to acquire samples for physico-chemical analysis. A total of 9 grab samples were acquired from the Site and the immediate vicinity along the margins of the estuary (**Figure 14.12a**).

[123] APEM (2017). P1343 Liverpool Cruise Terminal Marine Ecology EIA 2017

Particle Size Analysis

14.105. Data from the grab samples, which sampled the top 0.2m of sediment (based on using a standard 0.1m^2 Day grab), showed that the sediment was predominantly sand with a substantial fines component and a minor coarse / gravel fraction.

14.106. Site specific data showed that the surface sediments had an average of 61% sand, although it should be noted that Stations G02, 06, 09 and 10 all recorded values of over 90%, with correspondingly low compositions of the other sediment fractions.

14.107. Three stations (G03, 07 and 08) recorded moderately high levels of fine material (between 70.9% and 74.1%). The sediment at these sites was considered to be predominantly silty using the Folk Classification. These stations were located on the inward side of the Site, and confirm the earlier observation regarding finer sediments are located on the margins of the Mersey Estuary.

Table 14.13a: Sediment analysis - particle size results[26]

Sample	Mean Folk 1954 classification	Sorting	% Coarse (>2mm) %	% Sand (63µm to 2mm)	% Fines (<63µm)
G 01	Very Coarse Sand	Very Poorly Sorted	48.7	39.8	11.5
G 02	Medium Sand	Poorly Sorted	2.0	93.8	4.2
G 03	Medium Silt	Very Poorly Sorted	0.0	25.9	74.1
G 05	Medium Sand	Extremely Poorly Sorted	23.8	46.7	29.5
G 06	Fine Sand	Well Sorted	0.0	95.8	4.2
G 07	Coarse Silt	Very Poorly Sorted	0.0	29.1	70.9
G 08	Medium Silt	Very Poorly Sorted	0.0	26.3	73.7
G 09	Fine Sand	Well Sorted	0.0	96.0	4.0
G 10	Fine Sand	Moderately Well Sorted	0.0	96.8	3.2

Note that there is no station G04 as part of this survey.

Heavy Metal Analysis

14.108. The Centre for Environment, Fisheries and Aquaculture Science (Cefas) published threshold values for a number of sediment contaminants with respect to assessing their chemical suitability for disposal at sea. These thresholds, referred to as Action Levels, have been used to assess the level of potential contamination of the sediment acquired during the APEM survey of the Site.

14.109. There are two Cefas action levels:

- Cefas Action Level 1 (CAL1): The threshold concentration below which contaminant concentrations are generally assumed to be of no concern and are unlikely to influence the regulator decisions;
- Cefas Action level 2 (CAL2): Sediment contaminants in dredged material above the Action Level 2 thresholds are generally considered to be unsuitable for sea disposal and will need to be managed by a suitable waste contractor.

Table 14.14a: Sediment analysis - heavy metal results (APEM, 2017). Concentrations in mg.kg^{-1}

Parameter	CAL1	CAL2	G01	G02	G03	G05	G06	G07	G08	G09	G10
Arsenic	20	100	3.9	4.2	5.9	5.2	4	9.5	7	4.1	4.6
Cadmium	0.4	5	0.17	0.13	0.32	0.26	0.19	0.65	0.39	0.21	0.13

Parameter	CAL1	CAL2	G01	G02	G03	G05	G06	G07	G08	G09	G10
Chromium	40	400	7.6	6.8	18.6	12.8	11.2	25.6	21.3	9.2	8
Copper	40	400	9.7	9.5	17.7	14.3	8.4	23.9	19.2	7.8	7.6
Lead	50	500	13.8	10.6	46.5	30	12	78	56.1	11.5	15.7
Mercury	0.3	3	0.16	0.11	0.57	0.35	0.12	1.14	0.71	0.1	0.1
Nickel	20	200	7.1	4.6	11.5	8.3	5.2	13.4	12.8	5.2	4.9
Zinc	130	800	50.2	47	94.5	82.4	50.5	136.6	108.7	48.5	43.4

14.110. The following metals were present in the sediments at concentrations of environmental interest when compared to the Cefas Action Levels: cadmium, lead, mercury and zinc. The remaining metals were recorded at levels below the CAL1 threshold and are not considered to represent a risk to the environment.

14.111. Analysis of the sediment samples showed that Station G07 experienced a low level of heavy metal contamination. The levels of cadmium, lead, mercury and zinc in the sediments were all above the CAL1 threshold. However none of the levels approached the CAL2 threshold concentrations. Other stations (G03, 05 and 08) all recorded levels of mercury above the CAL1 threshold. In addition sediment from station G08 also returned levels of lead above the CAL1 limits.

14.112. Sediment samples from stations G01, 02, 06, 09 and 10 were all below the CAL1 thresholds for all metals.

14.113. Spatially, the stations with the sediment samples returning values above the CAL1 limits are all located within the Princes Jetty area. These stations were also observed to be comprised predominantly of fine material (with the exception of G05 which had a higher sand and coarse component). This could indicate that the area behind the Princes Jetty was acting as a historical area of accumulation of fine sediment, with higher levels of potential contamination due to the prevalence of fine material.

14.114. There are known historical sources of heavy metal input around the estuary from the levels of historic industrial activity. Based on this, it is reasonable to conclude that heavy metal contamination in the sediments is the result of historical run-off or discharges from the surrounding area.

14.115. Under the Water Framework Directive, the Mersey Estuary is considered to be heavily modified for navigation, ports and harbours, as per the current Development. The estuary is currently failing to achieve Good Status with respect to 'lead and its compounds' under its last review in 2016[124] (EA, 2017). There is potential that sediments with lead levels over CAL1 thresholds may be re-suspended during Development operations. However, the levels of lead observed in the grab samples, and the volume of material that could potentially be re-suspended are unlikely to pose a risk to the waterbody status. Although other heavy metal elements (e.g. cadmium, mercury and zinc) were observed to exceed the CAL1 thresholds, the WFD status for the waterbody does not identify them as elements of potential concern.

[124] Environment Agency 2017. Mersey Estuary: Operational Catchment. http://environment.data.gov.uk/catchment-planning/OperationalCatchment/3306.

14.116. It should be noted that the proposed Development activities do not utilise equipment that is subject to heavy metal leaching (e.g. cadmium, lead, mercury or zinc), i.e. the proposed equipment and operations would not contribute to the existing heavy metal levels in the sediment.

Organotin Analysis

14.117. Tributyltin (TBT) was historically used as an antifoulant, over time it degrades to dibutyltin (DBT) and triphenlytin (TPT).

14.118. DBT levels were below the detection limits (<0.005 $mg.kg^{-1}$) at all 9 grab stations (**Table 14.15a**). This is substantially lower than the CAL1 threshold of 0.100$mg.kg^{-1}$. Given the detection levels recorded at the Site, DBT contamination is not considered to be of environmental concern for this location.

Table 14.15a: Sediment analysis - organotin results[26]. Concentrations in $mg.kg^{-1}$

Parameter	CAL 1	CAL 2	G01	G02	G03	G05	G06	G07	G08	G09	G10
Dibutyltin	0.1	1.0	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Hydrocarbon analysis

14.119. In order to assess the levels of potential hydrocarbon contamination in the sediment at the Site, two sets of quality standards will be used to evaluate the sediment samples.

1) An initial set of threshold limits is provided by the Canadian Council of Ministers of the Environment (CCME). These are commonly used, globally, on marine and freshwater projects in the absence of other national or regional sediment quality thresholds. The CCME defines two assessment values:
   a) Interim Sediment Quality Guidelines (ISQG) / Threshold effect level (TEL): This represents the concentration below which adverse biological effects are rarely expected to occur.
   b) Probable effect level (PEL): The level above which adverse effects are expected to occur frequently.
2) OSPAR Effects Range Low (ERL): These levels were developed by the United States Environmental Protection Agency for assessing the ecological significance of sediment concentrations. These are concentrations below which effects are rarely observed or predicted among sensitive life stages and (or) species of biota for sediment[125]. The ERL levels are used to evaluate sediment concentrations of trace elements and synthetic organic compounds.

14.120. The results of the hydrocarbon analysis of the sediment samples is displayed in **Table 14.16a** and **Table 14.17a**. The majority of Polycyclic Aromatic Hydrocarbon (PAH) concentrations were above the CCME TEL criteria at stations G01, G03, G05, G07 and G08. All these stations recorded increased levels of fine material suggesting that there is a reduced current speed in this part of the Site which is located away from the main estuary channel. None of the sediment samples exceeded the PEL criterial. Stations G05, G05, G07 and G08 exceeded the OSPAR ERL levels for indenol[123,cd]pyrene and benzo[ghi]perylene. This suggests that the concentrations of PAHs may pose a risk to marine organisms at these stations.

[125] OSPAR. 2012. Levels and trends in marine contaminants and their biological effects – CEMP Assessment report 2012

Table 14.16a: Sediment analysis – PAH results (Stations G01 to G06)[26]. Concentrations in µg.kg^{-1}

Parameter	ERL	TEL	PEL	G01	G02	G03	G05	G06
Naphthalene		34.6	391	16.4	5.7	76.5	67	2.1
Acenaphthylene		5.87	128	6.4	2.4	39.3	17.9	<1
Acenaphthene		6.71	88.9	15.1	1.9	31.4	47.1	<1
Fluorene		21.2	144	14.9	2.6	43.4	45.3	<1
Phenanthrene		86.7	544	104.3	16.6	183.7	291.6	3.3
Dibenzothiophene *	190			7.6	1.9	21	25	<1
Anthracene		46.9	245	27.9	5.8	60.5	89.6	1.3
Fluoranthene		113	1,494	165	30.8	289.5	429	4
Pyrene		153	1,398	160.1	32.5	301.9	410.2	5.1
Benzo[a]anthracene		74.8	693	78.4	19	171.1	224.7	2
Chrysene		108	846	95.9	22.4	216.5	268.7	3.1
Benzo[a]pyrene		88.8	763	96.8	25.4	273.1	274.8	4.8
Indeno[123,cd]pyrene	240			74.3	19	257.2	203	6.1
Dibenzo[a,h]anthracene				13.1	4	43.7	38.9	<1
Benzo[ghi]perylene	85			73	18.8	252.9	211.6	5.5

14.121. Stations G02, G06, G09 and G10 typically recorded low levels of PAH concentrations, and below the evaluation thresholds. These stations are located on the margins of the main estuary channel and outside of the Princes Jetty Area (**Figure 14.12a**). These stations also recorded higher levels of coarse sediment, compared to the other survey stations. It is expected that the levels of coarse sediment and increased exposure to tidal currents has contributed to the low PAH concentrations.

Table 14.17a: Sediment analysis – PAH results (Stations G07 to G10)[26]. Concentrations in µg.kg^{-1}

Parameter	ERL	TEL	PEL	G07	G08	G09	G10
Naphthalene		34.6	391	94	66.6	2.4	1.1
Acenaphthylene		5.87	128	60.2	42.6	<1	<1
Acenaphthene		6.71	88.9	43.8	32.3	2.9	<1
Fluorene		21.2	144	59.3	43.5	2	<1
Phenanthrene		86.7	544	269.9	177.6	15.2	1.7
Dibenzothiophene *	190			28.9	20.7	1.2	<1
Anthracene		46.9	245	91.8	57.9	3.4	<1
Fluoranthene		113	1,494	492.5	250.9	21.7	3.3
Pyrene		153	1,398	524.9	264.2	20.7	3.9
Benzo[a]anthracene		74.8	693	276.1	144.4	9.3	1.9
Chrysene		108	846	328.2	193.1	10.7	2.6
Benzo[a]pyrene		88.8	763	448.2	256.3	10.4	6.6
Indeno[123,cd]pyrene	240			395.1	244.1	8.6	8.2

Parameter	ERL	TEL	PEL	G07	G08	G09	G10
Dibenzo[a,h]anthracene				65.5	42.2	1.4	<1
Benzo[ghi]perylene	85			394.9	254	7.6	6.4

14.122. PCBs adhere to particles in the water column, resulting in their eventual deposition and accumulation in sediments. The highest concentrations of PCBs are typically found in fine grained sediment[126].

14.123. Polychlorinated biphenyls (PCBs) were detected at very low levels throughout the sediment samples. The majority of sediment samples recorded PCB levels below the detection limit of <0.00008mg/kg^{-1}. These concentrations are indicative of an uncontaminated environment.

14.124. The sediments at station G07 recorded a concentration of PCB 28 that matched the threshold of the OSPAR ERL limit. In addition, Stations G03 and G07 both recorded PCB concentrations exceeding the ERL threshold for PCB 118 (**Table 14.18a**). The concentrations of PCB 28 and PCB 118 were marginally elevated above the ERL threshold, however there is a potential for these levels to cause an adverse effect on marine organisms.

Table 14.18a: Sediment analysis – PCB results[26]. Concentrations in µg.kg^{-1}

Parameter	ERL	G01	G02	G03	G05	G06	G07	G08	G09	G10
PCB28	1.7	0.2	<0.08	1	0.6	<0.08	1.7	0.7	<0.08	<0.08
PCB52	2.7	0.1	<0.08	0.5	0.3	<0.08	0.9	0.4	<0.08	<0.08
PCB101	3	0.1	<0.08	0.6	0.3	<0.08	1	0.5	<0.08	<0.08
PCB118	0.6	<0.08	<0.08	0.6	0.4	<0.08	0.9	0.3	<0.08	<0.08
PCB153	40	0.1	<0.08	<0.08	<0.08	<0.08	1.1	0.5	<0.08	<0.08
PCB138	7.9	<0.08	<0.08	1	0.2	<0.08	1.4	0.5	<0.08	<0.08
PCB180	12	<0.08	<0.08	0.3	0.1	<0.08	0.6	0.2	<0.08	<0.08

Summary

14.125. Based on the results of the above analysis, it is considered that the sediments across the Site can be classified into two categories:

- Group 1: This group comprises stations G02, G06, G09 and G10. These stations have low levels of fine (<63µm) material, (between 3.2 and 4.2%) and are predominantly composed of sand. The stations were located on the margins of the main estuary channel, and are expected to be under the influence of tidal flows. The analytical results from these stations are indicative of a relatively uncontaminated environment. The variations in heavy metal and hydrocarbon concentrations at these sites could be considered indicative of natural variation in the sediment.
- Group 2: This group comprises stations G01, G03, G05, G07 and G08. The sediments at these stations presented a varying proportion of fine material, between 11.5% and 74.1%. The stations were all located in the immediate vicinity of either the structures and retaining walls at

[126] National Research Council (NRC). 2001. A Risk-Management Strategy for PCB-Contaminated Sediments. National Academy Press Washington, D.C. ISBN 0-309-07321-9

the side of the estuary that experience reduced tidal flow velocities (G01) or in a sheltered area outside of the area of main tidal flows (G05, G05, G07 and G08) with minimal tidal currents. The results of the sediment analysis from these stations showed that there were levels of heavy metals over the CAL1 thresholds, but below the CAL2 limits. The hydrocarbon concentrations in the sediment were typically above either the CCME TEL or OSPAR ERL levels, indicating that there is a potential risk to marine organisms.

14.126. The levels of heavy metals and hydrocarbons in the sediments in the Group 2 stations are indicative of a low level of contamination. This is most likely due to a combination of the historical industrial activity along the banks of the estuary, and the limited flows within the Group 2 station locations allowing the accumulation of fine grained sediment.

Sensitive Receptors

14.127. The assessment of the sensitivity of the changes in sediment concentration (receptor) are presented in

14.128. Table 14.19**a**. A total of 5 out of the 9 survey stations consistently recorded levels of heavy metal and hydrocarbon contamination in excess of the 1st tier thresholds. However there were no instances of the 2nd tier thresholds being exceeded at any stations. As a result of the levels of contamination at these 5 stations, and that 4 of the survey stations recorded levels of below the 1st tier thresholds, the sensitivity is considered to be minor.

Table 14.19a: Sensitivity assessment for the movement of potentially contaminated sediments

Parameter	Description
Receptor	Sediment quality in the estuary
Features of interest	Mobilisation patterns from construction works at the Site
Temporal variability	Low levels of variation as the accumulation of potential contaminants is a long scale process.
Sensitivity	**Minor**

Likely Significant Effects

Demolition and Construction

Tidal Flow

14.129. Numerical modelling was conducted to assess the effects on tidal flows following the demolition and removal of the existing Princes Jetty. The results are displayed in **Figure 14.13a** to **Figure 14.16a**. The current speed magnitude and direction are plotted at times of peak ebb and flood tide followed by the difference in current magnitude resultant from the removal of the structure. In the speed difference plots yellow to red colours indicate speed magnitude increase with increasingly dark blue colours indicating speed magnitude decrease.

14.130. The most noticeable effect of removing Princes Jetty are the speed increases shown in **Figure 14.14a** and **Figure 14.16a**. This is due to the drag effect of the existing piled structure on the tidal flows being removed.

14.131. During the ebb tide maximum speed was modelled at 2.2 ms^{-1}, an increase of 0.8 ms^{-1}. The area of highest effect extends for approximately 225 m in a seaward direction. The overall footprint of effect during the ebb tide extends approximately 2km.

14.132. The removal of the jetty leads to a maximum increase in tidal flow velocity during the flood tide of approximately 0.4 ms^{-1}. During the flood tide, the overall footprint of effect extends approximately 1km up the estuary, although for the majority of the footprint the difference in tidal flows is between 0.1 and 0.2 ms^{-1}.

14.133. There is a small area that experiences a slight decrease in tidal flow velocity (approximately 0.1 ms^{-1}) immediately offshore of the original jetty location.

14.134. The effects during both flood and ebb tides are shown to be relatively confined to the eastern bank line of the Mersey Estuary. The removal of the existing structures does not show any effects on the main estuary channel. This indicates that there will be no overall effect on the general tidal propagation of the estuary or any overall effects on estuary water levels.

14.135. The results of the modelling show that the maximum flow speed in the vicinity of the existing jetty during the flood tide is increased to approximately 2ms^{-1} (an increase of 25%), and during the ebb tide the maximum velocity is increased to 2.2ms^{-1} (an increase of 57%). The area of effect is limited to approximately 24.3 ha (19.2 ha during the ebb tide, and 5.1 ha during the flood tide), an area which equates to approximately 0.27% of the overall Mersey Estuary (8,900 ha).

14.136. The Development has the potential to affect the Mersey Estuary with respect to either increasing or decreasing tidal flows in the vicinity of the Site as a result of the planned demolition of the existing jetty structure.

14.137. The initial likely effects of the removal of the existing structure and construction operations to tidal flows would be **local, temporary and of minor adverse significance** (**Table 14.20a**).

Table 14.20a: Initial effect to tidal flows – Demolition and construction

Assessment Factor	Value	Rationale
Receptor sensitivity	Negligible	See Paragraph 14.75
Probability	High	The removal of the existing jetty structure has to occur in order for the Development to progress.
Magnitude	Moderate	Change in tidal flows equates to a change of up to 57% on the ebb tide
Environmental change	Moderate	See Table 14.3a
Scale	Local	The area affected by the variations in tidal flow extend to 2 km seaward and 1 km landward from the Site.
Reversibility	Temporary	Although the existing structure would be permanently removed as part of the Development operations, new structures would be emplaced as part of the project. Therefore any effect on tidal flows would be limited to the duration of demolition and construction operations.
Type	Adverse	
Initial effect	**Minor**	

14.138. The construction operations are not expected to have an effect on the tidal flows in the vicinity of the Site. As a result, the effects on tidal flows during construction are not considered as part of this assessment.

Wave Effects

14.139. The existing Princes Jetty consists of a complex open structure including vertical and horizontal timber and concrete beams and other components such as decks and staircases. As the structure is relatively open, the majority of wave energy is likely to pass through the structure. Some scattering and dissipation is likely to occur and will depend on the water level and the height and wavelength of the waves.

14.140. The construction operations are not expected to have an effect on the waves at the Site. There may be some vessels on site during the Works, however they are not expected to contribute to the wave regime in the Mersey estuary. As a result effects on the wave regime during construction are not considered as part of this assessment.

14.141. The likely effects of the removal and demolition of the existing structure on the wave regime would be **local, temporary and of minor adverse significance** (**Table 14.21a**).

Table 14.21a: Initial effect to the wave regime – Demolition and construction

Assessment Factor	Value	Rationale
Receptor sensitivity	Minor	See Paragraph 14.88
Probability	High	The removal of the existing jetty structure has to occur in order for the Development to progress.
Magnitude	Negligible	The current jetty structure does not have a substantial effect on the baseline wave regime. Therefore the removal of this structure is not expected to cause a substantial change in the wave regime.
Environmental change	Negligible	See Table 14.3a
Scale	Local	Waves affected by the removal of the existing structure would be absorbed into the general wave regime of the Mersey Estuary immediately adjacent to the Site.
Reversibility	Temporary	Although the existing structure would be permanently removed as part of the Development operations, new structures would be emplaced as part of the project. Therefore any effect on waves would be limited to the duration of demolition and construction operations.
Type	Adverse	
Initial effect	**Minor**	

Transport of Estuarine Sediments

14.142. Numerical modelling was conducted to assess the effects on sediment transport patterns over a period of 30 days following the demolition and removal of the existing Princes Jetty. All the predicted effects on bed levels are limited to approximately 1.1 km of the existing jetty.

14.143. The pattern of sediment accumulation is shown by **Figure 14.17a** whereas the difference between this result and that predicted for the baseline case (**Figure 14.11a**) is shown by **Figure 14.18a**. In the sediment transport plots dark yellow to brown indicate increasing levels of sediment movement. In the accumulation difference plots yellow to red colours indicate (compared to the baseline environment) increasing levels of accretion with green and blue colours indicating areas where levels of accretion are reduced.

14.144. The area affected by the removal of the jetty extends both seaward to the West Waterloo Dock and landward down the margins of the estuary towards the Albert Dock area. The size of the area was modelled at approximately 12.2 ha (or 0.14% of the overall estuary area).

14.145. There is a small area adjacent to the Princes Half Tide Dock that is expected to be an area of marginally increased accretion rate. The model predicted that an additional 0.05 to 0.1m of sediment would accrete there over a 30 day period following removal of the jetty.

14.146. **Figure 14.25a** shows that there would be a low level of erosion in an area extending seawards from the Site. The depth of erosion is estimated at approximately 0.2m and the area is located immediately to the south of the Princes Half Tide Dock. The total volume of estuary bed eroded over a 20 day period is estimated at 1760 m^3 which is equivalent to approximately 0.5 kgs^{-1}. This rate of erosion is less than the expected rate of sediment loss during the piling removal. This calculation assumes that sediment at depths of more than 0.2m below the bed would be less erodible and would not erode under the predicted increased speeds of tidal flow.

14.147. The overall effect of removing the existing jetty reduces the potential for fine sediment accretion particularly in the area north of the structure, around the Princes Half Tide Dock approaches, with an estimated reduction in accretion of 0.3 to 0.4m of sediment.

14.148. The reduction in accretion in these areas results in some areas experiencing a small increase in the potential for fine sediment accumulation as material which would have settled further towards the channel is now able to settle nearer the bank line.

14.149. The likely effects of the removal and demolition of the existing structure on the sediment transport process would be **local, temporary and of minor adverse significance** (**Table 14.22**a).

Table 14.22a: Initial effect to sediment transport processes – Demolition and construction

Assessment Factor	Value	Rationale
Receptor sensitivity	Minor	See Paragraph 14.102
Probability	High	The removal of the existing jetty structure has to occur in order for the Development to progress.
Magnitude	Minor	The removal of the existing jetty would have an effect on the tidal flows and wave regime in the area. Changes to these processes which drive the sediment transport pathways would have an effect on the baseline sediment transport environment. The process of removing the existing jetty piles, may lead to the resuspension of potentially contaminated sediment.
Environmental change	Minor	See Table 14.3a
Scale	Local	Potential effects on the sediment transport process are limited to within 1.1km of the Site.
Reversibility	Temporary	Although the existing structure would be permanently removed as part of the Development operations, new structures would

Assessment Factor	Value	Rationale
		be emplaced as part of the project. Therefore any effect on sediment transport processes would be limited to the duration of demolition and construction operations.
Type	Adverse	
Initial effect	**Minor**	

14.150. The construction operations are not expected to have an effect on the sediment transport processes in the vicinity of the Site as the majority of operations and plant would be land based. As a result, effects on these processes during construction are not considered as part of this assessment.

Presence of Potentially Contaminated Sediments

14.151. As previous established (see 14.103 to 14.127), there is a low level of sediment contamination at the Site. However it should be noted that the demolition and construction operations are not expected to contribute to the existing levels of potential contaminants in the sediments.

14.152. The levels of heavy metal contamination lie between the CAL1 and CAL2 thresholds. This level of concentration indicates that the sediments requires further evaluation. This may include additional sampling for further analysis or the use of bioassays to more effectively assess the risk to the environment. As a result, the potential for the re-use of any sediment dredged as part of the works would be limited.

14.153. During demolition and construction activities at the Site a certain level of sediment disturbance is unavoidable. The level of disturbance is considered similar to that of sediment released during backhoe or grab dredging operations (1 $kg.s^{-1}$). The rate of sediment release during the demolition and construction is anticipated to be insignificant compared to the ambient sediment flux in the Mersey Estuary (refer also to the Water Framework Directive Scoping Assessment that is submitted in support of the planning application).

14.154. The Mersey Narrows and Wirral Northshore Special Protection Area (SPA) conservation area is located on the opposite side of the estuary. There is no indication from the modelling of estuary bed levels that potentially contaminated sediment would be mobilised across the main flow of the Mersey estuary. Distribution of the sediments is anticipated to follow the spatial pattern extent identified by the sediment transport modelling, i.e. restricted to within 1.1 km of the Site. As a result, the demolition and construction activities are not expected to have an effect on the SPA.

14.155. The movement of potentially contaminated sediment may lead to a localised deterioration in sediment (and water quality) around the Site and in the immediate vicinity. The level of potential contamination is relatively low, however it may provide a cumulative effect to the concentrations of potential contaminants in other areas of the estuary.

14.156. The likely effects of the removal and demolition of the existing structure on the movement of potentially contaminated sediments would be **local, temporary and of minor adverse significance** (**Table 14.23a**).

Table 14.23a: Initial effect on potentially contaminated sediment – Demolition and construction

Assessment Factor	Value	Rationale
Receptor sensitivity	Minor	See Paragraph 14.127

Assessment Factor	Value	Rationale
Probability	High	The removal of the existing jetty structure and subsequent construction piling has to occur in order for the Development to progress. Therefore the sediment is expected to be disturbed.
Magnitude	Minor	The volume of sediment likely to be disturbed during demolition and construction is expected to be very low.
Environmental change	Minor	See Table 14.3a
Scale	Site-wide	The demolition and construction works are only expected to affect sediments within the Site.
Reversibility	Temporary	Although the existing structure would be permanently removed as part of the Development operations, new structures would be emplaced as part of the project. Therefore any effect on potentially contaminated sediments would be limited to the duration of demolition and construction operations.
Type	Adverse	
Initial effect	**Minor**	

Completed Development

Tidal Flow

14.157. The results for the completed Development are shown in **Figure 14.19a** to **Figure 14.22a**. The tidal current speed magnitude and direction are plotted at times of peak ebb and flood tide followed by the difference in current magnitude from the completed Development.

14.158. The speed difference plots (**Figure 14.20a** and **Figure 14.22a**) compare the currents for the completed Development with the baseline conditions as this is the long term effect of the permanent works.

14.159. As the cruise terminal would reintroduce a piled structure (rather than a solid design) in the area of the existing Princes Jetty the effects shown above of the jetty removal are, to some extent, countered. The effects of the completed Development compared to baseline (existing) conditions are much less in magnitude and footprint than the effects of removing the existing jetty. (The effects of removing the existing jetty are themselves not significant.)

14.160. The effect shown at the time of peak ebb tide is a speed increase of 0.2 - 0.4 ms^{-1}. The footprint of effect extends approximately 0.6km seawards during the ebb tide and 0.2km landwards during the flood tide. The effects are shown to be confined to the eastern bank line of the Mersey Estuary, no effects mid channel are shown, indicating no predicted effect on the general tidal propagation of the estuary or any overall effects on water levels. Comparison of the water levels at Hale, landward of the Development showed no effect at high or low waters levels and negligible differences (less than +/- 2mm) during the ebb and flood phases of the tide.

14.161. The predicted limited effects of the completed Development on estuary hydrodynamics were shown to be broadly insensitive to increased mean sea level rise. **Figure 14.23a** and **Figure 14.24a** show comparisons of the currents at times of peak ebb and flood tides for baseline and completed Development cases with mean sea level increased by 0.54m**.** A very slightly increased footprint of effect is shown due to the increased tidal volume in the inner estuary and

consequential larger baseline currents. It should be noted that the morphology of the inner estuary is also expected to respond to mean sea level rise by accumulating sediment and hence reduce tidal volume. Therefore even the small enhancement to the effect of the Development as presented is precautionary.

14.162. The insensitivity of the predicted effects on tidal currents also means the effect of the Development on estuarine tidal propagation and water levels would remain negligible with increased mean sea level for the life time of the development.

14.163. The completed Development has the potential to offset the effects caused by the removal of the existing jetty. The likely effects of the completed Development relating to tidal flows would be **local, permanent and of minor adverse significance** (**Table 14.24a**).

Table 14.24a: Initial effect to tidal flows – Completed Development

Assessment Factor	Value	Rationale
Receptor sensitivity	Negligible	See Paragraph 14.75
Probability	High	The construction of the completed Development is a key objective of the project.
Magnitude	Minor	Change in tidal flows from the baseline are limited to a maximum of 0.4 ms^{-1} during the ebb tide.
Environmental change	Minor	See Table 14.3a
Scale	Local	The area affected by the variations in tidal flow extends approximately 0.6 km seawards during the ebb tide and 0.2 km landwards during the flood tide.
Reversibility	Permanent	Although the structure may eventually be upgraded or decommissioned, for the purposes of this ES it is considered as a permanent structure.
Type	Adverse	
Initial effect	**Minor**	

Wave Effects

14.164. The cruise terminal is proposed to be suspended on piles. The preliminary designs show piles at spacings of between about 5m and 15m. This is more open than the existing structure and therefore would transmit more wave energy and dissipate and disperse less wave energy than the existing structure. Most of the wave energy would pass under the deck of the proposed Development and impact on the sea wall. The sea wall is vertical and would reflect most of the wave energy incident upon it.

14.165. Under northerly and north-westerly wind conditions, this is likely to result in a small localised increase of waves at the north end of the landing stage and at the northern end of ships on berth.

14.166. In the context of the whole estuary, it should be noted that the combination of new terminal structure and existing sea wall would reflect no more wave energy than the vertical sea walls that make up the majority of the shoreline. Therefore it is expected that any effects of Princes Jetty structure on the wave climate in the estuary would be minimal.

14.167. The likely effects of the completed Development on the wave regime would be **local, permanent and of minor adverse significance** (**Table 14.25a**).

Table 14.25: Initial effect to the wave regime – Completed Development

Assessment Factor	Value	Rationale
Receptor sensitivity	Minor	See Paragraph 14.88
Probability	High	The construction of the completed Development is a key objective of the project.
Magnitude	Negligible	The new terminal structure and existing sea wall would reflect no more wave energy than the vertical sea walls that make up the majority of the shoreline.
Environmental change	Negligible	See Table 14.3a
Scale	Local	Most of the wave energy would pass under the deck of the proposed terminal and impact on the sea wall. The sea wall is vertical and would reflect most of the wave energy incident upon it
Reversibility	Permanent	Although the structure may eventually be upgraded or decommissioned, for the purposes of this ES it is considered as a permanent structure.
Type	Adverse	
Initial effect	**Minor**	

Transport of Estuarine Sediments

14.168. Numerical modelling was conducted for the completed Development. **Figure 14.23a** shows the potential for fine sediment accretion with the cruise terminal completed. **Figure 14.24a** shows the difference in potential accretion compared to baseline (existing) conditions. All the predicted effects are limited to approximately 1.1km of the existing jetty.

14.169. As indicated by the flow modelling, the introduction of piled structures associated with the cruise terminal counters some of the effect of removing the existing structure. The remaining effects are broadly small and localised.

14.170. The change in the extent of the piled structure results in a small area with an increase in the potential for accretion underneath the proposed piled structure (**Figure 14.24a**). This is estimated at a minor increase in the rate of sediment accretion between 0.05 and 0.2m.

14.171. Further afield, along the banks of the estuary there are minor, localised areas of reductions in the rates of accretion rate outside the Site. The levels show a 0.01 and 0.05m reduction in the rate of accretion in these areas.

14.172. There would be various types of cruise ships using the new terminal, of various lengths and power ratings. From an operational perspective, vessel docking procedures may utilise manoeuvring thrusters (e.g. bow thrusters, stern thrusters or azimuth thrusters). Modern cruise ships typically have three or more manoeuvring thrusters to assist in docking and low velocity movements within ports and harbours. These thrusters are required to produce powerful flows in order to move the vessels. Propeller thrust may also be generated by pilot vessels or tugs assisting the cruise ships with navigation.

14.173. The manoeuvring thrusters are likely to generate sufficiently powerful localised flows during docking operations to re-suspend sediment and lead to scouring of the estuary bed and the movement of sediment within and from the Site.

14.174. The berthing location for the vessels is unchanged from the present case and therefore the estuary bed already experiences propeller and thruster forces. However, future changes to the operation of the vessels and the power of the manoeuvring thrusters over the lifetime of the Development may result in a change to the sedimentation/erosion regime in and around the berth area.

14.175. Sediment transport modelling indicates that the area under the new jetty would be subject to accretion, this is likely to be relatively fine grained. The sediment inshore of the Development was observed to be predominantly fine grained (**Table 14.13a**), which would be particularly susceptible to scouring.

14.176. There would be an initial period where the level of scouring would be quite high while the system reaches an equilibrium. Following this period the levels of accretion and scouring are expected to stabilise.

14.177. The likely effects of the completed Development on the sediment transport process would be **local, permanent and of minor adverse significance** (**Table 14.26a**).

Table 14.26a: Initial effect to sediment transport processes – Completed Development

Assessment Factor	Value	Rationale
Receptor sensitivity	Minor	See Paragraph 14.102
Probability	High	The construction of the completed Development is a key objective of the project.
Magnitude	Minor	Likely effects on the completed Development on the rates of accretion are relatively small.
Environmental change	Minor	See Table 14.3a
Scale	Site-wide	Potential effects on the sediment transport process are limited to within 1km of the Site.
Reversibility	Permanent	Although the structure may eventually be upgraded or decommissioned, for the purposes of this ES it is considered as a permanent structure.
Type	Adverse	
Initial effect	**Minor**	

14.178. The likely effects of vessel operations on the sediment transport process would be **local, permanent and of minor adverse significance** (**Table 14.27a**).

Table 14.27a: Initial effect to sediment transport processes – Completed Development (Vessel Operations)

Assessment Factor	Value	Rationale
Receptor sensitivity	Minor	See Paragraph 14.127
Probability	Moderate	Changes to the operation of the cruise ships utilising the Development for loading and unloading purposes may occur

Assessment Factor	Value	Rationale
		over the life time of the Development. There is therefore some uncertainty associated with the probability of an effect arising.
Magnitude	Minor	The size of the cruise ship and the strength of the current flows would determine the level of propeller thrust generated by the manoeuvring thrusters (and pilot tugs). The berthing location is already visited by cruise ships and associated tugs and so the estuary bed already experiences propeller and thruster forces.
Environmental change	Minor	See Table 14.3a
Scale	Site-wide	Propeller thrust effects from vessel operations are expected to be limited to the Site
Reversibility	Permanent	Once the Site has undergone scouring as a result of any changes to vessel operations, the sediment would be redistributed throughout the Mersey Estuary. Natural levels of accretion are the only method of replenishing the sediment, and the level of accretion under the jetty (and inshore) is not expected to fully replenish the amount of disturbed sediment.
Type	Adverse	
Initial effect	**Minor**	

Presence of Potentially Contaminated Sediment

14.179. The completed Development would have an effect on the sediment transport processes within the estuary as outlined in the preceding section. However, the mobilisation of existing sediments would be negligible in relation to the size of the tidal sediment flux passing in and out of the estuary through The Narrows.

14.180. Re-suspension of potentially contaminated sediment may occur as a result of changes to vessel operations at the Development from the movement of cruise ships (see Paragraphs 14.172 to 14.176).

14.181. The mobilisation of re-suspended and potentially contaminated sediments is anticipated to follow the spatial patterns and distributions identified by the sediment transport modelling. The footprint of any changes in bed level are likely to be limited to within 1.1km of the Site and would be constrained to the north-eastern bank of the estuary.

14.182. The Mersey Narrows and Wirral Northshore SPA is located on the opposite side of the estuary. There is no indication from the modelling of estuary bed levels that potentially contaminated sediment would be mobilised across the main flow of the Mersey estuary. Distribution of the sediments is anticipated to follow the spatial pattern extent identified by the sediment transport modelling, i.e. restricted to within 1.1km of the Site. As a result, the demolition and construction activities are not expected to have an effect on the SPA.

14.183. The likely effects of the completed Development of the existing structure on the mobilisation of contaminated sediment would be **local, permanent and of minor adverse significance** (**Table 14.28a**).

Table 14.28a: Initial effect on potentially contaminated sediment – Completed Development (Structure)

Assessment Factor	Value	Rationale
Receptor sensitivity	Minor	See Paragraph 14.127
Probability	High	The construction of the completed Development is a key objective of the project.
Magnitude	Minor	Effects to the sediment bed level would be limited to 1 km as detailed in the sediment transport modelling.
Environmental change	Minor	See Table 14.3a
Scale	Local	Potential effects on the erosion / accretion are likely to be limited to within 1.1 km of the Site.
Reversibility	Permanent	If any sediments are disturbed they would enter the sediment background system of the Mersey Estuary. It would not be possible to return these sediments to their original site.
Type	Adverse	
Initial effect	**Minor**	

14.184. The likely effects of the completed Development of vessel operations on the mobilisation of contaminated sediment would be **local, permanent and of minor adverse significance** (**Table 14.29a**).

Table 14.29a: Initial effect on the mobilisation of potentially contaminated sediment – Completed Development (Vessel Operations)

Assessment Factor	Value	Rationale
Receptor sensitivity	Minor	See Paragraph 14.127
Probability	Moderate	Changes to the operation of the cruise ships utilising the Development for loading and unloading purposes may occur over the life time of the Development.
Magnitude	Minor	The size of the cruise ship and the strength of the current flows would determine the level of propeller thrust generated by the manoeuvring thrusters (and pilot tugs). The berthing location for the vessels is the same as presently used hence the seabed already experiences propeller and thruster forces.
Environmental change	Minor	See Table 14.3a
Scale	Site-wide	Propeller thrust effects from changes to vessel operations are expected to be limited to the Site
Reversibility	Permanent	If any sediments are disturbed they would enter the sediment background system of the Mersey Estuary. It would not be possible to return these sediments to their original site.
Type	Adverse	
Initial effect	**Minor**	

Vessel Wash

14.185. As a vessel moves through the water its hull displaces the water around it, generating surface waves diverging away from the sailing line. In addition, a transverse wave is generated by the pressure effects of the moving hull. These two wave trains interact and the maximum wave heights occur along a line where wave crests meet.

14.186. The nature of the waves generated is strongly dependent on the hull shape, the vessel velocity through the water and the water depth. The height of wave generated increases exponentially with the vessel speed, so a relatively small increase in speed can lead to a much larger relative increase in wave height. The vessel-generated wave heights decrease from the sailing line in proportion to the cube-root of the ratio of the distance from the sailing line divided by wave length. A literature review shows this reduction is common to all methods and is because the waves are an interaction between the transverse and diverging waves.

14.187. For the Liverpool Cruise Terminal, the Site is already visited regularly by cruise ships of varying sizes so the hull shape, vessel speed and route would be similar to the present situation meaning the waves generated would be of comparable magnitude and in the same area, hence similar areas of intertidal and subtidal habitats would be affected by vessel movements to and from the Development. The number of vessel visits would gradually change for both 'Transit' vessels making a call and 'Turnaround' vessels at the start/end of a cruise.

14.188. Table 5.1 of the November 2017 ES summarises the predicted vessel numbers using the Development, indicating an increase of 5 transit vessel visits by 2025 and an increase of 8 turnaround vessel visits by 2024. For the turnaround vessels, the largest change would be for the extra-large vessels with an increase from 1 presently to 6 in 2024. Therefore, vessel wash waves would occur slightly more often as the usage of the new cruise terminal increases. The contribution of vessel waves to the amount of wave energy experienced by the subtidal and intertidal habitats would remain small compared to that provided by waves in the area of the Site (1-year return period waves of 0.6 to 1.5m)[127]. This is considered to represent an effect of **negligible** significance.

Mitigation Measures and Likely Residual Effects

Demolition and Construction

14.189. For all of the effects assessed for the demolition and construction phases, significance of effect was considered to be minor adverse significance or lower for all receptors. Consequently, no additional specific mitigation measures are proposed during demolition and construction.

Completed Development

14.190. It was determined that the only potential effect for which additional mitigation may be required was the potential effect of the completed Development on the sediment transport processes at the Site due to potential changes in vessel operations. The Site is already visited by cruise vessels and associated tugs. However, the size and operation of the vessels and power of the manoeuvring thrusters may result in a change to the sedimentation/erosion regime in and around the berth area.

127 HR Wallingford (2017). Hydrodynamic and coastal process studies, Liverpool cruise terminal, RT001 R01-00. Report produced for Waterman Infrastructure and Environment Ltd.

14.191. In the absence of any mitigation measures, the likely effects of vessel operations on the sediment transport process would be local, permanent and of minor adverse significance. The safety of the vessel is paramount and the full range of manoeuvring thruster power must be available during docking and undocking operations to ensure that the safety of the cruise ships is not compromised.

14.192. As there is some uncertainty about the influence of future vessel operations on localised seabed scour, bathymetric surveys of the berthing location and the surrounding area are proposed; prior to the commencement of the proposed works (baseline), during the works and post-construction. Further surveys may be justified if there is a significant alteration to the nature of berthing operations. These surveys would verify the nature of the localised scour, and if necessary intervention could be made if this effect is materially greater than under the present situation.

14.193. The frequency and duration of the bathymetric surveys would be proportionate to the risks arising, and their scope would be agreed with the MMO.

14.194. The residual effects of vessel operations on sediment transport following the application of the identified mitigation measures have been assessed. **Table 14.30a** shows the assessment of residual effects. Changes to the original assessment which was presented in **Table 14.27a** are presented as *italic text.*

14.195. The implementation of the mitigation measures has lowered the probability of the effect of the Development on the sediment transport processes occurring at the Site. However, despite the reduction in probability, the residual effect on sediment transport processes remains **local, permanent and of minor adverse significance**.

Table 14.30a: Likely residual effects of vessel operations on sediment transport processes

Assessment Factor	Value	Rationale
Receptor sensitivity	Minor	See Paragraph 14.127
Probability	Low	Changes to the operation of the cruise ships utilising the Development for loading and unloading purposes may occur over the life time of the Development. *This would be verified by bathymetric survey and intervention steps taken if required.*
Magnitude	Low	The size of the cruise ship and the strength of the current flows would determine the level of propeller thrust generated by the manoeuvring thrusters (and pilot tugs) would remain unchanged. *The berthing location for the vessels is the same as presently used hence the seabed already experiences propeller and thruster forces.*
Environmental change	Minor	See Table 14.3a
Scale	Site-wide	Propeller thrust effects from vessel operations are still expected to be limited to the Site
Reversibility	Permanent	Once the Site has undergone scouring as a result of vessel operations, the sediment would be redistributed throughout the Mersey Estuary. Natural levels of accretion are the only method of replenishing the sediment, and the level of accretion under the jetty (and inshore) are not expected to fully replenish the amount of disturbed sediment.
Type	Adverse	

Assessment Factor	Value	Rationale
Residual effect	**Minor**	

Summary

14.196. In the absence of mitigation, the Development was assessed to have likely effects as follows:

- During demolition and construction, the effect of operations on tidal flows would have a **temporary, local effect of minor adverse significance**;
- During demolition and construction, the effect of operations on the wave regime would have a **temporary, local effect of minor adverse significance**;
- During demolition and construction, the effect of the operations on sediment transport would have a **temporary, local effect of minor adverse significance**;
- During demolition and construction, the effect of the operations on potentially contaminated sediments would be **temporary, local effect of minor adverse significance**;
- Once completed the Development will create a change in tidal flows that would have a **permanent, local effect of minor adverse significance**;
- Once completed the Development will create a change on the wave regime that would have a **permanent, local effect of minor adverse significance**;
- Once completed the Development will create a change on sediment transport processes that would have a **permanent, local effect of minor adverse significance**;
- Once completed, vessel operations at the Development will create a change in the sediment transport process that would have a **permanent, local effect of minor adverse significance**;
- Once completed the Development (and cruise ship vessel operations) will have limited potential to affect the levels of sediment contamination, and is expected to a create a change that would have a **permanent, local effect of minor adverse significance**; and
- Once completed, there would be effects of **negligible** significance in terms of vessel wash.

14.197. Following the mitigation recommended in this chapter the following residual effects are expected:

- The majority of likely effects are considered insignificant or negligible in terms of the wider Site. Due to the low significance of predicted effects, additional mitigation measures are generally not required to reduce the effect further.

15. Cumulative Effects

15.1. This chapter supplements the November 2017 ES Chapter 15: Cumulative Effects and should be read in conjunction with that chapter.

15.2. A review of the Marine Management Organisation's EIA Scoping Report has necessitated some additions to the text provided in the November 2017 ES chapter.

Consideration of Wirral Waters

15.3. Wirral Waters consists of residential units, office and research and development floor space, retail space, hotel and conference facilities, culture, education, leisure, community and amenity floor space, together with the provision of car and cycle parking, structural landscaping, formation of public spaces and associated infrastructure and public realm works, including retention of and conversion works to the Grade II Listed Hydraulic Tower.

15.4. Information relating the Wirral Waters project has been obtained from the planning application documents for the East Float part of the development including the Design and Access Statement, Cumulative Impact Assessment and Ecological Impact Assessment.

15.5. The project encompasses a number of docks separated from the Mersey Estuary by Twelve Quays on the western bank. The project includes Vittoria Pool, Vittoria Dock, and East Float.

15.6. The site supports common gull *Larus canus*, herring gull *Larus agentatus*; and black-headed gull *Larus ribibundus*. The site supports low numbers of over-wintering birds such as the common shelduck *Tadorna tadorna* and very low numbers of breeding birds.

15.7. The planning application documents indicate that:

- The land and water within and around the proposed Liverpool Cruise Terminal site supports little of biodiversity interest and the valued ecological receptors identified are not significantly affected by the Development; and
- None of the potential effects that arise from the Liverpool Cruise Terminal Development in either its construction or operational phase will extend as far as the Wirral Waters development on the west bank of the Mersey Estuary.

15.8. Consequently, it is considered that there will not be any significant cumulative effects with the Wirral Waters development. All potential cumulative effects have therefore been screened out.

APPENDICES

Appendix 2.3a: EIA Scoping Report for MMO

Liverpool Cruise Terminal

Environmental Impact Assessment Scoping Report for Harbour Revision Order and Marine Licence Applications

December 2017

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Quality Assurance – Approval Status

This document has been prepared and checked in accordance with Waterman Group's IMS (BS EN ISO 9001: 2008, BS EN ISO 14001: 2004 and BS OHSAS 18001:2007)

Issue	Date	Prepared by	Checked by	Approved by
First	December 2017	Gavin Spowage Associate Director	John Hughes Regional Operations Director	John Hughes Regional Operations Director
Comments				
Second	December 2017	Gavin Spowage Associate Director	John Hughes Regional Operations Director	John Hughes Regional Operations Director
		Revisions following legal review		
Third	December 2017	Gavin Spowage Associate Director	John Hughes Regional Operations Director	John Hughes Regional Operations Director
		Further revisions following further legal review		

Disclaimer

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We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.

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Contents

Appendices

1. Introduction

Mersey Docks and Harbour Company Ltd (hereafter referred to as the 'Applicant') is seeking to obtain a Marine Works Licence and Harbour Revision Order (HRO) for a scheme covering an area of approximately 5.77 hectares (ha), located at Princes Parade, Liverpool on the east bank of the Mersey Estuary (hereafter referred to as the 'Site'). Mersey Docks and Harbour Company Ltd is the Statutory Harbour Authority for the Port and Harbour of Liverpool.

Whilst the Applicant has agreed to promote a HRO with the Marine Management Organisation (MMO), Liverpool City Council (LCC) will be carrying out the demolition and construction works itself under licence from the Applicant, the terms of which are to be agreed between the Applicant and LCC at an appropriate time.

The proposals (hereafter referred to as the 'proposed Development') include the creation of a new jetty at the existing redundant Princes Jetty site upon which a new cruise ship passenger terminal would be built. The new cruise terminal will be connected to the existing landing stage by a 'linkspan' bridge and passenger walkways. The works will also include landscaping and associated infrastructure including short stay surface car parking for passenger drop off and pick up. The purpose of the proposed Development is to enable the existing temporary cruise terminal to be replaced with a permanent and enlarged cruise terminal capable of accommodating the change in the cruise market to larger ships and rising passenger numbers.

The Site currently comprises two main areas; the first comprises a section of open water within the Mersey Estuary adjacent to the dockside which will be reclaimed as part of the proposed Development; and the second comprises a surface car park. The remaining areas of the Site comprise unadopted highways, staging areas for the Isle of Man Ferry and the entirety of the existing Liverpool Landing Stage.

Due to the nature of the works to construct the proposed Development, the determining authorities are LCC and the MMO. The location of the Site is shown on **Figure 1** and the Planning Application and HRO boundaries on **Figure 2**. The figures are presented in **Appendix A**.

It is important to note that this Scoping Report was submitted to request a formal Scoping Opinion from LCC in July 2017 in accordance with the Town and Country Planning (Environmental Impact Assessment) Regulations 2017. The Scoping Opinion was received on 8th September 2017 and the individual scoping responses are provided as **Appendix B**. An Environmental Statement was then produced, based on the conclusions of the Scoping Opinion, and was submitted to LCC in support of a hybrid planning application for the proposed Development in November 2017. The Environmental Statement is available for download from the LCC online planning portal (planning reference 17O/3230) and can be accessed at this link.

1.1 Environmental Impact Assessment

The Environmental Impact Assessment (EIA) process is a systematic means of understanding and assessing the likely significant environmental effects arising from a development. The process enables developers to respond iteratively to the prevailing environmental conditions and constraints in relation to their proposals. This allows for the evolution of most practicable environmentally sustainable design and ensures that, if deemed necessary, measures are taken to prevent, reduce and where possible, offset potentially adverse significant environmental effects. The EIA process also aims to maximise the beneficial effects of redevelopment.

EIA also assists the relevant determining authority in reaching a decision on the planning application. Where an EIA is required, all relevant assessment information must be provided by the Applicant in a

document referred to as an Environmental Statement (ES). The ES must accompany the submission of the subject planning application.

EIA Directive 2011/92/EU[1] of the European Parliament and of the Council replaced and consolidated earlier EIA Directives and forms the overarching legal framework for Environmental Impact Assessment for all states within the European Union. This was updated and amended by Directive 2014/52/EU[2] in April 2014. The requirements of the Directive, as amended, have been transposed into UK legislation, under various planning and permitting regimes. Whilst there is some variance in the requirements of the Regulations for each of the regimes, the overarching requirements are set out within the Directive.

1.2 EIA Scoping

It was recognised by the Applicant that the proposed Development is above the 1 hectare threshold prescribed by the Town and Country Planning (Environmental Impact Assessment) Regulations 2017[3], (Schedule 2, Category 10g) for construction of Harbour and Port Installations. In addition, due to the nature and scale of the proposed Development, together with the environmental constraints and sensitivities associated with the Site, the Applicant voluntarily commissioned an EIA to identify and assess the likely significant environmental impacts of the proposed Development and to ensure that adverse impacts are mitigated through design, where possible.

However, the Applicant is now seeking a formal Screening Opinion from the MMO as this is a procedural requirement of the Harbours Act 1964[4].

As noted above, this Scoping Report was submitted to request a formal Scoping Opinion from LCC in July 2017. The Scoping Opinion was received on 8th September 2017 and the individual scoping responses are provided as **Appendix B**. An Environmental Statement was then produced, based on the conclusions of the Scoping Opinion, and was submitted to LCC in support of a hybrid planning application for the proposed Development in November 2017. The Environmental Statement is available for download from the LCC online planning portal.

The Scoping Report is now being submitted to the MMO to request a formal Scoping Opinion under the equivalent requirements set out in both the Marine Works (Environmental Impact Assessment) Regulations 2007[5], as amended[6] and the Environmental Impact Assessment (Miscellaneous Amendments Relating to Harbours, Highways and Transport) Regulations 2017[7] under the Harbours Act 1964, hereafter collectively referred to as the EIA Regulations.

The first stage of EIA is 'Scoping'. An important component of the EIA process, scoping enables significant environmental issues to be identified and the scope of the various technical studies which have been undertaken. It also enables non-significant environmental issues to be scoped out of the EIA, to provide a focussed document to assist decision makers in determining the planning application.

This report provides details of the Site and proposed Development, an outline of their likely significant effects on the environment, and the assessment methodologies that were employed during the EIA to assess these effects. Where a particular scoping response resulted in amendment to the proposed assessment methodology, this is noted and the reader is referred to the scoping responses presented in **Appendix B**.

[1] Eurolex (2011) 'Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment'
[2] Eurolex (2014) 'Directive 2014/52/EU Amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the
[3] HMSO (2017) 'The Town and Country Planning (Environmental Impact Assessment) Regulations
[4] HMSO (1964) Harbours Act
[5] HMSO (2007) Marine Works (Environmental Impact Assessment) Regulations'
6 HMSO (2017) Marine Works (Environmental Impact Assessment) (Amendment) Regulations
[7] HMSO (2017) Environmental Impact Assessment (Miscellaneous Amendments Relating to Harbours, Highways and Transport) Regulations 2017

The Scoping Report, as set out in Sections 2 to 7 below, was used to identify the likely environmental issues and to inform the scope of the technical studies included within the EIA submitted in support of the hybrid planning application. The report is structured as follows:

Section 2 outlines the background to the proposed Development and provides a brief description of its nature and purpose. It also provides a summary of the existing environmental conditions of the Site and its immediate surroundings.

Section 3 describes the consultations that have been undertaken as part of the EIA.

Section 4 provides a description of the potentially significant environmental effects that have been identified. The approach and methodology for the assessment of each topic in the EIA is described.

Section 5 provides an outline of issues which have been scoped out of the EIA.

Section 6 provides a summary of how significant environmental effects have been determined.

Section 7 provides details of the proposed structure of the ES.

2. The Site and Proposals

2.1 Site Location and Description

As shown on **Figure 2**, the Site comprises two areas, aligned north to south, linked by Princes Parade highway, and located to the west of Princes Dock. For the purposes of the Site description, the Site has been separated into four land parcels, which are described in the following paragraphs.

2.1.1 North East Car Park

The north east of the Site comprises a hard-standing surface car park, that is currently used to provide short term parking and drop off facilities for the existing Liverpool Cruise Terminal. During the Site survey the hard standing of the northern car park was noted to be mixed tarmac and cobbles, with some gravel areas. A disused railway line is also visible in this area.

2.1.2 Princes Jetty and Open Water

The dilapidated timber and concrete Princes Jetty and open waters of the Mersey Estuary occupy this part of the Site. The jetty is currently dilapidated and not publicly accessible and is surrounded by security fencing. Two mooring dolphins are located within the open waters of the Mersey Estuary, these are currently for the operation of the Liverpool Landing Stage.

2.1.3 Southern Area

This area comprises a marshalling area and kiosk for the existing Isle of Man ferry terminal along with a small surface car park and an area of soft landscaping and the Grade II Listed Titanic Memorial. A section of the Liverpool Canal Link also runs under the southern car park.

2.1.4 Access Roads

The car parks are linked by Princes Parade, a private road that runs north south and connects to St Nicholas Place in the southern part of the Site. Access ramps to the existing floating landing stage connect to Princes Parade.

2.1.5 Existing Liverpool Landing Stage

The landing stage is located within the River Mersey and facilitates the berthing and services of cruise ships, and at the southern end the current operation of the Isle of Man ferry. The structure is a pontoon that is connected to the quay wall by a number of link bridges including vehicular access.

2.2 The Surroundings

The Site is bound by the Mersey Estuary to the west, the residential properties at Alexandra Tower along with the Waterloo Dock to the north, offices and Princes Dock to the east and existing cruiser liner terminal and the Liver Building to the south.

The southern section of the Site, including the south car park, is situated within the Liverpool Maritime Mercantile City World Heritage Site Core Area, whilst the remainder of the Site is within the World Heritage Site Buffer Zone.

The Site is not subject to any other statutory designations. It is however, within the consultation zone for the Mersey Narrows Site of Specific Scientific Interest (SSSI), and the proposed extension area to the Liverpool Bay Special Protection Area

The Mersey Narrows & North Wirral Foreshore, approximately 820m to the west of the Site on the opposite bank of the Mersey Estuary, is designated a SSSI, RAMSAR site and Special Protection Area.

2.3 Potentially Sensitive Receptors

A number of receptors have been identified that would be potentially sensitive to adverse effects resulting from the proposed Development, including:

- The Mersey Estuary, the Princes Dock, the Waterloo Dock and Liverpool Canal Link;
- The existing estuary and dock walls;
- The setting of the Liverpool Maritime Mercantile City World Heritage Site;
- The setting of the Castle Street and Stanley Dock Conservation Areas;
- The operation of shipping traffic in the Mersey Estuary;
- Grade II Listed Titanic Memorial;
- Ecological habitats and species on-site and within the Mersey Estuary;
- Possible archaeological remains beneath the Site;
- Existing and future public transport services, car users, pedestrians and cyclists in and around the Site;
- Construction Site workers;
- Hotels on William Jessop Way;
- Existing residents in properties surrounding the Site, including Alexandra Tower and 1 William Jessop Way, residential property surrounding the Waterloo Dock, properties on the east side of the Princes Dock and future residential properties in the areas surrounding the proposed Development; and
- Tenants within the existing office blocks on Princes Parade.

Early consideration of the above sensitive receptors has, and will continue to be considered within the evolving design.

2.4 The Proposals

Liverpool City Council is proposing the development of a permanent Cruise Terminal Facility at the former Princes Jetty, Liverpool, to replace the existing temporary Cruise Terminal, which would close when the new facility becomes operational.

The permanent facility would provide for larger ships with passenger numbers of typically 3,600 and a crew of up to 2,000. Due to the trend towards larger cruise ships the facility will be designed in order to provide flexibility in order to serve ships of up to 5,000 passengers. A larger terminal building, than that currently in use, is therefore required. The proposed Development would comprise terminal building up to a maximum of 30m AOD (approximately 22.45m above the existing ground level), with a gross internal area (GIA) of up to 13,000m² along with ancillary structures and associated development. The overall footprint of the terminal has been based on cruise sector guidelines. In order to service the proposed larger cruise ships, a new vehicular and passenger access bridge is required to connect the terminal to the existing Liverpool Landing Stage. A parking strategy will be developed to ensure the development includes

sufficient on-site parking facilities for coaches, taxis, valet services and short-term parking for the Port of Call and Turnaround operations. It is expected that long-term parking for passengers will be provided for in off-site facilities within the City, as is presently the case.

Due to constraints with respect to available land, the proposals are for the demolition of the existing Princes Jetty to enable the Cruise Liner Terminal to be constructed within the River Mersey on a suspended deck, which shall require a lease from the Duchy of Lancaster and consents from MDHC (Peel Ports) for works in the River and works to the River Wall.

The 'Pilot Launch Building' located on the Liverpool Landing Stage is to be relocated. The current 'lower' cruise terminal reception building would be retained for use as staff welfare facilities and storage.

3. Consultations

Consultation with relevant bodies assists in ensuring that all relevant environmental issues are identified, together with the likely significant environmental effects of the proposed Development. This enables the EIA to operate as part of an iterative process whereby environmental issues are identified and considered as part of the design process. In this way, the design of the proposed Development can be refined through the incorporation of mitigation measures serving to limit its adverse effects and enhancing its beneficial effects. Consultations have been and will continue to be undertaken as part of the design and EIA process, and will include (but will not necessarily be limited to) the following organisations:

- Liverpool City Council;
- Marine Management Organisation;
- Environment Agency;
- Natural England;
- Historic England;
- Mersey Travel;
- Merseyside Ecological Advisory Service,
- The Applicant;
- United Utilities;
- The Isle of Man Steam Packet Company;
- Merseyside Wildlife Trust; and
- Peel Holdings.

4. Key Issues to be Addressed by the EIA

4.1 Introduction

The EIA will be undertaken in accordance with the requirements of the EIA Regulations and current industry good practice. The legal minimum requirements for the content of an ES are set out in the EIA Regulations. It is recognised that for the ES to fulfil its primary objective of enabling environmental considerations to be incorporated into the decision-making process, it must be focused on the most potentially significant environmental issues. These key issues were identified during the Scoping Study described in this report and are set out in the following section, which therefore define the focus, or scope, of the EIA.

4.2 Alternatives

In accordance with the EIA Regulations, the ES will present a description of the main alternatives to the proposed Development that were considered by the Applicant prior to selection of the final scheme, which may include a description of the following:

- '**Do nothing' scenario**: The consequences of no development taking place; and
- **Alternative designs**: The main alternatives considered, such as alternative layouts.

Where relevant, the basis for the selection of the final design shall be set out, with refence to the wider suite of application documents, including the Design and Access Statement. It is anticipated that considerations with respect to programme, cost, and engineering feasibility will be briefly considered alongside environmental constraints and considerations, including direct impacts and consideration of climatic factors such as resilience and embedded carbon.

4.3 The Proposed Development

In accordance with the EIA Regulations, the ES would include a comprehensive description of the proposed Development, as defined by a number of Parameter Plans, that will form the basis of the outline planning application. The description of the proposed Development would include a factual description of:

- Building layout and siting;
- Building height and massing;
- Quantum and distribution of proposed land uses;
- Outline landscaping strategy;
- Highway works, access, servicing, and parking arrangements;
- Structures within and above the River Mersey;
- Outline waste management strategy;
- Outline building services plant with an indication of emissions; and
- Outline drainage strategy.

The description of the proposed Development, together with the planning application drawings and accompanying area schedule, comprise the details that will be assessed and reported in the technical chapters of the ES.

4.4 Development Programme and Construction

The ES will include a description of the following aspects in relation to construction of the proposed Development:

- Likely programme and sequencing of Site works;
- Description of the demolition works;
- Anticipated types of piling, foundations, ground engineering likely to be employed;
- Description of structures to be constructed within the Mersey;
- Outline methods of construction; and
- Working hours.

The ES will also describe the potential likely environmental effects associated with the demolition and construction works such as vehicle movements, dust, noise, silt and waste removal and where appropriate, mitigation measures will be outlined to offset, reduce or, where possible, eliminate adverse effects. It is intended that such measures would be included in a site-specific Construction Environmental Management Plan with construction methodologies agreed with the MMO and LCC prior to the commencement of permitted works.

Each technical chapter within the ES will also give detailed consideration to demolition and construction effects specific to the topic area being assessed. Such assessments will be based on available information pertaining to the demolition and construction timetable and description of works as outlined above. In addition, where relevant, each Chapter shall consider the vulnerability of the proposed Development to major accidents or disasters. This shall be based on a bespoke significance criteria considering both the severity of the impact, and its likelihood of occurrence to determine the residual effect, following the incorporation of appropriate mitigation.

4.5 Air Quality

4.5.1 Key Issues

In accordance with the Air Quality Strategy for England, Scotland, Wales and Northern Ireland[8] and Part IV of the Environment Act[9], LCC has, and will continue to review the ambient air quality within their administrative boundary. LCC has designated the whole City of Liverpool as an Air Quality Management Area (AQMA) owing to exceedances of the National Air Quality Strategy objective for annual mean nitrogen dioxide (NO_2). Consequently, the Site is located within the AQMA. An Air Quality Action Plan[10] was produced by LCC, setting out the policies and measures to be implemented to improve air quality in the City.

It is anticipated that there could be the potential for construction works to affect local air quality mainly because of construction traffic and plant emissions, together with dust generation.

The completed and operational Development has potential to change traffic flows in the area surrounding the Site, resulting in changes to traffic related emissions. In addition, there are potential impacts associated with auxiliary engines running on the cruise ships whilst moored at the cruise terminal.

[8] Department of the Environment (2007) 'The UK National Air Quality Strategy', HMSO, London.
[9] HMSO Environment Act 1995.
[10] Liverpool City Council (January 2011) 'Air Quality Action Plan'

4.5.2 Potential Effects

The potential likely significant effects of the proposed Development on local air quality to be addressed in the ES are as follows:

- temporary generation of dust arising from the construction works leading to potential dust nuisance to surrounding sensitive receptors;
- temporary changes in traffic-related emissions during the demolition and construction works because of changes in traffic generated by the construction works, together with an increase in emissions from construction plant; and
- long-term effects from the completed Development on local air quality and the AQMA, particularly in relation to NO_2 and PM_{10} levels, due to:
  - emissions from traffic generated by the completed and operational Development;
  - ship movements;
  - cruise ship auxiliary engines during hotelling; and
  - building plant.

4.5.3 Approach and Methodology

The air quality assessment will be undertaken in accordance with relevant guidance and comprise the following:

- identification of potentially sensitive existing receptors which could be affected by changes in air quality that result from the construction and operation of the proposed Development;
- a review of baseline conditions through a review of relevant LCC air quality review and assessment documents and data from the monitoring network surrounding the Site;
- a qualitative assessment of air quality effects during demolition and construction work, with reference to the Institute of Air Quality Management (IAQM) guidance document[11];
- application of the ADMS-Roads air quality dispersion model, using data from the project Transport Consultants, to assess the likely significant effects of traffic generated by the completed and operational Development on local air quality, particularly NO_2 and PM_{10}, and to assess the likely air quality conditions that would be experienced at the proposed residential units surrounding the proposed Development. The air quality model will be verified against the LCC diffusion tube on Covent Garden / Water Street Junction located approximately 500m southeast of the Site. The effects on air quality will be assessed by comparing the 'without Development' scenario with the 'with Development' scenario;
- application of the ADMS air quality dispersion model to assess the likely significant effects of emissions from significant building plant and the cruise ship auxiliary engines during hoteling;
- comparison of the predicted pollutant concentrations with monitored air quality concentrations, the UK air quality objectives and the Environmental Protection UK & IAQM significance criteria[12];
- formulation of appropriate mitigation measures, where necessary. Consideration will be given to measures for controlling dust as set out in the IAQM guidance document.

The result of the above would be summarised in an appropriate ES chapter with supporting figures. All technical data used in the air quality assessment will be appended to the ES.

[11] Institute of Air Quality Management (IAQM) 2014. 'Guidance on the assessment of dust from demolition and construction.'
[12] Environmental Protection UK (2015). Land-use Planning & Development Control: Planning for Air Quality.

4.5.4 Relevant Subsequent Correspondence

*Merseyside Environmental Advisory Service's EIA Scoping Response (refer to **Appendix A**) requested that the air quality assessment should consider impacts upon statutory designated nature conservation sites.*

4.6 Noise and Vibration

4.6.1 Key Issues

A baseline noise survey, the strategy of which was agreed in advance with the Environmental Protection Unit (EPU) of LCC, was undertaken in March 2017 to establish prevailing ambient noise levels at potentially sensitive receptors within the vicinity of the Site. The survey identified the dominant noise source to be road traffic noise primarily from the A5052 and to a lesser extent Waterloo Road, both located to the east of the Site. Noise associated with tidal movement of the River Mersey was also noted as a noise source during the night-time survey period. Intermittent contribution from human activity was also noted. During the survey, no perceptible levels of vibration were noted, as anticipated given that there are no existing sources at or within the vicinity of the Site.

Although the Site and surrounds are predominantly urban and commercial in nature, there are a number of noise sensitive receptors that would have the potential to be adversely affected during the construction and operational phase of the proposed Development. These include: the residential Alexandra Tower and City Lofts located adjacent to the north and north-eastern Site boundary respectively; Malmaison hotel to the east; and the commercial premises of Princes Dock Offices No.12 directly adjacent to the eastern Site boundary.

Noise from operation of the proposed Development will consist of both permanent and scheduled transient sources, the latter being transit and docking cruise ships together with associated operations.

4.6.2 Potential Effects

The potential likely significant effects of noise and vibration during construction and once the proposed Development is completed and operational to be addressed in the ES will include:

- Temporary noise and vibration effects to existing sensitive receptors (including residential properties and listed buildings / structures) on and surrounding the Site because of demolition and construction works;
- Effects from changes in road traffic levels to existing sensitive receptors resultant from the demolition, construction and operational phase;
- Noise effects from operation of permanent sources associated with the proposed Development, in-particular fixed external plant; and
- Intermittent operational noise effects during transit and hotelling of cruise ships, including both traffic generation and running auxiliary engines.

4.6.3 Approach and Methodology

Liaison with the EHO of LCC has already been undertaken to agree the baseline survey strategy, assessment methodology and required noise criteria. Considering this, the noise and vibration assessment to be carried out by Waterman would incorporate the following:

- Consideration of identified sensitive noise and vibration receptors within the vicinity of the Site including Alexandra Tower (residential), City Lofts (residential), Malmaison (hotel) and Princes Dock Offices No.12 (commercial). Effects on Listed Structures will also be included within the assessment;
- Undertaking short-term attended baseline noise surveys within the vicinity of the identified sensitive receptors to establish the prevailing ambient noise levels on which to base the assessments. These were conducted in March 2017 having been agreed in advance with the EHO of LCC;
- Undertaking noise measurements of comparable cruise ship operations, should this be required, to establish potential operational noise levels from intermittent operations. Waterman currently have source noise measurements of cruise ship operations at Southampton Terminal Dock. The final approach will be agreed with the EHO of LCC;
- Estimating the levels of noise and vibration generated from the key demolition and construction activities and an assessment of the likely significant effects on surrounding sensitive receptors, using the methodology set out in British Standard (BS) BS5228[13][14];
- Assessment of the likely noise effects from permanent operational noise; namely fixed external plant on sensitive receptors. The assessment will be undertaken in general accordance with BS4142[15] having regard to the noise criteria of LCC in that the rating noise level should not exceed the existing background noise level at sensitive receptors;
- Assessment of the likely noise effects from intermittent operational noise; namely transit, docking and hoteling of cruise ships and associated operations. The assessment methodology will be agreed with the EHO of LCC but is likely to comprise a combination of guidance from BS4142 and change in the prevailing noise level during intermittent operations;
- Assessment of the impacts of road traffic noise due to changes resultant from the proposed Development. This assessment would be carried out in accordance with the Calculation of Road Traffic Noise (CRTN) memorandum[16] in respect of existing and future sensitive receptors. Regard will also be given to the advice in the Design Manual for Roads and Bridges[17] (DMRB).
- Preparation of an ES Chapter, appropriate figures and supporting appendices.

4.6.4 Relevant Subsequent Correspondence

*Merseyside Environmental Advisory Service's EIA Scoping Response (refer to **Appendix A**) requested that the noise assessment should consider impacts upon statutory designated nature conservation sites.*

4.7 Townscape and Visual

4.7.1 Key Issues

There are currently only few buildings and structures located within the Site. Therefore, the development offers an opportunity to improve and enhance the townscape character of the Site. In terms of views, there are a number of monuments, residential properties, hotels and building within the Liverpool – Maritime Mercantile City World Heritage Site that have direct views towards the Site that could potentially be affected by the proposed Development. Views through the Site towards the core of the World Heritage Site and along the waterfront would also be potentially affected by the proposed Development.

[13] BSI. (2014) BS 5228-1:2009+A1:2014. Code of Practice for noise and vibration control on construction and open sites. Noise'. BSI.
[14] BSI. (2009) BS 5228-2:2009. Code of Practice for noise and vibration control on construction and open sites. Vibration'. BSI.
[15] British Standard Institute (BSI) (2014); BS 4142:2014 'Methods for rating and assessing industrial and commercial sound'. BSI.
[16] DoT. (1998) The Calculation of Road Traffic Noise. HMSO.
[17] Highways Agency. (2011); Design Manual For Road & Bridges Vol 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 7 Noise & Vibration. TSO.

4.7.2 Potential Effects

The height and massing proposed by the Development has the potential to alter the existing townscape character and quality in addition to views to, through and from the Site. As such, the potential likely significant effects which the ES would address are as follows:

- Temporary visual intrusion during the construction works;
- Changes to the character, context and quality of the Site and the local townscape as a result of the buildings and structures;
- Permanent but transient changes to the character, context and quality of the Site and the local townscape; and
- Effects upon important but non-statutory vistas and local views including those from the Liverpool – Maritime Mercantile City World Heritage Site and on the west bank of the Mersey Estuary.

4.7.3 Approach and Methodology

A comprehensive Townscape and Visual Impact Assessment will be undertaken by Waterman. The methodology for the assessment will be principally based upon:

- Landscape Institute (LI) and Institute of Environmental Management and Assessment (IEMA), *Guidelines for Landscape and Visual Impact Assessment*, 3rd Edition, 2013 (GLVIA3)[18].

The approach and methodology will aim to include the following deliverables:

- An assessment and evaluation of the existing townscape character and visual quality of the Site and surrounding area via desk-based analysis and field study. The assessment will refer to relevant townscape/landscape character areas at a local level and other relevant appraisal documents held in the planning system;
- Liaison with LCC and Historic England (HE) throughout the assessment to review and agree the views to be assessed;
- Evaluation of key townscape features, grouped into areas of similar character, and classification of their sensitivity to change;
- The use of verified and rendered photomontages to illustrate and assess potential effects of the proposed Development upon townscape and key views identified with agreement of LCC and HE; and
- Development of mitigation measures where appropriate.

4.7.4 Relevant Subsequent Correspondence

*Historic England's EIA Scoping Response (refer to **Appendix A**) requested an assessment of the potential effect of cruise liners themselves upon townscape and views.*

[18] The Landscape Institute. 'Guidelines for Landscape and Visual Impact Assessment, 3rd Edition' 2013

4.8 Built Heritage

4.8.1 Key Issues

The Site is in a sensitive location with regards to built heritage due to its location, principally within the buffer zone of the Liverpool – Maritime Mercantile City World Heritage Site, but with the southern areas of the Site located within the World Heritage Site itself. The Site is adjacent to, or within the setting of, three Conservation Areas, and within the setting of several nationally significant listed buildings, including the Three Graces. There is also the Grade II Listed Titanic Memorial located within the wider Site boundary but excluded from the actual Site itself, and the existing structure of the Princes Jetty, which is identified as a non-designated heritage asset given its historical uses.

4.8.2 Potential Effects

The primary focus of the ES chapter and associated technical appendix will be the potential likely significant effects impact of the proposed Development on the World Heritage Site, the setting of other designated heritage assets, and the non-designated Princes Dock.

4.8.3 Approach and Methodology

The Built Heritage assessment will include:

- An overview of relevant national and local legislation and policy pertaining to heritage;
- Consultation on the pre-existing heritage studies of the Site, and review of historical documents, photographs and other sources at relevant archives and online databases. A history of the site and its context within the Liverpool waterfront will then be provided in the ES Chapter;
- A site inspection to assess the contribution the Site makes to the setting of other nearby designated heritage assets;
- Identification of significance to the Site's contribution to the setting of nearby designated heritage assets. This will be written to guidance outlined by Historic England in their publication: Conservation Principles[19], and include consideration of the Site's contribution to the Outstanding Universal Value of the Liverpool World Heritage Site;
- Consideration of the environmental effect on built heritage of the proposed Development; and
- Development of mitigation measures where appropriate.

4.8.4 Relevant Subsequent Correspondence

*Historic England's EIA Scoping Response (refer to **Appendix A**) requested a standalone report to assess how the proposed Development might impact upon the Outstanding Universal Values of the World Heritage Site (i.e. an ICOMOS Report).*

[19] English Heritage 'Conservation Principles' 2008

4.9 Archaeology

4.9.1 Key Issues

A preliminary search of readily available online resources indicates that other than the non-designated Princes Jetty and Landing Stage, and other associated structures which would be removed as part of the proposed Development, there is the potential for remains of other archaeological assets to be present within the Site boundary, such as the Liverpool Fort, the Limestone Perch (a post Medieval navigational mark) and a public bathhouse (all of which preceded the construction of Princes Dock). On the marine side, although it is possible that archaeological survival has already been compromised by the historic development of the docks, associated capital dredging programmes, and natural tidal erosion, it is nonetheless possible that the piling and dredging works required to construct the proposed Development will have additional adverse effects.

4.9.2 Potential Effects

Potential likely significant effects on buried heritage assets primarily relate to the possibility for the potential disturbance, removal and / or destruction during the construction activities on the Site.

4.9.3 Approach and Methodology

The archaeology assessment will include:

- A review of data held on the Merseyside Historic Environment Record;
- Consultation of historical sources at relevant archives and online databases. A history of the Site will be outlined in the ES chapter. Sources will also be utilised to assess the significance of, or potential for, features of heritage significance;
- A review of previous assessment reports for the Site and immediate surrounds, including the archaeological assessment undertaken by Liverpool Field Archaeology Unit in 2003 to inform the ES for the Liverpool Landing Stage Cruise Liner Extension (ABPmer, 2003);
- A walk-over survey of Site;
- A review of national and local planning policy;
- An appraisal of designated/non-designated heritage assets and recorded features of heritage significance within the Site and its immediate environs which may be impacted by the proposed Development;
- An assessment of the potential for features of heritage significance within the Site including those previously unknown below ground and marine archaeology;
- Identification of any settings of below ground and marine heritage significance which may be impacted by the proposed Development;
- Further investigations (e.g. an intrusive archaeological evaluation), should the initial assessment identify that these are required either prior to determination of, or as mitigation for, a planning application; and
- Development of mitigation measures where appropriate.

4.10 Ground Conditions

4.10.1 Key Issues

Geological maps for the area indicate the anticipated geology underlying the Site is likely to comprise Made Ground of a depth of up to approximately 13m, underlain by Tidal Flat Deposits and Glacial Till. These are underlain by the Chester Pebble Beds Formation at depth.

Historically, the Site has been in use as docks from at least the 1850s where historical mapping indicates substantial modification to the banks of the Mersey Estuary that the Site is located on. Historical uses of the Site are primarily associated with the docks and include warehouses and a railway. Two dock basins, located in the southern section of the Site, appear to have been infilled in the 1890s. By the 1990s all building on Site (i.e. warehouses, dock buildings and a former railway station) had been demolished.

4.10.2 Potential Effects

In consideration of the above, potential likely significant effects pertaining to ground conditions and contamination to be addressed as part of the EIA are anticipated at this stage to be:

- Health and safety risks to workers during construction works from potentially contaminated soils;
- Risks to future Site users from residual contamination;
- Risks to vegetation in landscaped areas from residual contamination;
- Potential risks to groundwater and surface water resources and birds, fish and wildlife from the release of existing contamination and new sources of accidental contamination during the demolition and construction works;
- The creation of new pollution pathways (for example via piling) through which existing ground contamination may migrate to underlying aquifers;
- The appropriate management of contaminated soils or hazardous materials; and
- Effects upon buried concrete and underground infrastructure.

4.10.3 Approach and Methodology

The Ground Conditions assessment will be undertaken by Waterman and comprise the following:

- Completion of a Preliminary Environmental Risk Assessment in accordance with current legislative requirements and best practice standards (CLR 7 to 11)[20]. This will determine the baseline conditions at the Site and enable a Site Conceptual Model (SCM) to be derived. This will relate historical Site uses and anticipated ground conditions to the proposed Development, thereby assessing potential contamination risks associated with the construction of the proposed Development and on completion of the proposed Development;
- An outline description of appropriate construction methods, particularly in relation to piling and other penetrative activities, to minimise groundwater impacts and the creation of pollution pathways;
- An outline of measures to protect Site workers, the general public, and future users of the Site from residual contamination that may be present;

[20] Environment Agency 'Contaminated Land Research' Series, 2002

- The formulation of procedures for the appropriate handling, licensing and management of contaminated and hazardous materials that are to be treated or removed from Site; and
- Liaison with the project team in relation to the incorporation of pollution prevention measures within the design of the completed Development.

4.11 Marine Ecology, Ornithology and Terrestrial Ecology

4.11.1 Key Issues

Whilst the Site itself is not subject to any statutory or non- statutory nature conservation designations, it is located within an area of the River Mersey which is currently under consultation to be included in the Liverpool Bay marine Special Protection Area (SPA) which is notified for the bird species it supports such as common tern *Sterna hirundo* and little gull *Hydrocoloeus minutus*. Currently, the Mersey Narrows and North Wirral Foreshore SPA is located approximately 800m to the west of the Site (on the opposite side of the Mersey) and the Mersey Estuary SPA is located approximately 3.8km to the south of the Site. As such, a separate Habitat Regulations Assessment (HRA) screening report will be required to assess the potential for impacts on the qualifying features of these designated sites as a result of the proposed Development.

The 'Extended' Phase 1 Habitat Survey found the Site to largely comprise hardstanding with a small area of ornamental planting, amenity grassland and a large wooden jetty with sparse ephemeral vegetation growing on top. The wooden jetty and the dock wall have potential for nesting by notable and common species of birds with Canada geese *Branta canadensis*, feral pigeon *Columba livia*, herring gull *Larus argentatus* (listed as a Species of Principal Importance on Section 41 the Natural Environment Rural Communities Act 2006) and lesser black backed gull *Larus fuscus* recorded using the jetty at the time of the survey. Based on the results of the 'Extended' Phase 1 Habitat Survey and the records returned from the biological data search it is considered that no further terrestrial surveys are required, however, clearance of the jetty may be required outside of the nesting bird season (typically March – August inclusive).

Whilst there are data available for fish, plankton and marine mammals within the River Mersey in the vicinity of the Site, there is limited information with respect to the benthic communities and river wall flora. It will therefore be necessary to investigate these communities further to determine the potential impacts of the proposals.

4.11.2 Potential Effects

Potential likely significant ecological effects of the proposed Development are at this stage are envisaged to be:

- The loss and/or disturbance of existing, albeit limited, plant communities;
- The loss and/or disturbance of roosting and nesting habitat for common breeding birds;
- The loss of habitats supporting species cited within the Special Protection Area; and
- The permanent loss or significant disturbance of riverbed habitats, and the resulting impact on benthic communities

4.11.3 Approach and Methodology

A Phase 1 Habitat Survey of the terrestrial habitat has been undertaken, which includes a desk-based data trawl of ecological records in and surrounding the Site. This shall form the basis of the Preliminary Ecological Assessment supplemented by a detailed ornithological data search of available published data sources for the relevant areas of the River Mersey, to provide an accurate assessment of the usage and value of the Site by birds, with particular reference to those cited within the SPA.

In liaison with Merseyside Ecological Advisory Service (MEAS) and Natural England, an HRA Screening Report shall be completed, and submitted to MEAS as the competent body on behalf of LCC. Upon submission of the HRA Screening Report further consultation would be undertaken with MEAS and NE to determine whether the proposed Development may be screened in or out of further assessment under the Habitat Regulations. In accordance with the EIA Regulations, the HRA and the EIA processes shall be appropriately coordinated.

A marine ecology study shall be undertaken based on existing and published data to describe baseline conditions for fish, plankton, marine mammals, benthic communities and river wall habitats. Whilst sufficient data is anticipated to be available, a methodology for the survey of invertebrates in the sediments in the River, by grab sampling, along with surveys of the walls, utilising wall scrapes, has been developed and shall be agreed with the Environment Agency and other relevant consultees. Water quality sampling shall also be undertaken concurrently with the survey works.

The ES chapter will be based on the findings of the baseline reports and surveys, in order that an accurate assessment of the ecological value of the Site can be undertaken and the extent of ecological impacts identified. The Ecological Impact Assessment will be undertaken in line with the IEEM Guideline for Ecological Impact Assessment in the UK and Ireland[21].

4.11.4 Relevant Subsequent Correspondence

*MEAS's EIA Scoping Response (refer to **Appendix A**) requested the following:*

- *The HRA screening exercise should be referred to as an Assessment of Likely Significant Effects (ALSE); and*
- *Passage and wintering bird surveys (undertaken from September to March inclusive) will be required to inform the ALSE and EIA. [Subsequent consultation with MEAS and LCC confirmed that a series of wintering bird surveys would be undertaken between October 2017 and January 2018 and reported during the pre-determination period.].*

4.12 Coastal Processes, Sediment Transport and Contamination

4.12.1 Key Issues

The proposed Development will have a direct effect on, as a minimum, localised coastal processes during construction and operation. The scope for the coastal processes assessment will therefore examine potential changes to flows and wave action for each of these phases as well as how the combination of these processes influences sediment transport and estuary morphology.

4.12.2 Potential Effects

Potential likely significant effects of the proposed Development with respect to coastal processes, sediment transport and contamination may include:

[21] Chartered Institute of Ecology and Environmental Management 'Guidelines for Ecological Impact Assessment in the UK and Ireland' Second Edition, 2016

- Changes in the tidal flow regime;
- Modifications to the transport of estuarine sediments;
- Deposition of sediments as a result of demolition and construction operations within the river; and
- Wave effect impacting on the proposed Development.

4.12.3 Approach and Methodology

To analyse the potential impacts on tidal flow within the River a 3D flow model, TELEMAC-3D will be used for the modelling. It is proposed that only the baseline conditions, and the conditions with the proposed Development completed shall be modelled, as the conditions during demolition and construction will be transitory, and it is proposed that there would be no break in programme between the demolition of the existing structure and the commencement of the new structure. The modelling will consider the effect of the proposed Development on estuarine sediment transport and patterns of erosion or sedimentation, and secondly the fate of sediment potentially released as part of the construction process. For the estuarine sediment transport model, the 3D mud transport module of TELEMAC-3D, namely SEDI-3D shall be applied. This model couples the sediment transport directly with the 3D flow modelling which allows the increased density caused by the sediment to be included in the hydrodynamic modelling. This effect is important in a highly turbid estuarine area such as the Mersey.

During the construction phase, there may be sediment releases during reclamation or pilling for the jetty. Plume modelling and pollutant dispersion modelling is included to identify the extent of potential impacts resulting from these operations. Modelling simulations would facilitate the identification of environmental impacts associated with the pier development activities. The fate of sediment released from the construction activity shall be assessed using the HR Wallingford, Lagrangian, particle tracking model - SEDPLUME-RW.

The effect of the proposed Development on waves is anticipated to be small and therefore a desk assessment of these effects is proposed to support the assessment of effects on sediment transport and estuarine morphology.

4.12.4 Relevant Subsequent Correspondence

*MEAS's EIA Scoping Response (refer to **Appendix A**) requested that sediment samples taken at the same time as the grab samples for the benthic ecology assessment are also to be analysed for chemical contamination.*

4.13 Cumulative Effects

4.13.1 Key Issues

The EIA Regulations require that, in assessing the effects of a particular development proposal, consideration is also given to the cumulative effects that may arise from the proposal in conjunction with other development proposals in the vicinity. Cumulative effects are those effects of a development that may interact in an additive or subtractive manner with the effects of other committed developments that are not currently in existence, but may be by the time the development is implemented.

4.13.2 Potential Effects

Potential cumulative effects can be categorised into two types:

- **Type 1 Effects:** The combined effects of individual effects resultant from the development upon a set of defined sensitive receptors, for example noise, dust and visual effects; and
- **Type 2 Effects:** The combined effects arising from another development site or sites, which individually might be insignificant, but when considered together, could create a significant cumulative impact.

Such effects will be identified, and mitigation measures will be proposed where necessary.

4.13.3 Approach and Methodology

Potential Type 1 effects for the proposed Development will be assessed in line with the construction programme and phasing logistics.

A standard set of specific criteria have been set in order to determine the 'other' schemes to be included within the Type 2 cumulative effects assessment. The criteria are:

- Schemes within 1km of the Site which have been granted planning permission where there is a net change in floorspace above 10,000m^2 and which are considered to have the potential to result in some cumulative effect; and
- Schemes close to the Site that have been granted planning permission, but fall below the floorspace threshold stated above. These schemes will be considered where their proximity to the Site is such that the potential for cumulative effects with the proposed Development cannot be ruled out.

The above criteria will be applied to consented schemes for which construction has not yet commenced, schemes currently under construction and 'reasonably foreseeable schemes'.

The final list of cumulative schemes to be assessed will be agreed with LCC and MMO. A separate chapter within the ES will assess the cumulative effects of the proposed Development in relation to effect interactions of the proposed Development in isolation, and the combined effects of the proposed Development with other presently or reasonably foreseeable schemes.

5. Issues to be Scoped Out of the EIA

The aim of the EIA Scoping process is to focus the EIA on those environmental issues that are likely to be significantly affected by the proposed Development. In doing so, environmental issues may be 'scoped out' where the potential for significant effects as a result of the proposed Development is deemed unlikely. The following section provides details of issues considered not to be significant in the context of the proposed Development and therefore proposed to be 'scoped out' of the EIA. Whilst a number of these items may be scoped out of the EIA, it may be identified that further consideration is required, and where appropriate this will be provided in the form of additional reports submitted as part of the suit of supporting documents.

5.1 Flood Risk

The proposed Development's use is classified as 'water compatible development' and would therefore be acceptable in principle in accordance with the National Planning Policy Framework (NPPF). It is therefore concluded that the impacts of flooding with respect to the proposed Development can be scoped out of the EIA. However, a Flood Risk Assessment (FRA) will be required, as sections of the Site are within Flood Zones 2 or 3. This would include a surface water drainage strategy and assessment of tidal water flooding including an allowance for climate change. The FRA would consider climactic factors to consider the resilience of the scheme to future predicted changes in climate, or those impacting on sea levels.

5.2 Water Quality

The potential water quality impacts arising from the construction and operation of the cruise liner facility would be considered within the Coastal Processes, Sediment Transport and Contamination Chapter, along with the Development Programme and Construction, Ecology and Ground Conditions and Contamination Chapters where relevant. Therefore, it is not proposed to provide a separate Water Quality Chapter within the ES as the likely significant effects are appropriately considered within the EIA. Consideration shall be given within the Development Programme and Construction Chapter to the construction methodologies employed and an outline Construction Environment Management Plan will be prepared, which will set out appropriate methodologies and working practices to minimise pollution risks during demolition and construction.

The operation procedures of the Terminal will be set out in the Design and Assess Statement and other supporting documentation submitted as part of the Application, along with an outline of protocol to be implemented to ensure routine operations with transiting and hotelling ships do not result in any impact on the water environment.

5.3 Transportation including Navigational Risks and Access

Transportation and Access are not, in themselves, considered to constitute environmental issues which should be considered within the context of an EIA. However, both issues will be addressed within a standalone Transport Assessment (TA) submitted in support of the planning application.

The proposed Development is not proposing significant changes to the current shipping operations in the Mersey. The existing berthing arrangements are to be retained and capital dredging undertaken by the port authority shall continue. Therefore, no impact is anticipated upon navigation within the Port of Liverpool or the River Mersey when the proposed Development is operational. During demolition and construction, there is potential for demolition and construction activities and vessels to have some impact on navigation

and the passage of vessels, this would however, be managed in line with best practice to ensure there is no residual significant impact. It is not considered that changes to navigation are required within the ES, however, if required a supporting statement, shall be provided, to consider navigational issues once the development is complete. A similar consideration would be given during demolition and construction as part of the construction management documentation.

The environmental impacts of traffic generation during the demolition activities, construction and operation of the proposed Development will be considered within Chapter 6: Development Programme, Demolition and Construction of the ES (refer to Section 5.4 of this Report), Chapter 7: Air Quality and Chapter 8: Noise and Vibration. Otherwise Transport and Access is scoped out of the EIA.

5.4 Sustainability

All sustainability issues would be dealt with in separate standalone planning application documents such as an Energy Strategy, a Sustainability Statement and relevant BREEAM Pre-Assessment Reports. Within the design documentation there will be a consideration of the design options and development, that will include embedded carbon, that can be reported within the Alternatives Chapter.

5.5 Socio-Economics

Consideration of population is required within the EIA Regulations. This is often considered in terms of the socio-economic effect of the development, such as population growth and the impact on existing and proposed future services. The proposed Development will give rise to additional employment opportunities and local spend (both during the demolition and construction works and operation of the proposed Development), however, it would not give rise to any new resident population. Accordingly, there would be no significant effects upon the supply and demand of education, health and recreation facilities. On this basis, socio-economics can be 'scoped out' of the EIA.

5.6 Human Health

Human health has been added to the list of topics to be considered for inclusion in an EIA as a result of the transposition of the 2014 Directive into UK law as the Town and Country Planning (Environmental Impact Assessment) Regulations 2017. Health is considered within the scope of a number of assessments to be included within the EIA, in particular the Air Quality, Noise and Vibration and Ground Conditions and Contamination assessments. A specific standalone Health chapter is therefore not considered necessary, as the requirements shall be covered appropriately elsewhere in the ES.

6. Defining the Significance of Environmental Effects

For each of the environmental topic areas assessed within the EIA, an assessment will be made in relation to the relative significance of the environmental effects identified. This will be undertaken with reference to definitive standards and legislation, where available. Where it is not possible to quantify effects, qualitative assessments will be carried out, based on available knowledge and professional judgement.

The significance of predicted effects will be described with reference to assessment criteria for each environmental topic considered. These criteria apply a common EIA approach of classifying effects according to whether they are substantial, moderate or minor effects as well as adverse, negligible or beneficial.

Specific criteria for each issue will be developed, giving due regard to the following:

- Extent and magnitude of the effect;
- Duration of the effect (short, medium or long term);
- Permanence of the effect (temporary or permanent);
- Nature of the effect (direct or indirect, reversible or irreversible);
- Whether the effect occurs in isolation, is cumulative or interactive;
- Performance against environmental quality standards or other relevant pollution control thresholds;
- Sensitivity of the receptor; and
- Compatibility with environmental policies.

For issues where definitive quality standards do not exist, significance will be based on the:

- Local, district, regional or national scale of value of the resource and/or receptor affected;
- Number of receptors affected;
- Sensitivity of those receptors; and
- Duration of the effect.

In order to provide a consistent approach in reporting the outcomes of the various studies undertaken as part of the EIA, the following terminology will be used throughout the ES to describe the likely significance (or otherwise) of identified effects:

- **Negligible:** No significant effect to an environmental resource or receptor;
- **Significant beneficial:** Advantageous or positive effect to an environmental resource or receptor; and
- **Significant adverse:** Detrimental or negative effect to an environmental resource or receptor.

Whilst there is no recognised definition of what constitutes a 'significant' effect, it is good practice to identify the degree of significance or importance. It is therefore proposed that, where adverse or beneficial effects have been identified, they will be assessed as being of:

- Minor significance (either beneficial or adverse): Slight, very short or highly localised effect;
- Moderate significance (either beneficial or adverse): Limited effect (by extent, duration or magnitude) which may be considered significant; and

• Major significance (either beneficial or adverse):	Considerable effect (by extent, duration or magnitude) of more than local significance or in breach of recognised acceptability, legislation, policy or standards.

7. Proposed Structure of the Environmental Statement

The proposed structure of the ES is set out below, based on the EIA Regulations, current best practice and the scoping analysis described above:

Non-Technical Summary

This will provide an accurate and balanced account of the key information in the EIA in non-technical language. The Non-Technical Summary will be produced as a stand-alone document in a format suitable for public dissemination.

Environmental Statement: Volume 1: Main Text

This will contain the full text of the EIA. The proposed chapter headings are set out below:

- Introduction;
- EIA Methodology;
- Existing Land Uses and Activities;
- Alternatives and Design Evolution;
- The Proposed Development;
- Development Programme and Construction;
- Air Quality;
- Noise and Vibration;
- Townscape and Visual Effects;
- Built Heritage;
- Archaeology
- Ground Conditions;
- Terrestrial and Marine Ecology;
- Coastal Processes, Sediment Transport and Contamination; and
- Cumulative Effects.

Environmental Statement: Volume 2: Figures

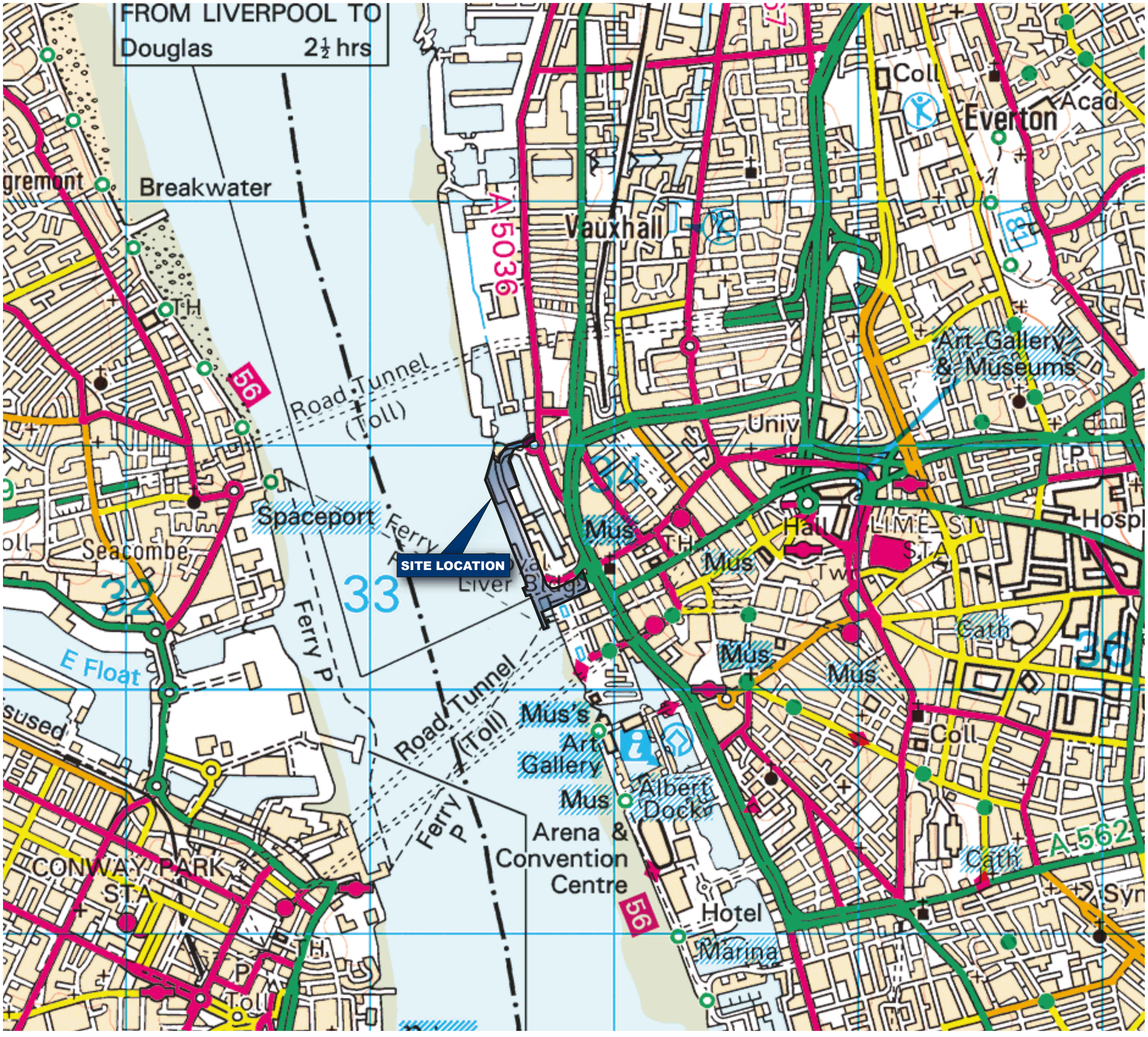
Environmental Statement: Volume 3: Technical Appendices

This will provide detailed supporting data and the full text of the technical assessments undertaken as part of the EIA. Such technical appendices are likely to include traffic survey data, Phase 1 contamination desk study, Phase 1 Habitat Survey and noise survey data. The precise list of appendices has yet to be determined.

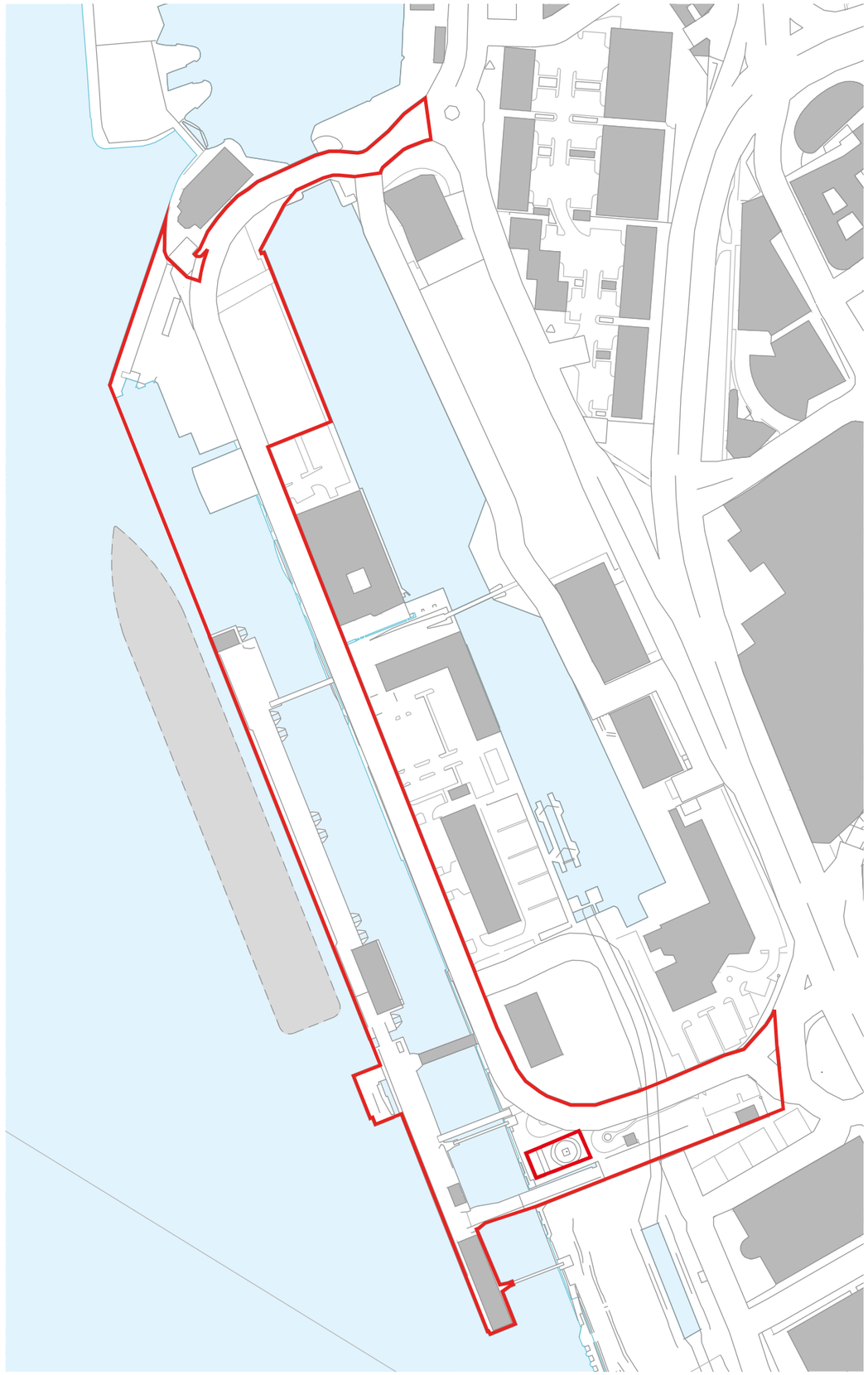
APPENDICES

Appendix A Figures

- Site Location Plan (Fig. 1)
- Site Boundary Plan (Fig. 2)



Project Details	WIE12464-100: Liverpool Cruise Terminal
Figure Title	Figure 1: Site Location
Figure Ref	WIE12464-100_GR_SR_1C
Date	July 2017
File Location	\\s-lncs\wiel\projects\wie12464\100\graphics\sr\issued figures



Site Boundary

N

Project Details	WIE12464-100: Liverpool Cruise Terminal
Figure Title	Figure 2: Site Boundary
Figure Ref	WIE12464-100_GR_ES_1.2A
Date	2017
File Location	\\s-lncs\wiel\projects\wie12464\100\graphics\es\issued figures

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Appendix B EIA Scoping Responses

Enquiries to: Peter Jones
Contact No: 0151 233 0316
Email: peter.jones@liverpool.gov.uk
Enquiry Ref: PJ/CLT
(Please quote at all times)
Date: 8th September 2017

Liverpool City Council

Mike Hopkins,
JLL,
One Piccadilly Gardens,
Manchester,
M1 1RG.

Dear Mike

Proposed Cruise Liner Terminal
Princes Parade, Princes Dock, Liverpool
Environmental Impact Assessment Scoping Report

I refer to your request that the Council adopt a formal Screening Opinion under Regulation 15 of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017, in respect of the proposed development of land at Princes Parade, Liverpool on the north bank of the Mersey Estuary, including the former Prince's Jetty.

The proposed development is to be the subject of an outline application with all matters reserved for a permanent Cruise Liner Terminal Facility together with associated structures. The development includes a terminal building, parking for cars, coaches and taxi's, with an extended deck structure in the river formed as a suspended deck independent of the river wall but bridged for pedestrian and vehicular access.

The site is part of a vacant plot that lies within the Princes Dock neighbourhood of the Liverpool Waters development for which outline permission was granted on 9th June 2013 (Application ref: 10O/2424). The proposed development is not part of the approved Liverpool Waters scheme so is being submitted as a standalone application. The site falls partly within the World Heritage Site and partly within the WHS Buffer Zone and is nearby a large number of heritage assets.

The proposed development is above the 1 hectare threshold set out in the Town and country Planning (Environmental Impact Assessment) Regulations 2017, Schedule 2 (Infrastructure projects 10 (g) for construction of Harbor and Port Installations. To comply with the requirements of the regulations you have advised that an EIA has been commissioned to identify and assess the likely significant environmental impacts of the development and ensure that adverse impacts are mitigated where possible.

A Scoping Report has been submitted with the request for a formal Scoping Opinion from LCC and the MMO in accordance with Regulation 15 of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017, and the equivalent requirements set out in both the Marine Works (Environmental Impact Assessment) Regulations 2007, and the Harbour Work (Environmental Impact Assessment) Regulations 2009 under the Harbours Act 1964. The Scoping Report provides details of the proposed scheme, an outline of the likely significant effects on the environment, and the assessment methodologies to asses these effects and issues to be scoped out of the EIA.

The Scoping Report has been circulated to statutory consultees and LCC's environmental advisors, MEAS, for their consideration. Copies of the replies received are attached for your information.

As you will see consultees have responded positively and confirmed the approach set out in your scoping submission is generally acceptable. The proposed EIA covers the main elements required by the regulations and provides a good level of detail on how the assessment will be carried out and the topics scoped out appear appropriate for the reasons provided.

One exception to this is energy which you suggest is scoped out. As you will see from the correspondence MEAS have advised that and energy chapter should be included in the EIA rather than as a separate report given the considerable energy requirements of the development and associated impacts. The LPA concur with MEAS's advice on this point and also MEAS's view that the EIA must make a clear distinction between construction and operational impacts for all chapters including cumulative effects with details of phasing and timing of works for all site areas.

Historic England have recommended that due to the site's close proximity to various heritage assets a separate Heritage Impact Assessment should be undertaken for the application and the findings incorporated into the ES. The LPA support this recommendation and the advice that the HIA should comply with ICOMOS guidance on HIA (as a separate technical appendix of the ES).

It is my understanding that you are now preparing to submit the application shortly and the EIA is intended to cover both land use and marine consent requirements for the scheme. In this case it will be necessary to liaise with the MMO to ensure the proposed ES fully addresses EIA requirements in respect of the marine environment. In the meantime I can confirm that Liverpool City Council as Local Planning Authority is satisfied the information presented in the scoping report provides an acceptable basis for preparing and ES to support this application, subject to addressing the energy and heritage advice.

In summary I can confirm that in accordance with Regulation 15 (Part 4) of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017, Liverpool City Council as Local Planning Authority has adopted this Scoping Opinion in relation to the Environmental Impact for the Cruise Liner Terminal development and the Local Planning Authority is satisfied the information presented in the Scoping Report provides an acceptable basis for preparing an ES to support an application for this development. This view has been adopted by the Local Planning Authority as a formal Scoping Opinion in in accordance with the requirements of the regulations and a copy of this letter has been placed on Part 1 of the Planning Register as part of the Local Planning Authority's application records.

Yours sincerely

,

Peter Jones
City Centre Development Management Team

cc by e mail:
John Navaratnam - Liverpool City Council
Peter Skates - Liverpool City Council
Stephen Brindle - Waterman Group
Amanda Yeomans - Natural England
Marie Smallwood - Historic England
Stephen Sayce - Environment Agency
Lucy Atkinson- Merseyside Environmental Advisory Service

Merseyside Environmental Advisory Service
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Director: Alan Jemmett, PhD, MBA

Enquiries: 0151 934 4951

Contact: Lucy Atkinson
Email: measdcconsultations@sefton.gov.uk

DEVELOPMENT MANAGEMENT ADVICE

To: Peter Jones
Organisation: Development Management
Liverpool City Council

From: Lucy Atkinson

Your Ref: Preapp
File Ref: LI17-053
W/P Ref: G:\MerseysideEAS\Development Control\e-DM Folder\Liverpool\2017\LI17-053 - Princes Dock, Liverpool\LI17-053_ResponseMemo_EIAScope_LA_final.docx
Date: 6th September 2017

EIA Scoping Opinion for the Proposed Cruise Liner Terminal, Princes Parade, Liverpool.

1. Thank you for consulting Merseyside Environmental Advisory Service in respect of this EIA Scoping Opinion. The proposals comprise development of Cruise Liner Terminal including terminal building, parking for coaches, taxis and cars along with landscaping and an extended structure in the river formed as suspended deck independent of the river wall but bridged for pedestrian and vehicular access.
2. Having reviewed the application and supporting documentation, our advice is set out below in Part One.
   - Part One deals with issues of regulatory compliance, action required **prior to determination** and matters to be dealt with through planning conditions. Advice is only included here where action is required or where a positive statement of compliance is necessary for statutory purposes.

   In this case Part One comprises paragraphs 3 to 34.

Part One

3. The applicant (Liverpool City Council) is voluntarily preparing an EIA under Schedule 2 (10)(g) Harbour and Port installations under the EIA Regulations 2017. The applicant has commissioned an EIA Scoping Report (ESR)*(Waterman Infrastructure & Environment Ltd July 2017ref WIE12464-100-R-1.3.1-Scoping)* which forms the basis for this scoping opinion.

4. The scoping phase of an Environmental Impact Assessment (EIA) presents the best opportunity to ensure that all the environmental impacts of a development are considered at an early stage. The EIA Scoping Report submitted includes all the relevant information that we would expect to be addressed. The subjects/topics that have been scoped out and reasoning appears appropriate, subject to relevant specialists being satisfied. The exception to this is energy, it is currently scoped out of the EIA although an energy strategy is proposed. Given the considerable energy requirements and associated impacts whilst cruise liners are in port, energy should be scoped into the EIA, with consideration given to ship to shore power requirements.

5. The EIA should also make a clear distinction between construction and operational impacts for all chapters including cumulative effects, and include a statement with regard to the phasing and timing of works for all site areas. I advise that the applicant be asked to confirm its intention to fully address the issues raised in the scoping opinion.

6. It is important that an integrated approach is taken to the EIA methodology to ensure consideration of interactions and in-combination effects. In addition, it is necessary to ensure that the results of the assessment are used to inform development design and the master plan.

7. A single EIA should be developed to cover both land use and marine consents elements of the scheme. Also, there should be a single evidence base to inform the HRA whose scope should cover both marine and land use elements. Therefore LCC will need to consult MMO and also establish which of the Defra bodies is going to lead on this project.

8. I consider the submitted EIA Scoping Report satisfactorily addresses the issues that should be covered by the Environmental Statement subject to the inclusion of a chapter on energy, and other technical specialists being satisfied with the relevant chapters/methodologies.

9. In addition, to the issues covered in the EIA Scoping Report, I advise that account is also taken of the information outlined in the paragraphs below.

<u>Habitats Regulations Assessment</u>

10. The applicant's environmental consultant proposes to undertake Habitats Regulations Assessment (HRA) screening in order to assess potential effects of the development on qualifying features of the proposed Liverpool Bay SPA extension, Mersey Narrows SPA (and Ramsar site) and the Mersey Estuary SPA (and Ramsar site).

11. However, rather than screening, I advise that this should be referred to as an Assessment of Likely Significant Effects (ALSE) and it will be used by the Council to determine whether the scheme is likely to impact upon European sites. In addition to the European sites stated above, the ALSE will also need to include, but not be limited to, the following European sites:
    - Ribble and Alt Estuaries SPA and Ramsar sites; and

- The Dee Estuary SPA and Ramsar sites.

10. **I advise that passage and wintering bird surveys (undertaken from September to March inclusive) will be required to inform the ALSE and EIA**. A minimum of 36 hours vantage point survey will be required (in accordance with the current best practice for vantage point surveys (*currently Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms, Scottish Natural Heritage, 2014*) and the survey should include the entire zone of influence of the proposed development including the application site (floating structures and dock walls), Princes Dock and the adjacent parts of the Mersey Estuary.

11. I welcome that HRA and EIA are to be coordinated as required by the EIA Regulations 2017, please note paragraph 7 above which discusses co-ordination of assessments and evidence bases.

<u>Ecological Impact Assessment (EcIA)</u>

12. The proposed EcIA should follow the CIEEM (2010 and 2016) guidelines covering marine and terrestrial impacts respectively. As part of the EcIA, the applicant's ecological consultant proposes undertaking a cumulative impact assessment which is based upon details of schemes obtained from the Local Authority and Marine Maritime Organisation (MMO). However, in addition to the Local Planning Authority and MMO, details of plans and projects for the cumulative assessment should also be obtained from the neighbouring authorities of Wirral and Sefton.

Extended Phase 1 Habitat Survey and Desktop Study

13. The scoping report states that an Extended Phase 1 Habitat Survey and desk-based assessment have been undertaken as the basis of a Preliminary Ecological Appraisal (PEA). This should be undertaken in accordance with best practice guidelines (i.e. CIEEM, 2013). Sources of the data consulted during the desk-based assessment have not been specified, but this should have included Merseyside BioBank.

Bats

14. As part of the EcIA, built structures within the site will need to be described and their bat roosting potential categorised in accordance with Collins[i] (2016). If potential bat roosting features were found to be present upon existing structures further dusk emergence and/or dawn re-entry surveys will be required. Full details of bat surveys along with any mitigation (if required) should be provided in the Environmental Statement.

Breeding birds

15. According to the scoping report, the wooden jetty and dock wall were recognised as having potential to support nesting notable and common bird species during the extended phase 1 habitat survey and a herring gull (a Priority Species) and lesser black backed gull were recorded using the jetty at the time of the survey. Also, at a location to the north of the application site kittiwakes are known to use the dock wall for nesting. Breeding bird survey of the jetty and dock wall will be required to ensure that any adverse impacts can be appropriately mitigated and compensated for. However, it will not be possible to view the dock wall for survey from the landward

side. One option to enable a survey is to board the Mersey ferry, which runs adjacent to the breeding site, and take video footage of them, alternatively a small boat or drone could be used.

16. The results of the extended phase 1 habitat survey and desktop study should be used to scope whether breeding bird surveys are also required of the terrestrial parts of the site. Breeding schedule 1 species (including peregrine falcon and black redstart) have previously been recorded at the Liverpool docklands. Consideration will need to be given to those species during the undertaking of the EcIA.

Aquatic surveys

17. An integrated aquatic survey sampling methodology is needed to (i) characterize the aquatic communities / habitats present (ii) enable impact assessment to be completed and (iii) advise on any avoidance measures, mitigation and compensation needed. A key point will be to identify potential prey items, such as fish species, for any of the designation features of the Mersey Estuary and Liverpool Bay Natura 2000 sites e.g. cormorant / grebe, which form part of the overwintering water bird assemblage.

18. The scoping report indicates that grab sampling and wall scraping will form part of the survey methodology. The grabs should be of a sufficient size and number to ensure that sampling effort is robust. It is up to the applicant to determine the scope of surveys and methodologies to adequately characterize the baseline marine ecology. Consideration could also be given to undertaken ROV survey of the dock wall, however this will depend on construction impacts which need to be clarified by the developer. For example, will the terminal building have footings in the river? If ROV survey is undertaken the video would need to be of a good quality to ensure that benthic communities and any invasive species can be adequately identified and be recorded at different water depths.

19. Sediment samples taken at the same time as the grab samples are also to be analysed for chemical contamination. This analysis must be undertaken at an accredited laboratory. The physical and chemical composition of the dock sediments to be removed and/or disturbed by the proposed development will need to be known to inform impact assessment and mitigation, re-use potential and disposal options e.g. environmental permit requirements.

20. The scoping report states that existing data will be used to describe existing marine conditions. However, the sources and age of these data have not been specified and will be required within the Environmental Statement. They should be no older than 3 years.

Other issues

21. I advise that an integrated approach and liaison between the applicant's environmental specialists will be required to ensure that any archaeological or intrusive site investigation works do not have harmful ecological impacts.

22. Air quality and noise assessments are proposed to inform the EIA. These assessments (along with any assessment of lighting) should consider impacts upon statutory designated nature conservation sites.

23. The application site lies adjacent to the Mersey Estuary Nature Improvement Area (NIA), although the site only provides very limited opportunities for the creation of additional habitat. Tree planting will not be appropriate on the site, although there are other options for enhancing the site's ecological value, such as the creation of green walls / roof areas.

Archaeology

24. Princes Dock, built 1816-21, is a non-designated heritage asset, recorded on the Merseyside Historic Environment Record, MME 9551.

25. Previous archaeological investigations of the site have demonstrated that below-ground structural remains of the dock do survive.

26. The National Planning Policy Framework, paragraph 128, is clear that:

    "Where a site on which development is proposed includes or has the potential to include heritage assets with archaeological interest, local planning authorities should require developers to submit an appropriate desk-based assessment and, where necessary, a field evaluation."

27. The Environmental Impact Assessment Scoping Report, Section 4.9, pp.13-14, has therefore correctly identified archaeology as one the issues to be addressed in the EIA.

28. MEAS is therefore in agreement with the proposed approach and methodology, as outlined in section 4.9.3 of the Environmental Impact Assessment Scoping Report, and would be happy to advise further on the nature of any archaeological mitigation, pre- or post-determination, that might be considered necessary.

Energy and Climate Change

29. There is no specific chapter on climate change or assessing the impacts of the proposal on climate change or vice versa, although the ESR discusses alternatives including reference to climatic factors such as resilience and embedded carbon. This is welcomed as consideration of the impacts of climate change on new development and *vice versa* are now included as part of the EIA Regulations.

30. The EIA Scoping report refers to an Energy Strategy being established for the site. As referred to above, it is considered that given the scale and nature of the development that energy should be scoped into the EIA as a separate chapter. Consideration should be given to the inclusion of low carbon or renewable energy sources as part of the energy strategy and in particular to ship to shore power supplies. This will assist in improving climate resilience, future proofing of the terminal and reducing local air quality impacts. It should also link to consideration of climate change issues as part of the EIA.

Waste

31. It is proposed that a waste strategy will be submitted with the planning application although no reference is made to waste in the EIA. Waste can be scoped out as this can be managed using normal planning controls and through other relevant legislative controls. Site Waste Management issues should be included within this strategy in order to comply with policy WM8 of the WLP. Policy WM9 will also be relevant and should be addressed at the planning application stage.

32. Impacts associated with the generation of waste during the construction process, such as dust and noise should be addressed through relevant chapters in the EIA. Also, the operational impacts of waste being moved off ship should be considered under relevant chapters of the EIA, for example, air quality (odours) and noise.

Construction Environment Management Plan

33. I advise that the applicant prepares a Construction Environmental Management Plan (CEMP) document to manage and mitigate the main environmental effects during the construction phases of the proposed development. The CEMP should address and propose measures to minimise the main construction effects of the development and, amongst other things, should include details of ecological mitigation, construction and demolition waste management, pollution prevention and soil resource management. The CEMP would normally be expected to include the agreed method statements to mitigate or avoid adverse environmental impacts including:

    - Ecological mitigation measures;
    - Biosecurity measure that will be undertaken during the works to prevent the spread of invasive non-native marine species;
    - Waste Audit or similar mechanism;
    - Demolition of existing structures; and
    - Measures to Prevent Pollution of Control Waters

34. The CEMP should be compiled in a coherent and integrated document and should be accessible to site managers, all contractors and sub-contractors working on site as a simple point of reference for site environmental management systems and procedures. I advise that the CEMP should be secured though planning condition or other legal agreement for e.g. S106. The details of the draft CEMP should be submitted to the Council, agreed and implemented prior to the discharge of the planning condition.

I would be pleased to discuss these issues further and to provide additional information in respect of any of the matters raised.

Lucy Atkinson
Waste Appraisal and Support Services Team Leader

[i] Collins J (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines, 3rd edition, Bat Conservation Trust ISBN-13: 978-1-872745-96-1

Date: 01 September 2017
Our ref: 223037
Your ref: Click here to enter text.

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T 0300 060 3900

FAO Peter Jones
Liverpool City Council
peter.jones2@liverpool.gov.uk

BY EMAIL ONLY

Dear Peter,

Environmental Impact Assessment Scoping consultation (Regulation 15 (3) (i) of the EIA Regulations 2011): Liverpool Cruise Terminal
Location: Princes Dock, River Mersey, Liverpool

Thank you for seeking our advice on the scope of the Environmental Statement (ES) in your consultation dated 31 July 2017**.**

Natural England is a non-departmental public body. Our statutory purpose is to ensure that the natural environment is conserved, enhanced, and managed for the benefit of present and future generations, thereby contributing to sustainable development.

Case law[1] and guidance[2] has stressed the need for a full set of environmental information to be available for consideration prior to a decision being taken on whether or not to grant planning permission. Annex A to this letter provides Natural England's advice on the scope of the Environmental Impact Assessment (EIA) for this development.

Should the proposal be amended in a way which significantly affects its impact on the natural environment then, in accordance with Section 4 of the Natural Environment and Rural Communities Act 2006, Natural England should be consulted again.

We would be happy to comment further should the need arise but if in the meantime you have any queries please do not hesitate to contact me at the details below.
For any new consultations, or to provide further information on this consultation please send your correspondences to consultations@naturalengland.org.uk.

Yours sincerely,

Amanda Yeomans
Lead Adviser, Coast and Marine Team
amanda.yeomans@naturalengland.org.uk
07919392624

Annex A – Advice related to EIA Scoping Requirements

[1] Harrison, J in *R. v. Cornwall County Council ex parte Hardy* (2001)
[2] *Note on Environmental Impact Assessment Directive for Local Planning* Authorities Office of the Deputy Prime Minister (April 2004) available from http://webarchive.nationalarchives.gov.uk/+/http://www.communities.gov.uk/planningandbuilding/planning/sustainabilityenvironmental/environmentalimpactassessment/noteenvironmental/

1. General Principles

Schedule 4 of the Town & Country Planning (Environmental Impact Assessment) Regulations 2011, sets out the necessary information to assess impacts on the natural environment to be included in an ES, specifically:

- A description of the development – including physical characteristics and the full land use requirements of the site during construction and operational phases.
- Expected residues and emissions (water, air and soil pollution, noise, vibration, light, heat, radiation, etc.) resulting from the operation of the proposed development.
- An assessment of alternatives and clear reasoning as to why the preferred option has been chosen.
- A description of the aspects of the environment likely to be significantly affected by the development, including, in particular, population, fauna, flora, soil, water, air, climatic factors, material assets, including the architectural and archaeological heritage, landscape and the interrelationship between the above factors.
- A description of the likely significant effects of the development on the environment – this should cover direct effects but also any indirect, secondary, cumulative, short, medium and long term, permanent and temporary, positive and negative effects. Effects should relate to the existence of the development, the use of natural resources and the emissions from pollutants. This should also include a description of the forecasting methods to predict the likely effects on the environment.
- A description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment.
- A non-technical summary of the information.
- An indication of any difficulties (technical deficiencies or lack of know-how) encountered by the applicant in compiling the required information.

It will be important for any assessment to consider the potential cumulative effects of this proposal, including all supporting infrastructure, with other similar proposals and a thorough assessment of the 'in combination' effects of the proposed development with any existing developments and current applications. A full consideration of the implications of the whole scheme should be included in the ES. All supporting infrastructure should be included within the assessment.

2. Biodiversity and Geology

2.1 Ecological Aspects of an Environmental Statement

Natural England advises that the potential impact of the proposal upon features of nature conservation interest and opportunities for habitat creation/enhancement should be included within this assessment in accordance with appropriate guidance on such matters. Guidelines for Ecological Impact Assessment (EcIA) have been developed by the Chartered Institute of Ecology and Environmental Management (CIEEM) and are available on their website.

EcIA is the process of identifying, quantifying and evaluating the potential impacts of defined actions on ecosystems or their components. EcIA may be carried out as part of the EIA process or to support other forms of environmental assessment or appraisal.

The National Planning Policy Framework sets out guidance in S.118 on how to take account of biodiversity interests in planning decisions and the framework that local authorities should provide to assist developers.

2.2 Internationally and Nationally Designated Sites

The ES should thoroughly assess the potential for the proposal to affect designated sites. European sites (e.g. designated Special Areas of Conservation and Special Protection Areas) fall within the scope of the Conservation of Habitats and Species Regulations 2010. In addition paragraph 118 of the National Planning Policy Framework requires that potential Special Protection Areas, possible Special Areas of Conservation, listed or proposed Ramsar sites, and any site identified as being necessary to compensate for adverse impacts on classified, potential or possible SPAs, SACs and Ramsar sites be treated in the same way as classified sites.

Under Regulation 61 of the Conservation of Habitats and Species Regulations 2010 an appropriate assessment needs to be undertaken in respect of any plan or project which is (a) likely to have a significant effect on a European site (either alone or in combination with other plans or projects) and (b) not directly connected with or necessary to the management of the site.

Should a Likely Significant Effect on a European/Internationally designated site be identified or be uncertain, the competent authority (in this case the Local Planning Authority) may need to prepare an Appropriate Assessment, in addition to consideration of impacts through the EIA process.

Sites of Special Scientific Interest (SSSIs) and sites of European or international importance (Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar sites)
The development site is within the extension to Liverpool Bay / Bae Lerpwl potential SPA and could also have a potential impact on the following designated nature conservation sites:

- Mersey Narrows SSSI
- North Wirral Foreshore SSSI
- Mersey Narrows & North Wirral Foreshore SPA
- Mersey Narrows and North Wirral Foreshore Ramsar
- Mersey Estuary SPA
- Mersey Estuary Ramsar
- Ribble & Alt Estuaries SPA
- Ribble & Alt Estuaries Ramsar
- Dee Estuary SAC
- Sefton Coast SAC

The Environmental Statement should include a full assessment of the direct and indirect effects of the development on the features of special interest within these sites and should identify such mitigation measures as may be required in order to avoid, minimise or reduce any adverse significant effects.

Further information on SSSIs and the special interest features can be found at www.magic.gov.uk. Natura 2000 network site conservation objectives are available on our internet site http://publications.naturalengland.org.uk/category/6490068894089216.

Natural England has published Conservation Advice packages which may provide useful information to aid the assessment for the Mersey Narrows and North Wirral Foreshore SPA / Ramsar and Mersey Estuary SPA / Ramsar. The Liverpool City Region packages and supporting information documents are available here: https://www.gov.uk/government/collections/conservation-advice-packages-for-marine-protected-areas.

2.3 Regionally and Locally Important Sites
The EIA will need to consider any impacts upon local wildlife and geological sites. Local Sites are identified by the local wildlife trust, geoconservation group or a local forum established for the purposes of identifying and selecting local sites. They are of county importance for wildlife or geodiversity. The Environmental Statement should therefore include an assessment of the likely impacts on the wildlife and geodiversity interests of such sites. The assessment should include proposals for mitigation of any impacts and if appropriate, compensation measures. Contact the local wildlife trust, geoconservation group or local sites body in this area for further information.

2.4 Protected Species - Species protected by the Wildlife and Countryside Act 1981 (as amended) and by the Conservation of Habitats and Species Regulations 2010
The ES should assess the impact of all phases of the proposal on protected species (including, for example, great crested newts, reptiles, birds, water voles, badgers and bats). Natural England does not hold comprehensive information regarding the locations of species protected by law, but advises on the procedures and legislation relevant to such species. Records of protected species should be sought from appropriate local biological record centres, nature conservation organisations, groups

and individuals; and consideration should be given to the wider context of the site for example in terms of habitat linkages and protected species populations in the wider area, to assist in the impact assessment.

The conservation of species protected by law is explained in Part IV and Annex A of Government Circular 06/2005 *Biodiversity and Geological Conservation: Statutory Obligations and their Impact within the Planning System*. The area likely to be affected by the proposal should be thoroughly surveyed by competent ecologists at appropriate times of year for relevant species and the survey results, impact assessments and appropriate accompanying mitigation strategies included as part of the ES.

In order to provide this information there may be a requirement for a survey at a particular time of year. Surveys should always be carried out in optimal survey time periods and to current guidance by suitably qualified and where necessary, licensed, consultants. Natural England has adopted standing advice for protected species which includes links to guidance on survey and mitigation.

2.5 Habitats and Species of Principal Importance

The ES should thoroughly assess the impact of the proposals on habitats and/or species listed as 'Habitats and Species of Principal Importance' within the England Biodiversity List, published under the requirements of S41 of the Natural Environment and Rural Communities (NERC) Act 2006. Section 40 of the NERC Act 2006 places a general duty on all public authorities, including local planning authorities, to conserve and enhance biodiversity. Further information on this duty is available here https://www.gov.uk/guidance/biodiversity-duty-public-authority-duty-to-have-regard-to-conserving-biodiversity.

Government Circular 06/2005 states that Biodiversity Action Plan (BAP) species and habitats, 'are capable of being a material consideration…in the making of planning decisions'. Natural England therefore advises that survey, impact assessment and mitigation proposals for Habitats and Species of Principal Importance should be included in the ES. Consideration should also be given to those species and habitats included in the relevant Local BAP.

Natural England advises that a habitat survey (equivalent to Phase 2) is carried out on the site, in order to identify any important habitats present. In addition, ornithological, botanical and invertebrate surveys should be carried out at appropriate times in the year, to establish whether any scarce or priority species are present. The Environmental Statement should include details of:

- Any historical data for the site affected by the proposal (e.g. from previous surveys);
- Additional surveys carried out as part of this proposal;
- The habitats and species present;
- The status of these habitats and species (e.g. whether priority species or habitat);
- The direct and indirect effects of the development upon those habitats and species;
- Full details of any mitigation or compensation that might be required.

The development should seek if possible to avoid adverse impact on sensitive areas for wildlife within the site, and if possible provide opportunities for overall wildlife gain.

The record centre for the relevant Local Authorities should be able to provide the relevant information on the location and type of priority habitat for the area under consideration.

2.6 Contacts for Local Records

Natural England does not hold local information on local sites, local landscape character and local or national biodiversity priority habitats and species. We recommend that you seek further information from the appropriate bodies (which may include the local records centre, the local wildlife trust, local geoconservation group or other recording society and a local landscape characterisation document).

3. Landscape Character

3.1 Landscape and visual impacts

Natural England would wish to see details of local landscape character areas mapped at a scale appropriate to the development site as well as any relevant management plans or strategies pertaining to the area. The EIA should include assessments of visual effects on the surrounding area and landscape together with any physical effects of the development, such as changes in topography. The European Landscape Convention places a duty on Local Planning Authorities to consider the impacts of landscape when exercising their functions.

The EIA should include a full assessment of the potential impacts of the development on local landscape character using landscape assessment methodologies. We encourage the use of Landscape Character Assessment (LCA), based on the good practice guidelines produced jointly by the Landscape Institute and Institute of Environmental Assessment in 2013. LCA provides a sound basis for guiding, informing and understanding the ability of any location to accommodate change and to make positive proposals for conserving, enhancing or regenerating character, as detailed proposals are developed.

Natural England supports the publication *Guidelines for Landscape and Visual Impact Assessment*, produced by the Landscape Institute and the Institute of Environmental Assessment and Management in 2013 (3rd edition). The methodology set out is almost universally used for landscape and visual impact assessment.

In order to foster high quality development that respects, maintains, or enhances, local landscape character and distinctiveness, Natural England encourages all new development to consider the character and distinctiveness of the area, with the siting and design of the proposed development reflecting local design characteristics and, wherever possible, using local materials. The Environmental Impact Assessment process should detail the measures to be taken to ensure the building design will be of a high standard, as well as detail of layout alternatives together with justification of the selected option in terms of landscape impact and benefit.

The assessment should also include the cumulative effect of the development with other relevant existing or proposed developments in the area. In this context Natural England advises that the cumulative impact assessment should include other proposals currently at Scoping stage. Due to the overlapping timescale of their progress through the planning system, cumulative impact of the proposed development with those proposals currently at Scoping stage would be likely to be a material consideration at the time of determination of the planning application.

The assessment should refer to the relevant National Character Areas which can be found on our website. Links for Landscape Character Assessment at a local level are also available on the same page.

3.2 Heritage Landscapes

You should consider whether there is land in the area affected by the development which qualifies for conditional exemption from capital taxes on the grounds of outstanding scenic, scientific or historic interest. An up-to-date list may be obtained at www.hmrc.gov.uk/heritage/lbsearch.htm.

4. Access and Recreation

Natural England encourages any proposal to incorporate measures to help encourage people to access the countryside for quiet enjoyment. Measures such as reinstating existing footpaths together with the creation of new footpaths and bridleways are to be encouraged. Links to other green networks and, where appropriate, urban fringe areas should also be explored to help promote the creation of wider green infrastructure. Relevant aspects of local authority green infrastructure strategies should be incorporated where appropriate.

4.1 Rights of Way, Access land, Coastal access and National Trails

The EIA should consider potential impacts on access land, public open land, rights of way and coastal access routes in the vicinity of the development. Appropriate mitigation measures should be incorporated for any adverse impacts. We also recommend reference to the relevant Right of Way Improvement Plans (ROWIP) to identify public rights of way within or adjacent to the proposed site

that should be maintained or enhanced.

4.2 England Coastal Path

Natural England has a duty to provide coastal access on foot around the whole of the English coast and is aiming to complete this by 2020. This is a new National Trail with an associated margin of land predominantly seawards of this, for the public to access and enjoy. Natural England takes great care in considering the interests of both land owners/occupiers and users of the England Coast Path, aiming to strike a fair balance when working to open a new stretch. We follow an approach set out in the approved Coastal Access Scheme and all proposals have to be approved by the Secretary of State. We would encourage any proposed development to include appropriate provision for the England Coast Path to maximise the benefits this can bring to the area. We suggest that the development includes provision for a walking or multi-user route, where practicable and safe. This should not be to the detriment of nature conservation, historic environment, landscape character or affect natural coastal change. Consideration for how best this could be achieved should be made within the ES. More information on progress of the England Coast Path is available here.

5. Air Quality

Air quality in the UK has improved over recent decades but air pollution remains a significant issue; for example over 97% of sensitive habitat area in England is predicted to exceed the critical loads for ecosystem protection from atmospheric nitrogen deposition (England Biodiversity Strategy, Defra 2011). A priority action in the England Biodiversity Strategy is to reduce air pollution impacts on biodiversity. The planning system plays a key role in determining the location of developments which may give rise to pollution, either directly or from traffic generation, and hence planning decisions can have a significant impact on the quality of air, water and land. The assessment should take account of the risks of air pollution and how these can be managed or reduced. Further information on air pollution impacts and the sensitivity of different habitats/designated sites can be found on the Air Pollution Information System (www.apis.ac.uk). Further information on air pollution modelling and assessment can be found on the Environment Agency website.

6. Climate Change Adaptation

The England Biodiversity Strategy published by Defra establishes principles for the consideration of biodiversity and the effects of climate change. The ES should reflect these principles and identify how the development's effects on the natural environment will be influenced by climate change, and how ecological networks will be maintained. The NPPF requires that the planning system should contribute to the enhancement of the natural environment 'by establishing coherent ecological networks that are more resilient to current and future pressures' (NPPF Para 109), which should be demonstrated through the ES.

7. Cumulative and in-combination effects

A full consideration of the implications of the whole scheme should be included in the ES. All supporting infrastructure should be included within the assessment.

The ES should include an impact assessment to identify, describe and evaluate the effects that are likely to result from the project in combination with other projects and activities that are being, have been or will be carried out. The following types of projects should be included in such an assessment, (subject to available information):

a. existing completed projects;
b. approved but uncompleted projects;
c. ongoing activities;
d. plans or projects for which an application has been made and which are under consideration by the consenting authorities; and
e. plans and projects which are reasonably foreseeable, ie projects for which an application has not yet been submitted, but which are likely to progress before completion of the development and for which sufficient information is available to assess the likelihood of cumulative and in-combination effects.

Liverpool City Council
Cunard Buildings
Pierhead
Water Street
Liverpool
L3 1DS

Our ref: SO/2017/117464/01-L01
Your ref: 17F/1628

Date: 04 September 2017

FAO Peter Jones

Dear Sir

TO ERECT A PART 14 AND PART 8 STOREY RESIDENTIAL BLOCK (USE CLASS C3) COMPRISING 237 APARTMENTS FOR MARKET SALE WITH COMMERCIAL SPACE AT GROUND LEVEL TO INCORPORATE B1A (OFFICE); A3 (RESTAURANT/CAFE); AND D2 (LEISURE/GYM) USE; 51 PARKING SPACES; 120 CYCLE PARKING SPACES, TOGETHER WITH PLANT; RECEPTION; HARD AND SOFT LANDSCAPING; ACCESS AND ASSOCIATED WORKS.
LAND TO WEST OF WATERLOO ROAD, PLOT C04 AND C06 , CENTRAL DOCKS, LIVERPOOL WATERS, LIVERPOOL

Thank you for consulting us with the above application received in this office 21st August 2017.

Environment Agency position

We have no objection in principle to the proposed development but make the following comments;

Contaminated Land

We have reviewed the following report with regards to potential risks to controlled waters from land contamination;

- Ground Conditions for Site of C04 and C06. Former Victoria Dock. Liverpool. Report Ref: CCG-C-17-9428. Date: April 2017.

Potentially contaminative activities associated with the site are the former Victoria Dock reported to have been infilled in 1973 and a former vehicle storage and container depot. Off-site potential contaminative sources include the infilling of former dock branches associated with the wider site.

Controlled water receptors potentially at risk are the underlying principle aquifer and the River Mersey located adjacent to the western boundary of the site.

Based on the information presented within the Ground Condition report, the site appears to pose a low risk to controlled waters. However, site investigation works completed to date do not appear to have investigated all of the land associated with this development given the proposed planning application boundary shown on Site Location Plan 0098-EX-PL-PN-XX-01 appears to include additional land not shown on drawing 17/94281/BH locations detailing the results of the site investigation.

To ensure the risks to controlled waters are appropriately assessed we recommend additional works are undertaken within areas of land not previously covered by the site investigation documented within the above report and where required appropriate mitigation measures included within the remedial strategy to address any identified risks to controlled waters.

The report detailed above provides us with confidence it will be possible to suitably manage the risk posed to controlled waters by this development. It is our opinion it would place an unreasonable burden on the developer to ask for more detailed information prior to the granting of planning permission but respect this is a decision for the local planning authority.

In light of the above, the proposed development will be acceptable if the following planning conditions are included within any planning permission granted for the site to ensure that any unacceptable risks from contamination are adequately addressed and mitigated during the re-development of the site. Without these conditions, the proposed development on this site poses an unacceptable risk to the environment and we would object to the application.

Condition

No development approved by this planning permission shall commence until a remediation strategy to deal with the risks associated with contamination of the site has been submitted to, and approved in writing by, the Local Planning Authority. This strategy will include the following components:

1. A preliminary risk assessment which has identified: all previous uses; potential contaminants associated with those uses; a conceptual model of the site indicating sources, pathways and receptors; and potentially unacceptable risks arising from contamination at the site.
2. A site investigation scheme, based on (1) to provide information for a detailed assessment of the risk to all receptors that may be affected, including those off site.
3. The results of the site investigation and the detailed risk assessment referred to in (2) and, based on these, an options appraisal and remediation strategy giving full details of the remediation measures required and how they are to be undertaken.
4. A verification plan providing details of the data that will be collected in order to demonstrate that the works set out in the remediation strategy in (3) are complete and identifying any requirements for longer-term monitoring of pollutant linkages, maintenance and arrangements for contingency action.

Any changes to these components require the written consent of the local planning authority. The scheme shall be implemented as approved.

Reason

To ensure that the development is not put at unacceptable risk from, or adversely affected by, unacceptable levels of water pollution in line with paragraph 109 of the National Planning Policy Framework.

Condition

Prior to any part of the permitted development being bought into use a verification report demonstrating completion of the works set out in the approved remediation strategy and the effectiveness of the remediation shall be submitted to and approved, in writing, by the local planning authority. The report shall include results of sampling and monitoring carried out in accordance with the approved verification plan to demonstrate that the site remediation criteria have been met. It shall also include any plan (a long-term monitoring and maintenance plan) for longer-term monitoring of pollutant linkages, maintenance and arrangements for contingency action, as identified in the verification plan, and for the reporting of this to the local planning authority.

Reason

To ensure the site does not pose any further risk to the water environment by demonstrating the requirements of the approved verification plan have been met and that remediation of the site is complete. This is in line with paragraph 109 of the National Planning Policy Framework.

Condition

If, during development, contamination not previously identified is found to be present at the site then no further development (unless otherwise agreed in writing with the Local Planning Authority) shall be carried out until a remediation strategy detailing how this contamination will be dealt with has been submitted to and approved in writing by the Local Planning Authority. The remediation strategy shall be implemented as approved.

Reason

To ensure the development is not put at unacceptable risk from, or adversely affected by, unacceptable levels of water pollution from previously unidentified contamination sources at the development site in line with paragraph 109 of the National Planning Policy Framework.

Given the applicant is proposing to utilise piled foundations within the sandstone bedrock we have recommended the inclusion of a specific piling condition as documented below to ensure the deeper groundwater within the sandstone aquifer is adequately protected.

Condition
Piling or any other foundation designs using penetrative methods shall not be permitted other than with the express written consent of the local planning authority,

Cont/d..

which may be given for those parts of the site where it has been demonstrated that there is no resultant unacceptable risk to groundwater. The development shall be carried out in accordance with the approved details.

Reason
To ensure the proposed piling activity is protective of controlled waters in line with paragraph 109 of the National Planning Policy Framework.

We ask to be consulted on the details submitted for approval to your Authority to discharge these conditions and on any subsequent amendments/alterations and ask that our comments below under 'Advice to Applicant' are provided to the developer / consultant.

Informatives

Reuse of material on site

The CLAIRE Definition of Waste: Development Industry Code of Practice (version 2) provides operators with a framework for determining whether or not excavated material arising from site during remediation and/or land development works are waste or have ceased to be waste. Under the Code of Practice:

- excavated materials that are recovered via a treatment operation can be re-used on-site providing they are treated to a standard such that they fit for purpose and unlikely to cause pollution
- treated materials can be transferred between sites as part of a hub and cluster project
- some naturally occurring clean material can be transferred directly between sites.

Developers should ensure that all contaminated materials are adequately characterised both chemically and physically, and that the permitting status of any proposed on site operations are clear. If in doubt, the Environment Agency should be contacted for advice at an early stage to avoid any delays.

The Environment Agency recommends that developers should refer to:

- the Position statement on the Definition of Waste: Development Industry Code of Practice and;
- The Environmental regulations page on GOV.UK.

Waste to be taken off site

Contaminated soil that is, or must be disposed of, is waste. Therefore, its handling, transport, treatment and disposal is subject to waste management legislation, which includes:

- Duty of Care Regulations 1991
- Hazardous Waste (England and Wales) Regulations 2005
- Environmental Permitting (England and Wales) Regulations 2017
- The Waste (England and Wales) Regulations 2011

Developers should ensure that all contaminated materials are adequately characterised both chemically and physically in line with relevant guidance and that

the permitting status of any proposed treatment or disposal activity is clear. If in doubt, the Environment Agency should be contacted for advice at an early stage to avoid any delays.

Please forward a copy of this letter to the applicant and send me a copy of the decision notice.

Yours faithfully

Mr Stephen Sayce
Sustainable Places Planning Advisor

Direct e-mail stephen.sayce@environment-agency.gov.uk

End

Historic England

NORTH WEST OFFICE

Mr Peter Jones
Liverpool City Council
Development Management
Municipal Buildings, Dale Street
Liverpool
L2 2DH

Direct Dial: 0161 242 1416

Our ref: PL00141070

9 August 2017

Dear Mr Jones

Re: LIVERPOOL CRUISE TERMINAL ENVIRONMENTAL IMPACT ASSESSMENT (EIA) SCOPING REPORT

Thank you for your letter of 31ST July 2017 consulting us about the above EIA Scoping Report.

This development could, potentially, have an impact upon a number of designated heritage assets and their settings in the area around the site. In line with the advice in the National Planning Policy Framework (NPPF), we would expect the Environmental Statement to contain a thorough assessment of the likely effects which the proposed development might have upon those elements which contribute to the significance of these assets.

The site falls respectively within the Liverpool Maritime Mercantile World Heritage Site (WHS) and its Buffer Zone (BZ), forming part of the dock system intrinsic to the Outstanding Universal Value of the WHS. The area lies adjacent to a cluster of Liverpool's defining buildings, known as Pier Head or the Three Graces, and consists of the Liver Building (GI), The Cunard (GII*) and the Port of Liverpool Building (GII*). Further designations exist in the form of a Conservation Area, as part of the proposed site lies within the Castle Area Conservation Area.

Our initial assessment shows a large number of heritage assets within 0.5 km of the proposed development. We would draw your attention, in particular, to the following:

- Liver Building (I)
- The Cunard (II*)
- Port of Liverpool Building (II*)
- Liverpool Maritime Mercantile World Heritage Site and its Buffer Zone (WHS)
- The Titanic Memorial (II)
- The Church of Our Lady and St Nicholas (II)

We would also expect the Environmental Statement to consider the potential impacts on non-designated features of historic, architectural, archaeological or artistic interest, since these can also be of national importance and make an important contribution to the character and local distinctiveness of an area and its sense of place. This information is available via the local authority Historic Environment Record (www.heritagegateway.org.uk) and relevant local authority staff.
We would strongly recommend that you involve the Conservation Officer of Liverpool City Council and the archaeological staff at Merseyside Environmental Advisory Service in the development of this assessment. They are best placed to advise on: local historic environment issues and priorities; how the proposal can be tailored to avoid and minimise potential adverse impacts on the historic environment; the nature and design of any required mitigation measures; and opportunities for securing wider benefits for the future conservation and management of heritage assets.

Given the surrounding landscape character, this development is likely to be visible across a very large area and could, as a result, affect the significance of heritage assets at some distance from this site itself. We would expect the assessment to clearly demonstrate that the extent of the proposed study area is of the appropriate size to ensure that all heritage assets likely to be affected by this development have been included and can be properly assessed.

It is important that the assessment is designed to ensure that all impacts are fully understood. Section drawings and techniques such as photomontages are a vital part of this.

The assessment should also take account of the potential impact which associated activities (such as construction, servicing and maintenance, and associated traffic) might have upon perceptions, understanding and appreciation of the heritage assets in the area. The assessment should also consider, where appropriate, the likelihood of alterations to drainage patterns that might lead to *in situ* decomposition or destruction of below ground archaeological remains and deposits, and can also lead to subsidence of buildings and monuments.

The creation of a new Cruise Terminal Facility on Liverpool waterfront will facilitate the continuation of an established use, and would allow cruise ships of greater scale to berth in the city than previously seen. The scoping report sets out the intention to consider the potential impacts of the construction of a permanent facility on the surrounding designated heritage assets, which is welcomed. However, we advise that in addition to this, the potential impacts of the cruiser liners themselves should also be evaluated as they would be a large scale, all be it temporary, entity positioned within key views of both the Pier Head and the WHS. Evidence that this methodology is already being utilised is shown within the visual assessment appended to the scoping

report, but we recommend that this approach is carried through into the main body of the text.

The site is situated partially within the Liverpool Maritime Mercantile World Heritage Site, and partially within its Buffer Zone. Whilst the scoping report makes reference to the need to consider the potential impacts of the proposed development on the Outstanding Universal Value of the designation, we advise that this analysis should be carried out in a separate Heritage Impact Assessment (HIA), with the findings incorporated into the main body of the ES.

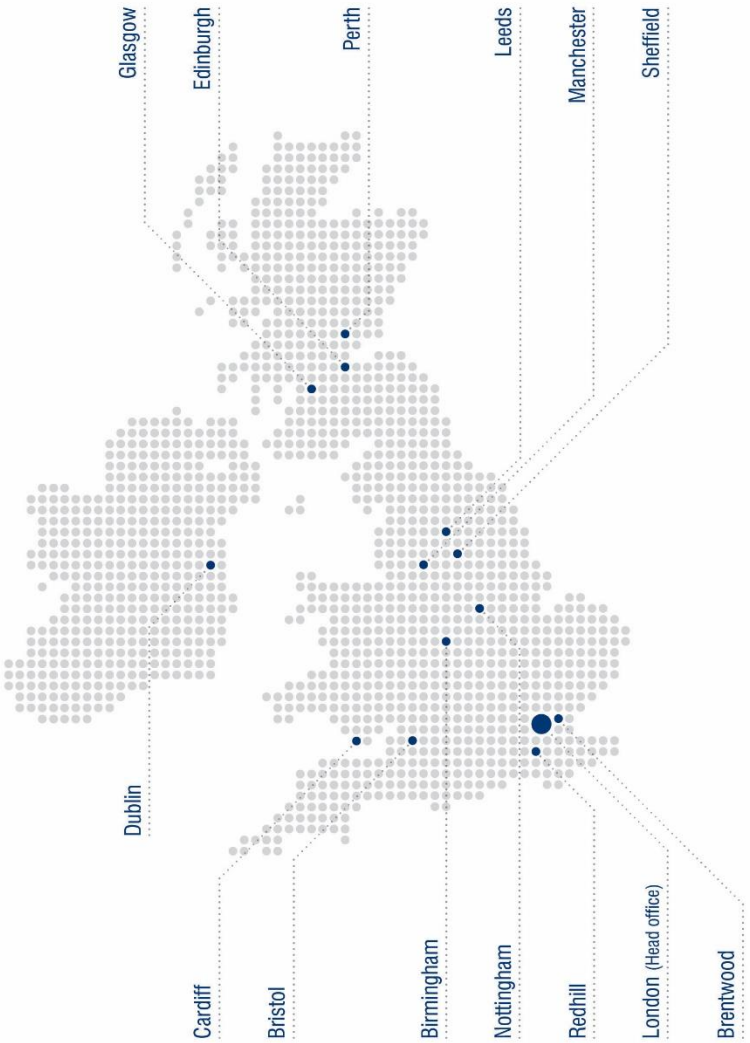
The HIA will need to comply with the guidance set out in appendix four of the ICOMOS Guidance on Heritage Impact Assessments for Cultural World Heritage Properties and be included, in full, as a technical appendix of the ES.

If you have any queries about any of the above, or would like to discuss anything further, please contact me.

Yours sincerely,

Marie Smallwood
Inspector of Historic Buildings and Areas
marie.smallwood@HistoricEngland.org.uk

UK and Ireland Office Locations



Appendix 2.4a: MMO Scoping Responses

Marine Management Organisation

Scoping Opinion

Harbours Act 1964

Title: Liverpool Cruise Liner Terminal

Applicant: Liverpool City Council

MMO Reference: DC10147

Contents

1 Proposal

Liverpool City Council are proposing the creation of a new cruise terminal at Princes Jetty, Liverpool. The proposed Development will enable the existing temporary cruise terminal to be replaced with a permanent and enlarged cruise terminal capable of accommodating the change in the cruise market to larger ships and rising passenger numbers.

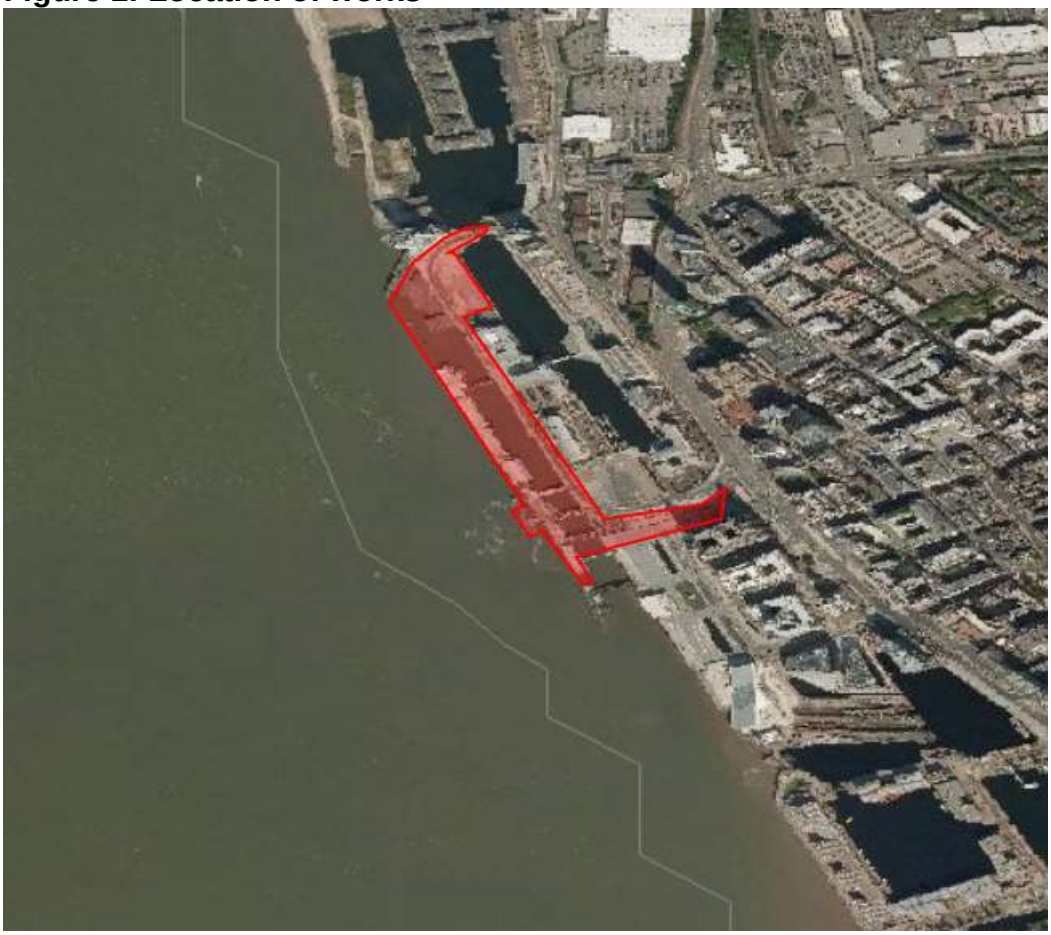
1.1 Project Background

The development will include the creation of a new jetty at the existing redundant Princes Jetty site, upon which a new cruise ship passenger terminal would be built. The new cruise terminal will be connected to the existing landing stage by a 'linkspan' bridge and passenger walkways. The works will also include landscaping and associated infrastructure including short stay surface car parking for passenger drop off and pick up.

2 Location

The proposed Liverpool Cruise Terminal is located at Princes Jetty, River Mersey which is displayed in Figure 1 below.

Figure 1: Location of works



3 Environmental Impact Assessment (EIA)

Council Directive 2011/92/EU (as amended) on the assessment of the effects of certain public and private projects on the environment ("the EIA Directive") aims to protect the environment and the quality of life by ensuring that projects which are likely to have significant environmental effects by virtue of their nature, size or location are subject to an EIA before permission is granted.

The Marine Management Organisation ("MMO") considers the proposed works to be an Annex II project under the EIA Directive 2011/92/EU, specifically:

> Article 4(2) 10 (e) "Construction of roads, harbours and port installations, including fishing harbours (projects not included in Annex I)".

In accordance with Schedule 3 of the Harbours Act 1964, should the MMO decide that the proposed application relates to a project which requires an EIA, the MMO must give the applicant an opinion, in writing, about the scope and level of detail of the information which the proposed applicant will be required to supply in an Environmental Statement ("ES"), if the application is made. This Opinion is set out below.

4 Scoping Opinion

Waterman Infrastructure & Environment Limited have prepared a Scoping Report on behalf of Liverpool City Council entitled "Liverpool Cruise Terminal: Environmental Impact Assessment Scoping Report for Harbour Revision Order and Marine Licence Applications" ("the Scoping Report") which has been submitted to the MMO.

The MMO agrees with the topics outlined in the Scoping Report and in addition, we outline that the following aspects be considered further during the EIA and must be included in any resulting ES.

4.1 Nature Conservation Designations

The ES must thoroughly assess the potential for the proposal to affect designated sites. European sites (e.g. designated Special Areas of Conservation and Special Protection Areas) fall within the scope of the Conservation of Habitats and Species Regulations 2017. In addition paragraph 118 of the National Planning Policy Framework requires that potential Special Protection Areas (SPA), possible Special Areas of Conservation (SAC), listed or proposed Ramsar sites, and any site identified as being necessary to compensate for adverse impacts on classified, potential or possible SPAs, SACs and Ramsar sites be treated in the same way as classified sites. The development site could have a potential impact on the following designated nature conservation sites:

SPA
Liverpool Bay SPA
Mersey Narrows & North Wirral Foreshore SPA

Mersey Estuary SPA
Ribble & Alt Estuaries SPA

Liverpool Bay SPA was fully classified as an SPA on 31 October 2017. The site must be considered within any assessments coming forward as a whole site rather than two distinct sites. All interest features of the site need to be included in the ES and the most up to date citation for population figures of the birds must be used. As a result of the extension to the SPA, numbers of red throated diver and common scoter have also been amended, please refer to the site citation for up to date population numbers.

SAC
Dee Estuary SAC,
Sefton Coast SAC

Ramsar
Mersey Narrows and North Wirral Foreshore Ramsar, Mersey Estuary Ramsar
Ribble & Alt Estuaries Ramsar

SSSI
Mersey Narrows SSSI

The ES must include a full assessment of the direct and indirect effects of the development on the features of special interest within these sites and must identify such mitigation measures as may be required in order to avoid, minimise or reduce any adverse significant effects.

The MMO recommends that there must be a separate section of the ES to address the impacts upon European and Ramsar sites entitled ‘Information for Habitats Regulations Assessment’. It is important that all impact pathways are considered including impacts both direct and indirect through all phases of the development including construction and operation.

The ES must consider the impact of the proposal on the breeding, passage and wintering birds that the SSSI, SPAs and Ramsar sites are designated for, and the habitats that support these species. The potential effects due to loss of intertidal feeding habitat due to the change in the hydrodynamic regime, bird disturbance and smothering of habitats must be included. The potential disturbance due to noise (resulting from piling) must be fully assessed. Suitable mitigation techniques, such as timing of the works must be implemented. The use of vibro-piling is the preferred method for minimising noise and vibration impacts on the environment, but where this is not feasible, a soft start method must be employed for percussive piling to deliver the required design depth only. The bird and noise data used in the assessment has to be of sufficient quality and current enough to be able to determine the level of impact of the development. The ES must consider the impacts on the features of the designated sites through operation of the jetty and future maintenance activity (any future dredging requirements) which will be required at the site.

4.2 Other Species and Habitats

4.2.1 Local habitats

The ES must consider any impacts upon local wildlife and geological sites. Local Sites are identified by the local wildlife trust, geo-conservation group or a local forum established for the purposes of identifying and selecting local sites. These sites are of county importance for wildlife or geodiversity. The ES needs to therefore include an assessment of the likely impacts on the wildlife and geodiversity interests of such sites. The assessment must include proposals for mitigation of any impacts and if appropriate, compensation measures.

The potential impact of the proposal upon features of nature conservation interest and opportunities for habitat creation/enhancement must be included within this assessment in accordance with appropriate guidance on such matters. Guidelines for Ecological Impact Assessment (EcIA) have been developed by the Institute of Ecology and Environmental Management (IEEM) and are available on their website.

The ES must consider whether there is likely to be a loss of intertidal habitats due to the construction causing a change in the hydrodynamic regime within the estuary. The MMO recommends that the applicant must use modelling to assess the potential changes in the hydrodynamic functioning of the estuary (tidal propagation, tidal prism etc.) due to the development of the new berth. The ES must assess the additional boat wash resulting from more heavily laden vessels and present any evidence available on the current impacts of wash on the erosion of the intertidal and subtidal habitats in the area.

4.2.2 Protected species

The ES must assess the impact of all phases of the proposal on protected species. Records of protected species should be sought from appropriate local biological record centres, nature conservation organisations, groups and individuals; and consideration must be given to the wider context of the site for example in terms of habitat linkages and protected species populations in the wider area, to assist in the impact assessment.

The conservation of species protected by law is explained in Part IV and Annex A of Government Circular 06/2005 Biodiversity and Geological Conservation: Statutory Obligations and their Impact within the Planning System. The area likely to be affected by the proposal must be thoroughly surveyed by competent ecologists at appropriate times of year for relevant species and the survey results, impact assessments and appropriate accompanying mitigation strategies included as part of the ES. Surveys must always be carried out in optimal survey time periods and to current guidance by suitably qualified and where necessary, licensed, consultants. There is standing advice for some protected species which includes links to guidance on survey and mitigation.

MMO is aware that records of starlet sea anemone (*Nematostella vectensis*) have been identified through survey work in association with the proposed works. This species is protected under Schedule 5 of the Wildlife and Countryside Act 1981. It is advised that the onus is on the developer to ensure they are complaint with the

legislation. MMO expect to see evidence provided within the ES to demonstrate compliance with regard to the legislation.

The ES must thoroughly assess the impact of the proposals on habitats and/or species listed as 'Habitats and Species of Principal Importance' within the England Biodiversity List, published under the requirements of S41 of the Natural Environment and Rural Communities (NERC) Act 2006. Section 40 of the NERC Act 2006 places a general duty on all public authorities, including local planning authorities, to conserve and enhance biodiversity.

A habitat survey (equivalent to Phase 2) must be carried out on the site, in order to identify any important habitats present. In addition, ornithological, botanical and invertebrate surveys should be carried out at appropriate times in the year, to establish whether any scarce or priority species are present. The ES must include details of:

- Any historical data for the site affected by the proposal (e.g. from previous surveys);
- Additional surveys carried out as part of this proposal;
- The habitats and species present;
- The status of these habitats and species (e.g. whether priority species or habitat);
- The direct and indirect effects of the development upon those habitats and species;
- Full details of any mitigation or compensation that might be required.

The development must seek, where possible, to avoid adverse impact on sensitive areas for wildlife within the site, and if possible provide opportunities for overall wildlife gain.

4.2.3 Invasive Species

The risk posed by invasive, non-native species (INNS) within the existing dock must be considered and fully assessed. MMO expects to see reference to biosecurity and INNS in the EIA. Non-native marine species are known to inhabit Liverpool Docks (e.g., the striped sea squirt *Styela clava* and the orange-striped green anemone *Haliplanella lineata*). Under the Wildlife and Countryside Act 1981, it is illegal to release or allow to escape any animal which is not ordinarily a resident of the UK. It will therefore be necessary to determine whether such species are likely to be present within the proposed development area and, if so, take necessary measures to avoid their release into the wider marine environment during the construction phase. The possible impacts of releasing any non-native marine species needs to be included in the EIA.

4.3 Benthic Ecology

It is not clear from the Scoping Report whether data on benthic invertebrate communities specifically within designated sites will be used or collected. These animals provide a source of food for bird species that the SPA sites are designated

to protect, and therefore if any sites could possibly be affected by the proposed development then it will be necessary to obtain data that will allow the impact on benthic communities within them to be assessed. This must be included in the ES.

4.4 Coastal Processes

The EIA must consider whether there is likely to be a loss of intertidal habitats due to the construction causing a change in the hydrodynamic regime within the estuary. MMO recommends that modelling must be used to assess the potential changes in the hydrodynamic functioning of the estuary (tidal propagation, tidal prism etc.) due to the development of the new berth. The modelling of sediment transport will also need to include some analysis of the impacts upon sensitive receptors. For example, the modelling also needs to consider the fate of disturbed sediments and whether this could lead to, for example, smothering of benthic habitats. It is likely that the importance of the effects will be different for the construction and operational phases. The Approach and Methodology (Section 4.12.3) of the Scoping Report needs to specifically consider the differences between the model set-ups for each case needed to capture the necessary results.

The ES must consider the importance of the modification of the wave field around the new facility (including under storm and possibly storm surge conditions) to examine if there will be significant refraction or diffraction effects that might affect the facility or affect adjoining structures. If determined to be of importance, this also needs to be incorporated into the modelling study (using SWAN or one of the appropriate modules within TELEMAC3D).

Successful modelling of sediment transport is highly dependent on the correct assessment of the bed sediments in the region, in terms of the type, grain size and strength. HR Wallingford SEDPLUME-RW, Lagrangian, particle tracking model is proposed to be used. HR Wallingford will be able to advise on the density of bed sediment survey appropriate to their modelling and included in the ES. This sampling could be conducted at the same time as the grab samples for the benthic survey and for the sediment sampling suggested in Section 4.12.4 by the Mersey Environmental Advisory Service's EIA Scoping Response for analysis for chemical contamination.

There is no specific mention of modelling the general suspended sediment concentration (SSC) in the region. Particularly in the construction phase it is likely that significant sediment will be re-suspended and transported. Modelling must include an examination of the extent of the sediment plume and its possible impacts on sensitive habitats. Section 4.12.2 identifies the importance of "Modifications to the transport of estuarine sediments" but this implies a knowledge of the present sediment transport, background SSC and recent morphology changes (unless the whole study is just modelling without real world verification). The information required above can probably be addressed in the ES through a desk study of the literature, without the need for specific physical surveys of sediment or morphological changes in the Mersey. It is a region that has been well studied over many years. This would help to put any changes in sediment transport, SSC and estuarine morphology from the TELEMAC3D modelling in context. However, The North West Inshore Fisheries Conservation Authority (NWIFCA) have received information from fishers in the

Mersey that tidal effects and sedimentology have changed since completion of Liverpool 2 which have affected cod spawning grounds, and build-up of sediments on the east side of the estuary. Using data from before these effects alone may give inaccurate baseline.

The ES must assess the additional boat wash resulting from more heavily laden vessels and present any evidence available on the current impacts of wash on the erosion of the intertidal and subtidal habitats in the area.

4.5 Fish Ecology and Fisheries

4.5.1 Fish Ecology

The ES must include estuarine/marine and migratory fish and significant impacts arising during demolition, construction and operation of the proposal (where applicable) must be assessed. The degree to which these impacts occur will depend upon noise magnitude, duration and timing. Piling works is a particularly well known source of damaging noise in the aquatic environment and noise transmission in the Estuary must be modelled to better understand its impacts and mitigation.

Indicative spawning and nursery grounds in Coull et al., (1998) and Ellis et al. (2012) need to be utilised in the ES to provide a more comprehensive description of the importance of the Mersey Estuary to marine fish. There are additional evidence sources regarding marine/estuarine and migratory fish which could be incorporated into the ES. These include Potts and Swaby (1993) and the 2016 Annual Stock Status Report for Atlantic salmon.

As mentioned above, according to Coull et al. (1998) and Ellis et al. (2012), nursery and spawning grounds for several marine fish may extend into the Mersey Estuary. These include herring (*Clupea harengus*), sprat (*Sprattus sprattus*), sandeel (*Ammodytidae*), sole (*Solea solea*), plaice (*Pleuronectes platessa*), whiting (*Merlangius merlangus*) and cod (*Gadus morhua*). It is requested that indicative spawning and nursery grounds identified in Coull et al. (1998) and Ellis et al. (2012) are included in the ES to provide a more comprehensive description of the importance of the Mersey Estuary to marine/estuarine fish. Potts and Swaby (1993) contains a summary of fish in the Mersey Estuary from a range of published and unpublished literature. Also, Langston et al. (2006) produced a characterisation of the Mersey Estuary Special Protection Area, which contains information about fish present in the Mersey Estuary.

'The permanent loss or significant disturbance of riverbed habitats, and the resulting impact on benthic communities' has been scoped in as a potential effect (Subsection 4.11.2). Riverbed habitats can provide important spawning and feeding habitats for marine and estuarine fish and must therefore be scoped into the assessment.

4.5.2 Migratory Fish

The Mersey River and Mersey Estuary is of importance to migratory fish; Atlantic salmon (*Salmo salar*), river lamprey (*Lampetra fluviatilis*), sea lamprey (*Petromyzon marinus*) and European eel (*Anguilla anguilla*). Also, sea trout (*Salmo trutta*) have

been reported to be present in the Mersey (Jones, 2006) and it is reasonable to assume that if Atlantic salmon are present then sea trout will also be present. The ES must fully consider the importance of the Mersey Estuary for the passage of migratory species and the effects from both the construction and operational phase of this development.

The Environment Agency ("EA") has published data on fish counts in the Mersey in the National Fish Populations Database[1]. The EA may also be able to provide more recently available plankton/icthyoplankton data that they have collected in the area.

The 2016 Annual Stock Status Report for Atlantic salmon may provide useful contextual information regarding salmon fishing and the status of river stocks in the region surrounding the proposal.

The 2010 North West Eel Management Plan and the 2015 Eel Management Plan Progress Report may provide useful information for inclusion in the ES. This is in relation to eel population information in the regional water bodies, management measures and the status of eel stock in the north-west.

4.5.3 Commercial/non-commercial fishing

In the Scoping Report there is no reference to commercial or non-commercial fishing. The potential impacts on commercial charter boat operators in the Mersey, and other types of commercial fishing must be scoped in. There is a wide variety of commercially exploitable fish species recorded, including cod, whiting, herring, plaice and flounder. Commercial fishers and charter boat operators are important users of the river who could be adversely affected by the project – both during construction and operation. The assessment should look at the socio-economics along with direct impacts on fish and shellfish stocks within the immediate area and the cumulative affects the project may have within Liverpool Bay. The River Mersey is an important fishing ground and the potential impact on stakeholders should be considered.

It would be beneficial to consult with North Western Inshore Fisheries and Conservation Authority and local fishing/angling associations to gather evidence to characterise any fishing activity being conducted in the Mersey estuary which may be directly or indirectly affected by the proposal.

4.6 Archaeology / Cultural Heritage

This development could potentially have an impact upon a number of designated heritage assets and their settings in the area around the site. In line with the advice in the National Planning Policy Framework (NPPF), the ES must contain a thorough assessment of the likely effects which the proposed development might have upon those elements which contribute to the significance of these assets.

An initial assessment shows a number of designated heritage assets within 0.5km of the proposed development. The MMO highlight, in particular, the following:

[1] https://data.gov.uk/dataset/national-fish-population-database-load-statistics

- The Liver Building
- The Cunard Building
- The Port of Liverpool Building
- Liverpool Maritime Mercantile World Heritage Site and its Buffer Zone
- Memorial to the Hero's of the Marine Engine Room
- The Church of Our Lady and St Nicholas

The ES must review the potential impacts on non-designated features of historic, architectural, archaeological or artistic interest, since these can also be of national importance and make an important contribution to the character and local distinctiveness of an area and its sense of place. This information is available via the local authority Historic Environment Record (www.heritagegateway.org.uk) and relevant local authority staff.

The MMO recommend that you involve the Conservation Officer of Liverpool City Council and the archaeological staff at Merseyside Environmental Advisory Service in the development of this assessment. They can advise on: local historic environment issues and priorities; how the proposal can be tailored to avoid and minimise potential adverse impacts on the historic environment; the nature and design of any required mitigation measures; and opportunities for securing wider benefits for the future conservation and management of heritage assets.

Given the surrounding landscape character, this development is likely to be visible across a very large area and could, as a result, affect the significance of heritage assets at some distance from this site itself. MMO expects the assessment to clearly demonstrate that the extent of the proposed study area is of the appropriate size to ensure that all heritage assets likely to be affected by this development have been included and can be properly assessed. It is important that the assessment is designed to ensure that all impacts are fully understood. Section drawings and techniques such as photomontages are a vital part of this and must be included in the ES.

The assessment must also take account of the potential impact which associated activities (such as construction, servicing and maintenance, and associated traffic) might have upon perceptions, understanding and appreciation of the heritage assets in the area. The assessment must also consider, where appropriate, the likelihood of alterations to drainage patterns that might lead to *in situ* decomposition or destruction of below ground archaeological remains and deposits, and can also lead to subsidence of buildings and monuments.

The creation of a new Cruise Terminal Facility on Liverpool waterfront will facilitate the continuation of an established use, and would allow cruise ships of greater scale to berth in the city than previously seen. The Scoping Report sets out the intention to consider the potential impacts of the construction of a permanent facility on the surrounding designated heritage assets, which is welcomed. In addition, the potential impacts of the cruiser liners themselves must also be evaluated as they would be a large scale entity positioned within key views of both the Pier Head and the Liverpool Maritime Mercantile World Heritage Site and its Buffer Zone. Evidence that this methodology is already being utilised is shown within the visual assessment

appended to the Scoping Report, but it is recommended that this approach is carried through into the main body of the text.

The site is situated partially within the Liverpool Maritime Mercantile World Heritage Site, and partially within its Buffer Zone. Whilst the Scoping Report makes reference to the need to consider the potential impacts of the proposed development on the Outstanding Universal Value of the designation, this analysis must be carried out in a separate Heritage Impact Assessment (HIA), with the findings incorporated into the main body of the ES.

The HIA will need to comply with the guidance set out in appendix four of the International Council on Monuments and Sites (ICOMOS) Guidance on Heritage Impact Assessments for Cultural World Heritage Properties and be included, in full, as a technical appendix of the ES.

4.7 Navigation / Other Users of the Sea

A marine Navigation Risk Assessment (NRA) must be included in the ES under a 'Shipping and Navigation' chapter. This risk assessment needs to detail proposed risk mitigation measures, including any proposed alteration to aids to navigation in the area, particularly during the construction phase of this project.

A NRA must be undertaken to supply detail on the possible impact on navigational issues for both Commercial and Recreational craft. The NRA must address issues such as:

- Collision Risk
- Navigational Safety
- Visual intrusion and noise
- Risk Management and Emergency response
- Marking and lighting of site and information to mariners
- Effect on small craft navigational and communication equipment
- Proposed risk mitigation measures, including and aids to navigation deemed necessary.

Various types of marine employment may be at risk from both the construction and operational phase of this development and must be scoped into the ES.

4.8 Water Quality

Water quality as a receptor has been scoped out of the ES with a statement that topics will be covered under other chapters. This is acceptable provided water quality is adequately considered in the ES.

The scope of the 'Coastal Processes, Sediment Transport and Contamination' chapter does not explicitly discuss water and/or sediment quality. In this chapter the release of contaminated sediment into the marine environment is not considered as

a potential effect, although it is stated that ‘during the construction phase there may be sediment releases during reclamation or piling. There is also the potential for increases in SSC during any requirement for future dredging works. An increase in SSC has the potential for smothering of sensitive habitats. The ES must consider the potential volume of sediment which may be re-suspended and establish if sediment contaminant testing is necessary. It must also include information on the sediment quality and the potential for effects on water quality through suspension of contaminated sediments, as well as identify whether increased SSC resulting from construction are likely to impact upon the interest features and supporting habitats of any designated sites.

The ES must also consider an increase in the pollution risk as a result of the increased number and size of vessels the berth will accommodate during the operation of the development.

4.8.1 Water Framework Directive (WFD)

MMO requires that the assessment work considers the relevant WFD hydromorphology supporting quality elements as potential effects (or receptors). It is likely that a WFD assessment will be required as part of any marine licence application and it is recommended the scope for this is agreed as early as possible.

This will allow the applicant to identify the combined survey and monitoring requirements for both EIA and WFD assessment purposes, reduce duplication of effort and identify any data gaps at an early stage.

A large amount of modelling and assessment work has been carried out for other large developments in the Mersey Estuary. The MMO recommends that this work is reviewed to provide further evidence to support the EIA and WFD assessment.

4.9 Dredge and Disposal

No mention is made of dredging (either capital or maintenance) within the Scoping Report. If dredging is required a sediment contaminant survey will be required under the OSPAR guidelines to support a marine licence application and must be undertaken by an MMO certified laboratory.

If any dredging or disposal is required then the scope of the report is not adequate and the MMO expects to see an assessment of the impacts of dredging and disposal on marine receptors in the ES. If a new disposal site is proposed a detailed disposal site characterisation will need to be undertaken.

4.10 Pollution

4.10.1 Noise and Vibration

The Scoping Report does not detail direct or indirect impact pathways with regard to marine fauna. Due to the limited details of the proposed construction works, it is difficult to anticipate what the potential effects may be. However, the MMO expect

that the potential effects of underwater noise and vibration are considered in the ES where applicable.

Whereas noise and vibration effects have been dealt with separately under terrestrial assessment, vibration has been omitted from the section on Marine Ecology, and their effects may differ from noise effects which have been scoped in, therefore these effects must be included in the ES. Underwater noise and vibration must be treated as two separate effects. It would make sense to include this within the Marine Ecology chapter, rather than the Noise and Vibration chapter, which predominantly addresses airborne noise and vibration.

4.10.2 Soil and Groundwater Contamination

There is the potential for groundwater and surface water contamination. Section 4.10 of the Scoping Report states that “Geological maps for the area indicate the anticipated geology underlying the site is likely to comprise made ground of a depth of up to approximately 13m, underlain by Tidal Flat Deposits and Glacial Till” and that there is a potential risk of contamination of groundwater and surface water resources during the demolition and construction works. It is therefore important that TELEMAC modelling is sufficiently extensive in terms of dispersion and dilution for the fate of any contamination released during construction to have been assessed.

4.11 Risk of Major Accidents and Disasters Relevant to the Project (including those caused by Climate Change)

The England Biodiversity Strategy published by Defra establishes principles for the consideration of biodiversity and the effects of climate change. The ES must reflect these principles and identify how the development’s effects on the natural environment will be influenced by climate change, and how ecological networks will be maintained.

4.12 Additional Points

The ES must include a description of the following aspects in relation to construction of the proposed development:

- Likely programme and sequencing of Site works;
- Description of the demolition works;
- Anticipated types of piling, foundations, ground engineering likely to be employed;
- Description of structures to be constructed within the Mersey;
- Outline methods of construction; and
- Working hours.

5 Cumulative Impacts & In-Combination Impacts

The ES must include an impact assessment to identify, describe and evaluate the effects that are likely to result from the project in combination with other projects and activities that are being, have been or will be carried out. The following types of projects should be included in such an assessment, (subject to available information):

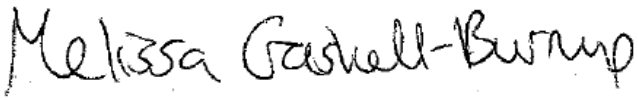
- existing completed projects;
- approved but uncompleted projects;
- ongoing activities;
- plans or projects for which an application has been made and which are under consideration by the consenting authorities; and
- plans and projects which are reasonably foreseeable, i.e. projects for which an application has not yet been submitted, but which are likely to progress before completion of the development and for which sufficient information is available to assess the likelihood of cumulative and in-combination effects.

MMO is aware of the number of proposed developments due come forward either within the parameters of the outline permission for Liverpool Waters or outside of this outline permission for the scheme. This scheme must be thoroughly considered within the in-combination assessment and MMO expects to see the exploration of in-combination impact with Wirral Waters due to the close proximity and potential impact to the same designated sites as discussed in the Nature Conservation Designations section above. In addition, the cumulative effects from proposals from the length of the tidal extent of the river must be assessed, and this must include effects on marine/estuarine migratory fish.

6 Conclusion

The topics highlighted in this scoping opinion must be assessed during the EIA process and the outcome of these assessments **must** be documented in the ES in support of the marine licence application and any associated planning application(s).

This statement, however, should not necessarily be seen as a definitive list of all EIA requirements. Given the scale and programme of these planned works other work may prove necessary.



Melissa Gaskell-Burnup
Marine Case Officer
16/03/18

Appendix 2.5a: Subsequent Consultation Responses

Date: 20 September 2018
Our ref: 255215
Your ref: DC10147

Customer Services
Hornbeam House
Crewe Business Park
Electra Way
Crewe
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CW1 6GJ

T 0300 060 3900

Melissa Gaskell-Burnup
Marine Management Organisation
harbourorders@marinemanagement.org.uk

BY EMAIL ONLY

Dear Melissa,

Consultation: DC10147 The Proposed Mersey Docks and Harbour Company (Liverpool Cruise Terminal Extension) Harbour Revision Order
Location: Princes Jetty, Princes Dock Liverpool

Thank you for your consultation on the Harbour Revision Order for Liverpool Cruise Terminal Extension which was received by Natural England on 10 August 2018. For your awareness Natural England has provided advice to Liverpool City Council regarding the outline planning permission (reference 17O/3230) for this development in March 2018. However, please note that following recent ECJ rulings (detailed below) we provide additional recommendations to ensure the development is compliant with the Habitats Regulations.

In summary, Natural England advises that there is likely significant effect, therefore a requirement for appropriate assessment, and as it stands insufficient information within the application documents to conclude that the proposed works, as described in the Harbour Revision Order, will not have an adverse effect on the internationally designated sites. This is due to uncertainty of the mitigation measures required (particularly for cormorants).

The number of documents, revisions and appendices makes it complicated for the reader to locate the most up to date and relevant information, we advise that a clear audit trail is presented. A succinct overarching table highlighting the revisions of documentation and their purpose should be provided, this will particularly useful for the upcoming planning reserved matters and marine licence applications. Natural England has reviewed the following documents in order to provide the advice contained within this letter:

- Wintering Bird Survey Final Report. APEM (dated January 2018).
- Environmental Statement Volume 1: Main Text Liverpool Cruise Terminal. Waterman Infrastructure & Environment Limited (dated October 2017) and Associated Appendices.
- Liverpool Cruise Terminal Environmental Statement Addendum (EAD) (dated June 2018) and associated appendices including:
  - Appendix 13.7a Information to inform a Habitat Regulations Assessment (HRA) Screening Report: Assessment of Likely Significant Effects (ALSE) (dated June 2018 v5)
  - Appendix 13.6a Consideration of Liverpool Bay SPA
  - Appendix 13.8a Starlet sea anemone *Nematostella vectensis* in the vicinity of the proposed Liverpool Cruise Terminal Site Investigation works
  - Appendix 13.9a: Extract from November 2017 ES Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology - Assessment of Underwater Noise & Vibration Effects
  - Appendix 14.3a: Water Framework Directive Scoping Report

Designated Sites

We can confirm that the proposal is within and adjacent to Liverpool Bay / Bae Lerpwl Special Protection Area (SPA) and in close proximity to Mersey Narrows and North Wirral Foreshore SPA / Ramsar and Mersey Narrows Site of Special Scientific Interest (SSSI).

Habitats Regulations Assessment (HRA)

Natural England notes that the HRA screening report provided on the consultation webpage is dated November 2017 (version 2). Within the EAD scoping document (Appendix 13.7a) an updated HRA screening report (dated June 2018) is available. To avoid confusion we recommend that the most recent report (v5) replaces the current version (v2) as a standalone document.

Natural England notes that the HRA has not been produced by your authority, but by the applicants. As competent authority, it is your responsibility to produce the HRA. We provide the advice enclosed on the assumption that your authority intends to adopt this HRA to fulfil your duty as competent authority.

Whilst Natural England concurs with the overall conclusion that the application will result in likely significant effect (i.e. for cormorant) we advise that the assessment currently does not provide enough information and/or certainty to justify the assessment conclusion. Where there is a likelihood of significant effects (excluding any measures intended to avoid or reduce harmful effects on the European Site), or there are uncertainties, a competent authority should undertake an Appropriate Assessment in order to fully assess the implications of the proposal in view of the conservation objectives for the European sites in question.

Natural England therefore advises that an Appropriate Assessment should now be undertaken. Please note that Natural England is a statutory consultee on appropriate assessments (Regulation 63 (3) therefore please re-consult us once the appropriate assessment has been completed. Additional comments on the HRA are provided in Annex A below.

Natural England highlights the recent ruling made by the Court of Justice of the European Union (the CJEU) on the interpretation of the Habitats Directive in the case of People Over Wind and Sweetman vs Coillte Teoranta (ref: C 323/17). The case relates to the treatment of mitigation measures at the screening stage of a HRA when deciding whether an appropriate assessment of a plan/project is required. The Court's Ruling goes against established practice in the UK that mitigation measures can, to a certain degree, be taken into account at the screening stage. As a result, Natural England advises that any "embedded" mitigation relating to protected sites under the Habitat Regulations 2017 Regulation 63 (1) should no longer be considered at the screening stage, but taken forward and considered at the appropriate assessment stage to inform a decision as to whether no adverse effect on site integrity can be ascertained. In light of the recent case law, any reliance on measures intended to avoid or reduce harmful effects at the likely significant stage is vulnerable to legal challenge.

Mitigation

We advise that consideration of appropriate mitigation measures for the overall scheme should be provided as part of the application for the HRO. Whist we acknowledge detailed methodologies may be provided later through planning and marine licence applications, we advise that sufficient detail and commitment is required to justify and support conclusions of an appropriate assessment to demonstrate that there will be no adverse effect on site integrity and therefore no further progression through the Habitats Regulations tests will be required.

In combination and cumulative assessment

Wirral Waters Scheme

We disagree with the comments that state that there is little biodiversity interest within the Wirral Waters site and that the ecological receptors are not significantly affected by the proposed (Wirral Waters) works (EAD 15 pg. 25) One of the key species identified at outline planning permission stage for which mitigation would be required was cormorant. Furthermore, since the outline permission was granted a colony of breeding common terns have become established in East Float dock. Natural England has been providing advice on the schemes coming forward and has highlighted that

mitigation measures (for cormorants and common terns) will be required to avoid adverse effect on site integrity.

Uncertainties remain relating to effects that may become significant when considered in combination with other plans or projects. When your authority undertakes the necessary Habitats Regulations Assessment, consideration also needs to be given to the in combination effects with other plans and projects (if it can be determined that the project itself would not result in likely significant effect).

The in combination assessment needs to assess whether there are any other plans and projects in the vicinity which have the same effect as this development i.e. habitat loss and displacement. We advise that as part of any in combination assessment you consider all schemes which may impact on the interest features of designated sites. This could include plans or projects from neighbouring Local Planning Authorities and the MMO.

We acknowledge that Port related activities have been included, however there is limited evidence to demonstrate what is meant by these and how they have been considered in combination. The recent application for the Twelve Quays Terminal at Birkenhead could also be included within the in combination assessment.

Wildlife and Countryside Act (1981)
SSSI
Our concerns regarding the potential impacts upon the SSSI listed above coincide with our concerns regarding the potential impacts upon the international designated sites.

Please note that if your authority is minded to grant planning permission contrary to the advice in this letter, you are required under Section 28I (6) of the Wildlife and Countryside Act 1981 (as amended) to notify Natural England of the permission, the terms on which it is proposed to grant it and how, if at all, your authority has taken account of Natural England's advice. You must also allow a further period of 21 days before the operation can commence.

Schedule 5- marine protected species
We acknowledge that additional information regarding starlet sea anemone (*Nematostella vectensis*) has been included with the application (Appendix 13.8a). The species is also discussed within the Environmental Statement (November 2017) however, it is unclear whether an assessment of impact on this species from the overall proposed works has been carried out. Appendix 13.8a includes information relevant to the ground investigation works (boreholes). We advise that the thorough consideration of impact of the development (including demolition, construction and operational impacts) on the species is made and we highlight that the onus is on the developer to ensure they are complaint with the legislation.

If you have any queries relating to the advice in this letter please contact me at the details below.
Please re-consult Natural England on the appropriate assessment as required.

Yours sincerely

Amanda Yeomans
Lead Adviser- Planning Casework (Coast and Marine Team)
Cheshire, Greater Manchester, Merseyside and Lancashire Area Team
Amanda.yeomans@naturalengland.org.uk

Annex A – Additional comments

HRA- Screening Report (v5 June 2018)

The screening report should be updated following our advice as above, specifically relating to the People Over Wind and Sweetman vs Coillte Teoranta (ref: C 323/17) ruling.

Table 3 Potential mechanisms and the initial list of European sites that could be affectedWhilst we acknowledge that Table 3 has been included within the screening report our previous advice indicated the requirement for HRA due to the location of the proposed works and potential impact pathways to the designated sites.

We disagree with the statement "impacts from construction are not considered significant.." the statement continues to state that there will be minor impact on the River Mersey. Based on the evidence provided Natural England advises that there is a pathway for impact to interest features of the designated sites and this requires thorough consideration within any assessment coming forward to determine the significance of any impact. Therefore, all construction and associated activities should be discussed within the HRA along with any mitigation measures for completeness. Supporting evidence should be provided throughout to support any conclusions made.

Table 4 Assessment of LSE

A number of conclusions are made within this table with limited evidence provided in support. We advise that further evidence is provided in order to support the conclusions made. This information may already be available within the Environmental Statement and therefore reference to this should be made within the HRA. The Regulations require all potential effects to be discussed with supporting evidence, and then either ruled in or out of further assessment (i.e. Appropriate Assessment).

We advise that table 4 does not include an assessment of all relevant impact pathways. Additional pathways are discussed within the EIA, however these are not considered further within the HRA screening, for example disturbance from construction activities.

The HRA should be read as a standalone document, therefore all evidence and references should be provided as support to conclusions stated. Natural England would expect to be consulted on the final HRA and Appropriate Assessment as required.

LSE is confirmed for cormorants, as a result this feature should be further considered within an Appropriate Assessment taking into consideration the conservation objectives of the site to determine whether there is an adverse effect on site integrity.

We note that in the EAD (14.10 page 24) the number of piles is increased to 171, the HRA should be updated to include an assessment of all impacts associated through the piling activity- including duration of disturbance from the activity and habitat loss associated with the activity. Any further consideration of potential updates to the ES with the number of piles used through the assessment should also be considered.

Liverpool Bay SPA- Appendix 13.6a

Ornithology receptors: Impact assessment

With reference to the table showing the impact assessment on the qualifying features of Liverpool Bay SPA, Natural England advises the MMO that the cormorant should be screened in for further assessment, not only are birds potentially feeding in the Mersey, but consideration to roosting sites is required.

WFD and comments on Marine Invasive Species

Natural England welcomes the proposed production of a project specific Biosecurity Risk Assessment and would be happy to provide additional advice either to aid production of the assessment or to review the final version. Further information should be provided within the risk assessment to identify what the current baseline of Invasive Non Native Species (INNS) is, and what the potential risks are for invasive species within the Mersey Estuary. We would advise Mersey Docks and Harbour

Company (Peel Ports) to consider this aspect further particularly for wider biosecurity planning work that may be undertaken within their role of Harbour Authority, particularly working to demonstrate good practice measures.

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PLANNING ACT (2008 – THE PROPOSED MERSEY DOCKS AND HARBOUR COMPANY (LIVERPOOL CRUISE TERMINAL EXTENSION) HARBOUR REVISION ORDER
Reference Number: DC10147

Date: 20th September 2018

To: Melissa Gaskell-Burnup – MMO

Underwater Noise Advice

1. With reference to the above application and your request for comments, please find my comments below in my capacity as advisor on underwater noise.

Document (s) reviewed

2. Environmental Statement Volume 1: Main Text. Liverpool Cruise Terminal. October 2017 (relevant sections).
3. Liverpool Cruise Terminal. Environmental Statement Addendum. June 2018 (relevant sections).

Project background / overview

4. On 1 August 2018, the Mersey Docks and Harbour Company made a formal application to the Marine Management Organisation ("MMO") under section 14 of the Harbours Act 1964 for a Harbour Revision Order ("HRO") in respect of works to be undertaken within the limits of the Port by Liverpool City Council.

5. The HRO would authorise the construction and maintenance of works and other facilities at the Port. The works comprise the construction of a reinforced concrete suspended deck, a cruise liner terminal building, a vehicular and pedestrian linkspan bridge, a new floating pontoon and two steel mono pile mooring dolphins. The HRO would also authorise the demolition of the existing timber and concrete decked jetty known as Princes Jetty, as well as modifications to the existing landing stage.

Cefas comments in response to the questions raised by the MMO:

To the best of your knowledge is the description of the environment and potential impacts accurate?
Observations

6. The baseline environment is considered in chapter 13 (from para 13.68). The report identifies several species of conservation importance that migrate through the Mersey Estuary including European eel, sea and river lamprey and Atlantic salmon. The likely seasonal presence of some of the key species of conservation interest within the Mersey Estuary is provided in Table 13.9 of the report, based on data from Coull *et al*. (1998) and Ellis *et al.* (2012). Cefas fisheries advisors will be better placed to comment on whether the description of the (baseline) environment is accurate.

7. The report identifies that the number of marine mammals recorded within the Estuary is low; however, there are occasional sightings of harbour porpoise, bottlenose dolphin, grey and harbour seals.

8. In terms of potential impacts, underwater noise and vibration is considered from para 13.141 of the report, which is appropriate. A desk based assessment has been undertaken. Sources of underwater noise arising from the proposed works include:

i. Piling of steel tubular piles for the new Cruise Liner Terminal. The overall design for the new suspended deck structure has not been finalised. However, for the purposes of assessment it is considered that there would be 155 piles, each 914 mm in diameter. Percussive piling or vibro-piling may be used, but as a worst-case scenario, the assessment assumes that percussive piling will be undertaken. It is estimated that there would be a maximum five months of piling but the specific months during which piling would occur are yet to be confirmed.

ii. Deconstruction and removal of existing Princes Jetty due to the breaking and removal of wooden piers and other structures.

iii. Barges and other boats utilised to remove the Princes Jetty structure.

9. The report gives a good account of the potential impacts of noise on fish and marine mammals, and refers to appropriate noise exposure criteria for fish. For marine mammals, it would have been more appropriate to refer to the recent NMFS (2016) guidance rather than Southall et al. (2007).

10. In general, the assessment is reasonable, although behavioural effects have not been considered for fish with swim bladders involved in hearing. Behavioural effects may be expected in the far field, although they are particularly difficult to assess, since they are highly dependent on behavioural context (Ellison et al. 2012; Popper et al., 2014) and responses may not scale with received sound level (Gomez et al., 2016). Consequently, there is considerable uncertainty in assessing the risk of behavioural responses.

Do you agree with the conclusions reached?
Observations

11. The report concludes the following:

"The only potential effect for which additional mitigation would be required to result in an effect of minor significance or less was the potential effect of underwater noise generated by pile driving activity during construction of the new jetty. This effect was assessed to be of moderate adverse significance for fish and marine mammals.

With these measures (see next question for the proposed mitigation) *in place it is considered that any effects would be local and temporary and magnitude of the effect is considered to be negligible. The value of the receptor is considered to be very high and sensitivity of the receptor to underwater noise is assessed to be high. Overall, residual significance of effect would be* ***minor adverse*** *significance".*

12. I agree that with the appropriate mitigation in place, the risk of significant impact is likely to be low. Mitigation is discussed below in points 13-16.

Are the proposed mitigation and monitoring measures sufficient?
Observations

13. It is proposed that a soft-start piling approach is implemented (para 13.253). Where possible, vibro-piling will be used instead of percussive piling as vibro-piling produces lower sound levels. Despite the great uncertainties regarding the effectiveness of soft starts, such measures may help to reduce the total number of dangerous exposures.

14. **Minor comment:** I wish to draw to the applicant's attention that there are uncertainties regarding the potential effects of vibro-piling on sensitive fish receptors / fish behaviour. Graham et al. (2017) observed an unexpectedly high source level for vibration piling in their study, compared to impact piling.

Furthermore, the pulsed sound signature of the vibration piling was more comparable to impact piling than previously thought. The study, which focused on cetaceans, found that displacement by impact piling was more limited than expected and vibration piling had greater impacts than anticipated.

15. **Major comment:** Given that the timing of the works is not yet known, I recommend that mitigation is revisited once details and plans have been finalised. However, I would recommend periods of downtime when no piling (neither impact or vibropiling) is taking place per 24 hours to minimise the risk of potential impact during key months / sensitive periods for fish migration. The report does state that piling hours would be restricted* and there would be extensive windows of no piling activity when fish could move past the area. I defer to Cefas fisheries advisors for any further comments they may have.

    * General construction hours would likely be 08:00 - 18:00 hours Monday to Friday; 08:00 - 13:00 hours Saturday; with no working on Sundays or bank holidays.

16. I note in the ES Addendum that additional text has been added in para 13.99 to describe the proposed mitigation measures for the piling operations following discussions with the Environment Agency in May 2018, which I support:

    "All efforts will be made to avoid the period of 1st September to 30th November when conducting piling, with the peak period of upstream salmon migration expected to be October and November… If any piling is to be conducted between these dates it is proposed that piling would be restricted to the ebb tide between the dates 13th September to 30th November (at the project site migrating salmon would be expected to be absent or numbers very low at the start of September and during the period when migration is most likely it is expected that the ebb tide is the stage of the tidal cycle during which upstream movements past the project site would be least likely, with upstream migration expected to be primarily restricted to the flood tide). Through discussion with the EA at a meeting conducted on the 21st May 2018, it was agreed that avoiding the most sensitive periods for salmon migration as far as possible, and restricting piling to the ebb tide if piling was conducted within that period would be an effective mitigation measure to reduce effects on salmon as far as reasonably practicable".

Are there any minor technical or presentational comments that affect the overall confidence in the conclusions? Please insert as an annex.
Observations
17. No comments to make.

Is the project description clearly presented and consistent throughout the ES?
Observations
18. Yes, the project description is clearly presented and consistent throughout the ES, although

Is there an adequate description of the baseline physical and biological environment?
Observations
19. Please see previous points 5-7 which address this question.

Is there an adequate description of the potential project impacts and effects on the physical and biological environment?
Observations
20. Yes, please see points 8-10 above where this is discussed in more detail.

Is there an adequate description of the potential cumulative and inter-related impacts and effects on the physical and biological environment?
Observations
21. To the best of my knowledge, yes there is an adequate description of the potential cumulative effects – see chapter 15 of the ES.

In collecting data have details of any quality standards or assurance methods been given? If not please explain what you would expect to see and if they have, please explain if such standards and methods are suitable.
Observations
22. Not applicable to underwater noise.

Is the timeliness of the data appropriate for the intended use?
Observations
23. Yes, overall, the timeliness of the data is appropriate for the intended use.

Is the evidence that has been supplied appropriate (i.e. proportionate and targeted) for its intended use?
Observations
24. Yes, the evidence that has been supplied is appropriate for its intended use.

Is the evidence consistent with that submitted for operations of a similar nature?
Observations
25. Yes, the evidence is consistent with that submitted for operations of a similar nature.

For evidence that relies on modelled data has an unbiased statistical accuracy assessment been carried out?
Observations
26. Not applicable to underwater noise.

Summary
27. Overall, effort has been undertaken to produce an informative desk based assessment of the potential effects of underwater noise on marine receptors, and the conclusions are reasonable. There is the potential risk for piling activities in particular to impact migratory fish species and other marine receptors. Behavioural effects are particularly difficult to assess, since they are highly dependent on behavioural context, and responses may not scale with received sound level. Appropriate mitigation will likely reduce the risk of impact.

28. The applicant has identified a number of appropriate mitigation measures, including avoiding the period of 1st September to 30th November when conducting piling, to avoid the peak period of upstream salmon migration (see point 16).

29. I recommend periods of downtime when no piling (neither impact or vibropiling) is taking place per 24 hours to minimise the risk of potential impact during key months / sensitive periods for fish migration.

References

Coull, K.A., Johnstone, R., and S.I. Rogers. (1998). Fisheries Sensitivity Maps in British Waters. Published and distributed by UKOOA Ltd.

Ellis, J.R., Milligan, S.P., Readdy, L., Taylor, N. and Brown, M.J. (2012). Spawning and nursery grounds of selected fish species in UK waters. Sci. Ser. Tech. Rep., Cefas Lowestoft, 147: 56pp.

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Centre for Environment Fisheries & Aquaculture Science

Cefas

MARINE WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) REGULATIONS 2007 (AS AMENDED). APPLICATION BY WATERMAN INFRASTRUCTURE AND ENVIRONMENT LTD. (WIE), ON BEHALF OF LIVERPOOL CITY COUNCIL (LCC), FOR THE CONSTRUCTION OF A NEW CRUISE SHIP TERMINAL AND ASSOCIATED INFRASTRUCTURE, LIVERPOOL.

Reference Number: DC10147 C7765B206

Date: 19th September 2018

To: Melissa Gaskell-Burnup, MMO (via email)

1. With reference to the above application for the construction of a new cruise ship terminal and associated infrastructure by Waterman Infrastructure and Environment Ltd. (WIE), on behalf of Liverpool City Council (LCC), and your request for comments dated 14th August 2018, please find my comments below in my capacity as advisor on coastal processes.

2. This minute is provided in response to your advisory request in relation to the above proposal in my capacity as scientific and technical advisor for coastal processes. The response pertains to those areas of the application request that are of relevance to this field. This minute does not provide specialist advice regarding benthic ecology, fish and fisheries, shellfisheries, or underwater noise as, whilst these are within Cefas' remit, they are outside my area of specialism.

3. In providing this advice I have spent 7.5 hours of the 7.5 hours allocated by the MMO. I have booked my time to C7765B206.

Document (s) reviewed

4. Liverpool Cruise Terminal - ES Volume 1 - Main Text 171110.pdf;
5. Liverpool Cruise Terminal - ES Volume 2 – Figures.pdf;
6. Liverpool Cruise Terminal - ES Volume 3 – Appendices; and
7. Liverpool Cruise Terminal - ES Addendum - July 2018.pdf.

Description of the proposed works

8. On behalf of LCC, WIE have submitted an Environmental Statement (ES) (2018) and subsequent addendum to obtain planning permission, a Marine Works Licence and a Harbour Revision Order, for the development of a new cruise ship terminal to cater for an increase in the number of cruise vessels and passengers.

9. The proposed development is located at Princes Parade, Liverpool on the east bank of the Mersey Estuary and covers an area of approximately 5.77 ha. Works relating to the marine environment that have the potential to impact on physical and coastal processes are:

    - The demolition of the derelict Princes Jetty. The jetty consists of a concrete deck suspended on timber piles (estimated 140 piles) and is currently in a state of disrepair and is unsuitable for safe berthing of vessels;
    - The demolition of Mooring dolphins between Princes Jetty and Pontoon D; and
    - the construction of a new jetty. This will consist of a reinforced concrete slab spanning between a grid of precast reinforced concrete beams that would be supported by steel tubular piles. The number of piles used in the final design has not been finalised. Applying a precautionary worst-case scenario approach to the assessment (Paragraph 13.39), 155 piles have been used in the ES assessment.

10. The development is expected to result in an increase in vessel transits (total of medium, large and extra-large vessels. No equivalent vessel lengths provided) from 37 in 2020 (predicted year of opening) to 42 in 2027. These estimates have been used in the ES assessment.

<u>Answers to MMO Questions</u>

Question 1: To the best of your knowledge is the description of the environment and potential impacts accurate?

Observations

11. A good general description of the urban context is provided in the ES (Ch. 3), with a detailed description of the proposed works (Ch. 5). Information regarding the baseline physical conditions, processes and the potential impacts are clearly presented in Ch. 14 and associated figures and appendices. These are considered to be accurate.

Question 2: Do you agree with the conclusions reached?

Observations

12. Paragraphs 14.186 and 14.187 summarise the conclusions, both with and without mitigation measures in place. The development was assessed to have likely effects as follows:

    a. During demolition and construction, the effect of operations on tidal flows would have a **temporary, local effect of minor adverse significance**;

    b. During demolition and construction, the effect of operations on the wave regime would have a **temporary, local effect of minor adverse significance**;

c. During demolition and construction, the effect of the operations on sediment transport would have a **temporary, local effect of minor adverse significance**;

d. During demolition and construction, the effect of the operations on potentially contaminated sediments would be **temporary, local effect of minor adverse significance**;

e. Once completed the Development will create a change in tidal flows that would have a **permanent, local effect of minor adverse significance**;

f. Once completed the Development will create a change on the wave regime that would have a **permanent, local effect of minor adverse significance**;

g. Once completed the Development will create a change on sediment transport processes that would have a **permanent, local effect of minor adverse significance**;

h. Once completed, vessel operations at the Development will create a change in the sediment transport process that would have a **permanent, local effect of moderate adverse significance**;

i. Once completed the Development (and cruise ship vessel operations) will have limited potential to affect the levels of sediment contamination, and is expected to a create a change that would have a **permanent, local effect of minor adverse significance**;

Following mitigation:

j. The majority of likely effects are considered insignificant or negligible in terms of the wider Site. Due to the low significance of predicted effects, additional mitigation measures are generally not required to reduce the effect further.

k. The use of scour protection assets (e.g. concrete mattresses or rock placement) on the estuary bed within the Development would reduce the probability of vessel operations having an effect on sediment transport processes. However, it does not reduce the source of the effect and it is expected to result in a **permanent, local effect of moderate adverse significance.**

13. I agree with the conclusions reached. However, whilst I agree with the conclusions regarding the impact on sediment transport as a process, I defer comment to my colleagues with regards to the potential impacts and effects of any contamination that may be mobilised as a result.

Question 3: Are the proposed mitigation and monitoring measures sufficient?

Major Changes Required

14. The applicant proposes to use of scour protection assets (e.g., concrete mattresses or rock placement) in order to reduce scour of sediments within the development site and surrounding area as a result of vessel operations (e.g., prop wash). Whilst this is considered to be suitable mitigation in line with common practice, further design details are required (E.g., type and extent).

Minor Changes Required

15. No monitoring has been proposed. However, if not already being undertaken as part of on-going management of the site (E.g., maintenance dredging), due to the potential changes to local erosion and accretion described in the ES and the proposed developments dependency on sufficient water depths for safe navigation, I recommend that the applicant undertakes regular bathymetric surveys of the site and the surrounding area; prior to the commencement of the

proposed works (baseline), during the works and post-construction. This will; allow the monitoring and quantification of erosion and accretion rates, comparison of actual erosion and accretion with those predicted within the ES, provide an indication of the potential release of contaminated sediments (by proxy) and will provide the applicant with important bathymetric data to support the safe delivery of the project and subsequent use of the Liverpool Cruise Terminal.

Question 4: Are there any minor technical or presentational comments that affect the overall confidence in the conclusions? Please insert as an annex.

Observations

16. No, all text, figures and appendices are clear enough to not affect the overall confidence in the conclusions.

Question 5: Is the project description clearly presented and consistent throughout the ES?

Observations

17. Yes.

Question 6: Is there an adequate description of the baseline physical and biological environment?

Observations

18. Please see my answer to Question 1.

19. I defer comment to colleagues in the benthic ecology team for potential impacts and effects on the biological environment.

Question 7: Is there an adequate description of the potential project impacts and effects on the physical and biological environment?

Observations

20. Yes, potential project impacts and effects on the physical environment and processes are clearly presented in Ch. 14 and associated figures and appendices.

21. I defer comment to colleagues in the benthic ecology team for potential impacts and effects on the biological environment.

Question 8: Is there an adequate description of the potential cumulative and inter-related impacts and effects on the physical and biological environment?

Observations

22. Yes, potential project impacts and effects on the physical environment and processes are clearly presented in Ch. 15 and associated figures and appendices.

23. I defer comment to colleagues in the benthic ecology team for potential impacts and effects on the biological environment.

Question 9: In collecting data have details of any quality standards or assurance methods been given? If not please explain what you would expect to see and if they have, please explain if such standards and methods are suitable.

Observations

24. Generally, where applicable, suitable quality standards and/or assurance methods have been referenced.

Minor Changes Required

25. Paragraph 14.57 states that "*Bathymetric changes within the Mersey have been subject to detailed monitoring for many years in relation to navigation. The effort has focussed on the major estuary channel and associated banks, with less attention given to the intertidal areas*". However, I would expect to see summary details of the bathymetric data used to give confidence that this data is suitable (E.g., date of survey, surveyor, equipment used etc.).

26. Model calibration for tidal flows and sediment fluxes are based on "*ADCP transect measurements during a spring tide in October 1995 and validated for a neap tide during January 1996*" (Paragraph 14.8) and a report by HR Wallingford (2014, Report DDR5376-RT002[1]). I would expect to see some form of justification or comparison to ensure the use of this data is suitable. Please also see my answer to Question 13. Additionally, I do not have access to the report referenced and so cannot comment on its validity.

Question 10: Is the timeliness of the data appropriate for the intended use?

Observations

27. The majority of data required to make an informed decision is presented.

Major Changes Required

28. Paragraph 14.11 states that "*Due to the expected negligible nature of water level changes as a result of climate change within the Mersey, the numerical modelling parameters have not included any assessment of climate change*". However, no reference is provided to justify this assumption. I recommend that future climate scenarios are modelled.

Question 11: Is the evidence that has been supplied appropriate (i.e. proportionate and targeted) for its intended use?

Observations

29. Please see my answer to Question 10. The following data has been supplied:

a. Local tidal regimes (including range and velocity) throughout the estuary (Figure 14.8 and Tables 14.6 and 14.7);
b. Indicative wave climate for return periods of 1, 10 and 50 years (Table 14.9).
c. Wind climate as measured at John Lennon Airport over the last 20 years (Table 14.10)
d. Sediment samples, including a map showing the locations of the acquired samples (Figure 14.12) and the results of the physicochemical analysis (Tables 14.13 to 14.18);
e. Bathymetric survey data (see comment 25 for further details) (Figure 14.7);
f. A comparison of simulated and observed sediment fluxes (Figures 14.4 and 14.5);
g. Predicted baseline tidal flow rates during peak flood and ebb and on sediment accumulation (Figures 14.9 to 14.11);
h. Predicted effect of jetty removal and construction of cruise terminal on tidal flow rates during peak flood and ebb and on patterns of sediment accumulation (Figures 14.13 to 14.25);

Question 12: Is the evidence consistent with that submitted for operations of a similar nature?

Observations

30. Yes.

Question 13: For evidence that relies on modelled data has an unbiased statistical accuracy assessment been carried out?

Minor Changes Required

31. A comparison of modelled and observed tidal discharge and sediment fluxes under spring tide conditions has been provided (Figures 14.4 and 14.5). However, no unbiased statistical accuracy assessment of the model has been provided. I recommend a targeted assessment be undertaken and reported to give confidence to the model outputs.

Any additional comments

32. None.

Summary

33. In my review of the documents listed above, I consider that the applicant has generally correctly identified and assessed all potential impacts on physical and coastal processes associated with the proposed works. However, some changes are recommended and are listed below:

Minor Changes Required

34. Please see comments 15, 25, 26 and 31 above.

Major Changes Required

35. Please see comments 14 and 28 above.

Centre for Environment Fisheries & Aquaculture Science

Cefas 20 1902 1997–2017

MARINE AND COASTAL ACCESS ACT (2009). APPLICATION BY THE MERSEY DOCKS AND HARBOUR COMPANY FOR THE LIVERPOOL CRUISE TERMINAL. ENVIRONMENTAL STATEMENT REVIEW. CONSULTATION 1.

Reference Number: DC10147

Date: 21st September 2018

To: Melissa Gaskell-Burnup – MMO (by email only)

1. With reference to the above request to review the environmental statement and supporting appendices by the Mersey Docks and Harbour Company for the proposed Liverpool Cruise Terminal, and your request for comments dated 10th August 2018, please find my comments below in my capacity as advisor on dredging/disposal and sediment contamination issues.

2. This minute is provided in response to your advisory request in relation to the above proposal in my capacity as scientific and technical advisor on dredging/disposal and sediment contamination issues. The response pertains to those areas of the application that are of relevance to this field. This minute does not provide specialist advice regarding fisheries, benthic ecology, marine processes, shellfisheries or underwater noise as, whilst these are within Cefas' remit, they are outside my area of specialism.

Documents and the chapters and sections reviewed

3. Environmental Statement Volume 1: Main Text, Waterman Infrastructure & Environment Limited, October 2017.
    - Chapter 1 Introduction;
    - Chapter 14. Coastal Processes, Sediment Transport and Sediment Contamination
    - Chapter 15. Cumulative Effects;

4. Environmental Statement Addendum, Waterman Infrastructure & Environment Limited, June 2018.
    - Chapter 14. Coastal Processes, Sediment Transport and Sediment Contamination
    - Chapter 15. Cumulative Effects.

Project overview and description

5. Mersey Docks and Harbour Company is proposing the demolition of the derelict Princes Jetty, construction of a new jetty and construction of a new Cruise Liner Terminal building on the jetty. The site is on the east bank of the River Mersey, Liverpool.

6. The marine works are to consist of the demolition of the existing jetty and installation of piles for the new jetty. The footprint on the estuary bed of the piles is approximately 102 m^2 for the new jetty. The number of piles and their locations could be subject to change once the design is finalised. Construction is scheduled for 2018-2020. **Notably there is no dredging associated with the project** (confirmed in table 2.2a in the ES addendum).

Summary of comments

7. The ES is well written and clear. With regards to sediment contamination, the receptor (sediment quality), pathway (sediment disturbance from construction) and baseline (contaminant survey) are

all clearly presented and assessed. I concur that the provided evidence supports the conclusion of 'local, temporary and minor adverse significance' effects.

Questions raised by MMO case officer:

Question 1. Is the project description clearly presented and consistent throughout the ES?

Observations

8. Yes, in general the project description is clearly presented and consistent.

Question 2. In collecting data have details of any quality standards or assurance methods been given? If not please explain what you would expect to see and if they have, please explain if such standards and methods are suitable.

Minor

9. Sediment contamination data was acquired in the APEM Marine Ecology survey supplied as appendix 13.1. The report simply states, "Contaminant analyses were conducted according to UKAS accredited methods where appropriate". I would expect the name of the processing laboratory and a methods statement to be included. Specifically, the test(s) without UKAS accreditation should be noted. Note that I do not consider it mandatory that an MMO certified dredging material testing laboratory be used in this instance as the material will not be dredged. However, the testing methods should be included. This is important as the applicability of the standards compared against (e.g. Cefas Action Levels) relies on a similar or comparable test method. Overall however I do not expect that this would change the conclusions of the report as the works represent a relatively modest local remobilisation of sediment only.

Question 3. For evidence that relies on modelled data has an unbiased statistical accuracy assessment been carried out?

Observations

10. Not applicable.

Question 4. Is the timeliness of the data appropriate for the intended use?

Observations

11. Yes. Sediment contaminant samples were collected from a survey in June 2017. It is normally recommended that sediment contaminant data is within 3 years of the works date. Given the works are scheduled to end in 2020, I consider the data to be appropriate.

Question 5. Is the evidence that has been supplied appropriate (i.e. proportionate and targeted) for its intended use?

Observations

12. Yes. Sediment samples have been analysed for a full suite of common contaminants including heavy/trace metals, organotins, PAHs, PCBs and PDBEs.

Question 6. Is the evidence consistent with that submitted for operations of a similar nature?

Observations

13. Yes.

Question 7. Is there an adequate description of the baseline physical and biological environment?

Observations

14. Yes, as described in section 14.102 to 14.126 of the ES and with further detail in appendix 13.1.

Minor

15. The units of tables 14.16/14.17 (PAHs) and 14.18 (PCBs) are incorrectly stated as $mg.kg^{-1}$. These should be **µg.**kg^{-1}. The units are correct in appendix 13.1. Although this does not impact the assessment or the conclusions this should be corrected so the data is not misinterpreted.

Question 8. To the best of your knowledge is the description of the environment and potential impacts accurate?

Observations

16. The potential impacts are assessed based on the sediment disturbance from construction and piling work and potential changes to sediment hydrodynamics following the completion of the project:

    - "The likely effects of the removal and demolition of the existing structure on the movement of potentially contaminated sediments would be local, temporary and of minor adverse significance"

    - "The likely effects of the completed Development of the existing structure on the mobilisation of contaminated sediment would be local, permanent and of minor adverse significance"

17. In my opinion this is a reasonable assessment of the potential impacts on sediment quality.

Question 9. Is there an adequate description of the potential project impacts and effects on the physical and biological environment?

Observations

18. Yes. Please refer to point 16-17.

Question 10. Is there an adequate description of the potential cumulative and inter-related impacts and effects on the physical and biological environment?

Observations

19. No cumulative or inter-related impacts are identified for contaminated sediment (paragraph 15.91 of the ES). Given the highly localised scale of the sediment disturbance I consider this to be acceptable.

Question 11. Do you agree with the conclusions reached?

Observations

20. Yes. Please refer to my comments above for details.

Question 12. Are the proposed mitigation and monitoring measures sufficient?

Observations

21. Not applicable, there are no mitigations suggested for sediment contamination.

Question 13. Are there any minor technical or presentational comments that affect the overall confidence in the conclusions? Please insert as an annex

Observations

22. Please see comment 15 above.

Centre for Environment Fisheries & Aquaculture Science

Cefas

MARINE WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) REGULATIONS 2007 (AS AMENDED): CRUISE LINER TERMINAL, PRINCES PARADE, LIVERPOOL, UK

Reference Number: DC10147

Date: 21th September 2018

To: Melissa Gaskell-Burnup - MMO

1. With reference to the above Environmental Statement (ES) scoping report and your request for comments dated 10th August 2018, please find my advice below.

2. This minute is provided in response to your advisory request in relation to the above proposal in my capacity as scientific and technical advisor for benthic ecology. The response pertains to those areas of the application request that are of relevance to this field. This minute does not provide specialist advice regarding marine processes, fish and fisheries, shellfisheries, or underwater noise as, while these are within Cefas' remit, they are outside my area of specialism.

Documents reviewed

3. ES Volume 1 Main Text 17110:

   Chapter 13. Marine Ecology, Ornithology and Terrestrial Ecology; Chapter 15. Cumulative Effects; Appendix 13.1: Marine Ecology Benthic Survey Report

   Appendix 13.1. Marine Benthic Ecology Survey Report

4. Liverpool Cruise Terminal - ES Addendum - July 2018

   Chapter 13. Marine Ecology, Ornithology and Terrestrial Ecology

   Chapter 15. Cumulative Effects

Description of the proposed works

5. Liverpool City Council is seeking to obtain a Marine Works Licence and Harbour Revision Order (HRO) for a scheme covering an area of approximately 5.77 hectares, located at Princes Parade, Liverpool, on the east bank of the Mersey Estuary.

6. The proposed Development would comprise the demolition of the derelict Princes Jetty and the construction of a new jetty. A new Cruise Liner Terminal building would be constructed on the new jetty. The existing 'lower' cruise terminal building would be modified and refurbished for use as storage and staff welfare. The Development would also include vehicular link-span bridges, pedestrian walkways, parking for coaches, taxis and cars and areas of hard and soft landscaping.

Responses to questions posed by the MMO:

Question 1: To the best of your knowledge, is the description of the environment and potential impacts accurate?

Observations:

7. Yes, to my knowledge, the baseline environment of relevance to benthic ecology described in the ES (sections 13.57-13.67) is accurate.

8. The potential for marine ecology receptors to be impacted by the proposed works through different pathways is shown in Table 13.1. It is my opinion that the potential impacts on benthic ecological receptors have been correctly identified. There are no additional impacts that I believe require consideration.

Question 2: Do you agree with the conclusions reached?

Observations:

9. Overall, I agree with the conclusions reached regarding the impacts on benthic ecological receptors (i.e. that the significance of impacts through all pathways will be negligible or minor; sections 13.100-13.251).

Minor comments

10. Regarding impacts on subtidal habitats and species through loss of habitat (sections 13.105-13.108), it is stated that the value of the receptor is high, that the magnitude of the effect is minor and, therefore, that the significance of impact is minor. However, Table 13.7 indicates that a high value combined with minor magnitude can result in an impact of minor or moderate significance. The sensitivity of the receptor is judged to be medium (section 13.107), which may explain why the significance of impact was concluded to be minor rather than moderate (based on the matrix in Table 13.7). Nevertheless, a clarification of how the impact was determined to be of minor, not moderate, significance would be helpful.

11. There doesn't appear to be any conclusions regarding impacts on designated sites and associated benthic features in the ES. The only internationally important designated site within the vicinity of the proposed works that protects benthic features is the Dee Estuary SAC, which is located 4.2 km from the proposed development (Table 13.8). As the area expected to be affected by sediment displacement due to the proposed works is restricted to 1 km from the development site (sections 13.114 and 13.225), I would not expect the proposed works to undermine the conservation objectives of this designated site. Moreover, as effects of changes in sediment transport regime on the benthos are expected to be gradual and temporary (sections 13.115 and 13.116), I would not expect any consequent changes in benthic communities within designated sites in closer proximity to the proposed works (e.g. the Mersey Narrows & North Wirral Foreshore SPA; 0.8 km from the development site) to have significant indirect effects on other protected features (e.g. birds) through changes to food availability.

Question 3: Are the proposed mitigation and monitoring measures sufficient?

Observations:

12. Inherent mitigation measures relevant to benthic ecological receptors are proposed for pollution (sections 13.191-13.192 and 13.240) and the spread of non-native species (sections 13.210 and 13.248). As all impacts on benthic ecological receptors are concluded to be of negligible or minor significance following inherent mitigation measures, no additional mitigation measures are proposed for impacts on benthic ecological receptors (sections 13.252-13.256).

13. I agree that the inherent mitigation measures are sufficient and no additional mitigation measures are required for benthic ecological receptors.

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Question 4: Are there any minor technical or presentational comments that affect the overall confidence in the conclusions? Please insert as an annex.

Observations:

14. There are no major technical or presentational issues that affect my overall confidence in the conclusions.

Minor comments:

15. Table 13.10 indicates that the value of subtidal species and habitats is medium, whereas throughout most of the assessment (sections 13.100-13.251) the value is treated as high. The high value is consistently qualified throughout the impact assessment as being due to the presence of *Nematostella vectensis*, which is a species of conservation importance that happens to also be non-native, and indeed the value of this receptor is reduced to medium when assessing the impact of the spread of non-native species. However, given that this species is present within the proposed development area, it's not clear why the value of the receptor is recorded as medium in Table 13.10.

Question 5: Is the project description clearly presented and consistent throughout the ES?

Observations:

16. Yes, the project is clearly described in sections 5 and 6 of the ES

Question 6: Is there an adequate description of the baseline physical and biological environment?

Observations:

17. Yes, see paragraph 8 above.

18. Benthic sampling could not be conducted in the intertidal area at the mouth of Princes Half-Tide Dock due to its very small size (0.003 km^2), restricted access and health and safety considerations (Table 13.1a in ES Addendum). While it would be preferable to have access to data from this area, especially given that this is the only soft-sediment intertidal area in the immediate vicinity of the proposed works, I think it is a reasonable assumption that "*the benthic assemblages within this section would be impoverished (in common with the subtidal assemblages) and that the species present would be widespread throughout the estuary*" (section 13.58). I therefore do not think this limitation should affect the conclusions for intertidal species and habitats, but these conclusions will necessarily be made with lower confidence than those for subtidal species and habitats.

Question 7: Is there an adequate description of the potential project impacts and effects on the physical and biological environment?

Observations:

19. Yes, see paragraph 9 above.

Question 8: Is there an adequate description of the potential cumulative and inter-related impacts and effects on the physical and biological environment?

Observations:

20. Inter-related effects are assessed using the term 'Type 1 cumulative effects', i.e. effects on a receptor resulting from a combination of stressors associated with a single development (sections 15.3-15.5). No Type 1 cumulative effects are identified for benthic ecological receptors (section 15.13). There are no Type 1 cumulative effects that I believe require assessment.

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21. Impacts resulting from the combined effects of multiple developments are considered as 'Type 2 cumulative effects' in the ES (sections 15-6-15.12). Benthic species and habitats are not identified as major receptors of Type 2 cumulative effects (sections 15.78-15.86). Assuming that any cumulative impacts on sediment transport and contaminant release are only negligible or minor (as concluded in section 15.90), then I would agree that benthic ecological receptors are unlikely to be significantly impacted by the combined effects of the proposed works and other potential developments.

Question 9: In collecting data have details of any quality standards or assurance methods been given? If not please explain what you would expect to see and if they have, please explain if such standards and methods are suitable.

Observations:

22. Yes, quality assurance standards have been adhered to for the collection of benthic ecological data (section 13.15 of the ES).

Question 10: Is the timeliness of the data appropriate for the intended use?

Observations:

23. Yes, contemporary data (June 2017) are used to inform the impact assessment (section 2.2.1 of the Benthic Survey Report, Appendix 13.1).

Question 11: Is the evidence that has been supplied appropriate (i.e. proportionate and targeted) for its intended use?

Observations:

24. Yes, the evidence provided is appropriate for its intended use.

Question 12: Is the evidence consistent with that submitted for operations of a similar nature?

Observations:

25. Yes, evidence is consistent with that submitted for operations of a similar nature.

Question 13: For evidence that relies on modelled data has an unbiased statistical accuracy assessment been carried out?

Observations:

26. Impacts on benthic ecological receptors due to sediment displacement (sections 13.111-13.116 and 13.223-13.225) are based on sediment transport modelling. I will defer to experts in sedimentary and coastal processes to comment on the reliability of these models.

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Our ref: SO/2018/118538/01-L01
Your ref: DC10147

Date: 1 October 2018

FAO Melissa Gaskell-Burnup

Dear Melissa

THE MERSEY DOCKS AND HARBOUR COMPANY (LIVERPOOL CRUISE TERMINAL EXTENSION) HARBOUR REVISION ORDER 2018
LIVERPOOL PIER HEAD, LIVERPOOL

Thank you for consulting us with the proposed Harbour Revision Order received in this office 10th August 2018.

Environment Agency position

We have no objection to the Harbour Revision Order but make the following comments;

For protection of the Environment Agency

We note the saving provision for our powers as set out in article 16 of the draft Order and confirm this appears to be acceptable in principle.

Environmental Statement Addendum

The Environmental Statement Addendum for Liverpool Cruise Terminal includes programme changes designed to reduce the impact from pile driving on the upstream migration of adult salmonids. These changes reference a meeting conducted with us and aim to cover the mitigations suggested at that time. However we don't believe all points were accurately covered and for the avoidance of doubt would request the following changes;

Paragraph 13.99

Change 1. If any piling is to be conducted between these dates it is proposed that piling would be restricted ~~to the ebb tide~~ between the dates ~~13th~~ 1st September to 30th November.

Change 2. Remove text in brackets stating salmonids are unlikely to be present early September. This is a misunderstanding.

Please forward a copy of this letter to the applicant.

Yours faithfully

Mr Stephen Sayce
Sustainable Places Planning Advisor

Direct e-mail stephen.sayce@environment-agency.gov.uk

End

Appendix 2.6a: Navigation Risk Assessment

AECOM Imagine it. Delivered.

Liverpool Cruise Terminal

Navigational Risk Assessment

Liverpool City Council

60532049

LCT ACM XX GE RP MT 00002

15th June 2018

Quality information

Prepared by	Checked by	Approved by
David Meikle Regional Director Ports & Marine	Ron Glenton Marine Engineering Consultant	David W Meikle Regional Director Ports & Marine

Revision History

Revision	Revision date	Details	Authorized	Name	Position
P01	15th June 2018	First Issue	DWM	David Meikle	Regional Director
P02	21 June 2018	Revised	DWM	David Meikle	Regional Director
P03	27 June 2018	Revised	DWM	David Meikle	Regional Director

Distribution List

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Table of Contents

FIGURES

1. Introduction

All UK Statutory Harbour Authorities (SHAs) have a responsibility to comply with, *inter alia*, the letter and spirit of the Port Marine Safety Code (PMSC). A core requirement of the PMSC is that the Duty Holder of the SHA must:-

- Assess, and keep under review, the marine risks within the waters for which the SHA is responsible;
- Develop policies and procedures to manage those risks and to employ, resource, and empower suitably competent personnel to manage marine operations and reduce risk;
- Undertake the above by means of a structured Safety Management System (SMS), which has clear objectives, clear outcomes, and has the concept of continuous improvement embedded within it.

As might be expected for a large, diverse, and high-profile port like Liverpool, the Port has extremely high standards of navigation and a pro-active approach to management of risk. This applies to existing “proven” marine operations and also to proposed new developments such as the Liverpool Cruise Terminal (LCT). The development extends the existing cruise facilities downstream of its present location at Liverpool landing stage adjacent to the Prince Dock, but does not alter its operation in principle. However the proposed LCT development will extend downstream, towards the proposed new Isle of Man Ferry Terminal (IOMFT) development; these together constitute major capital works in this riverfront location.

Although the operation of the LCT in isolation has not changed, the operational interface with the adjacent IOMFT, will increase river traffic in the local area, and therefore change hazards.

For the above reasons, the Liverpool City Council, the developer of the LCT, has commissioned AECOM to undertake this Navigational Risk Assessment (NRA) for the purposes of identifying and managing the risks arising from and to the LCT and the IOMFT taken together.

The NRA methodology followed is essentially the Formal Risk Assessment (FRA) process preferred and used extensively by many operators and Authorities and is based on guidance published by IMO in:

- MS/Circ.1023 MEPC/Circ.392: 5-4 2002;
- MSC/Circ.1180 MEPC/circ.474: 25-8-2005;
- MSC-MEPC.2/Circ.:16-10-2006.

This present document is a mixture of project information and outline NRA procedure. Once the NRA risk assessment has been completed, then this document will be updated with all of the results and it will then form a record of the NRA findings.

2. Location and Scope of the Liverpool Cruise Terminal Development

2.1 Description of Existing Site

Figure 1: Location Plan. Of Liverpool Cruise Terminal (Chart. by Navtronics)

The site is approximately 15. nm upstream from the Q1 North Cardinal Mark at the entrance to Queen's channel on the navigable estuary of the river Mersey; see the chart excerpt graphic in Figure 1.

The site is located to the West of the Prince's Dock at 53˚ 24.526' N and 003˚ 00.066' W and adjacent to, and downstream of, the existing Liverpool landing stage which is presently used by cruise liners.

The site comprises some historic docklands, which have in the past been developed to facilitate the existing cruise landing stage. The downstream site will be further developed to extend the existing facility and create an extended deck for buildings and infrastructure. The site comprises mixed hardstanding areas and old disused wharfage.

The site is surrounded by water: Princes Half-Tide Dock, Princes Dock are located to the east while the River Mersey is to the west. The site is connected to the city to the north and east, with access from Princes Parade to Bath Street and Waterloo Road.

Figure 2: Location Plan: Existing Liverpool cruise landing stage and site of Liverpool cruise Terminal

Figure 3: Site Location: Existing Liverpool Landing stage.

The location of the existing structures and the site of the new LCT and the IOMFT are shown in Figure 2 & Figure 3 above.

2.2 Brief Description of the Development

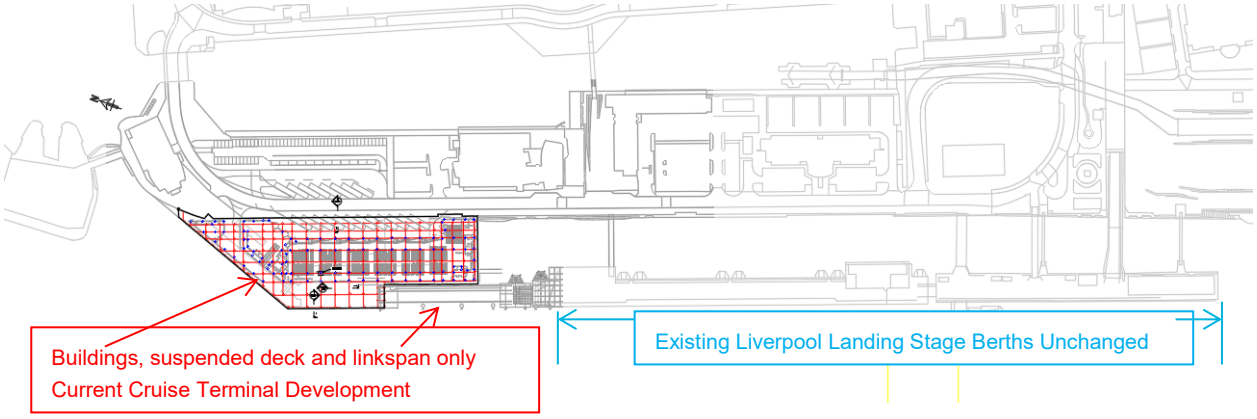


Figure 4: Outline Cruise Terminal Development Plan

The proposed LCT development area is shown on Figure 4. It is situated on the north Bank of the river Mersey, immediately downstream from the site of the existing Liverpool Cruise Landing Stage.

The River Mersey has a 10.6m tidal range between HAT and LAT. Also, significant tidal and flood currents can be expected adjacent to the site. The site is also subject to some wave action both direct and flow.

As AECOM understands it at present the LCT development consists of the construction of a pile suspended deck shown red in Figure 4. This will be used for the construction of buildings hotels and related structures. The river frontage to the suspended deck is NOT an extension of the Cruise Berthing existing facility; this will remain the same at the Liverpool landing stage. AECOM understand that the new works will NOT be any form of vessel berthing frontage. A steel linkspan and floating pontoon are to be installed to give access from upstream to the existing Liverpool landing stage pontoons. The linkspan will provide vehicular assess to these pontoons only, it will not provide a Roll On/Roll Off facility for any vessels.

AECOM understand that the maritime functionality of the cruise terminal area remains unchanged by the proposed LCT development but this would need to be reported in detail by Liverpool City Council and their Consultants so that the Hazard Identification (HAZID) Workshop attendees can identify hazards. This report should highlight whether the size of cruise vessel is programmed in the future to INCREASE, and define the maximum increase (if any) catered for in the designs

The most significant change to local river traffic in the immediate vicinity of the LCT will be the construction of the IOMFT immediately downstream adjacent to Waterloo docks.

This interface is the main subject of the NRA.

2.3 Brief Description of Vessels Manoeuvring/Mooring possible Hazards

AECOM at the present time have not received information on the design vessels programmed to use the berth and the means of vessel manoeuvre. It is important that as much information as possible is presented at the HAZID Workshop as only then can a full assessment of hazard be undertaken. This would include the following:-

- The full range of vessels which will use the Cruise terminal, and whether these will be larger than the present users;
- The proposed or current manoeuvring practise of vessels onto/from the cruise berth, and whether this is tug assisted or otherwise,;
- A berthing and departing procedure will be necessary for each vessel class for different tides , current and wind/wave conditions;
- Limiting environmental conditions for the berthing of vessels and whether it is intended to berth during a 24/7 time frame.
- Safeguards need to be in place, for example, through central Port Vessel Traffic Services to ensure that Isle of Man ferry movements and Cruise ship movement do not schedule for the same time slot.

For the downstream IOMFT vessel Manoeuvring Simulation/Analysis has been carried out on 2 October 2017 by Liverpool Pilotage Services Ltd in conjunction with the Isle of Man Steam Packet Company, and this will be an important part of the Workshop to compare Isle of Man manoeuvring with Liverpool Cruise Terminal.

The above AECOM brief descriptions are based on a limited amount of Cruise Terminal Information and it will be necessary for Liverpool city council and their consultant to confirm this information so that the attendees at the HAZID Workshop can fully understand and assess the hazard situation.

3. Navigational Risk Assessment Procedure

3.1 What is a Risk Assessment

A risk assessment is a written document that records a three step procedure:-

- Identifying the hazards in the workplace/project;
- Assessment of the risks presented by these hazards;
- Putting control measures in place to reduce the risk of these hazards causing harm, to an acceptable level.

3.2 Terminology and Outline Procedure.

- A hazard is an unwanted and unplanned event or danger which has the potential to cause harm to persons, the environment, property, or the reputation of key stakeholders;
- Hazards shall be identified by consensus during the procedures and listed, for each aspect of the navigational operations of the LCT;
- Each hazard shall be assessed and a consensus will be reached in relation to the likelihood, or probability (P) of that hazard occurring;
- Each hazard shall also be assessed and a consensus will be reached, in relation to the consequences, if the hazard were to be realised. This will include consideration of outcomes for people, environment, property, and reputation (PEPR);
- The agreed consensual values of likelihood and consequence (C) are used to determine the risk;
- The Risk (R) is therefore the product of the Probability and Consequence (R = P x C);
- The above process will produce a base line numeric risk score for each hazard ;
- If the base line numeric risk score lies within one of the unacceptably high bands (see matrix in Appendix A), then further risk control measures shall be considered and applied until the residual risk score is tolerable, as defined in the matrix.

In an ideal situation, the numeric values of C and P would be known from historic data bases of similar Navigational Risk Assessments, however this is rarely the case. Therefore in order to ensure that these variables are assessed as accurately as they can be, in a Formal Risk Assessment (FRA), Hazard identification (HAZID) Workshop shall be held. The participants in the HAZID Workshop shall be persons with expert knowledge of the operations which are being assessed and who have been involved in such operations on a day to day basis for a number of years.

3.3 Navigational Risk Assessment Detail

An information pack together with an initial draft version of this document, was distributed to all prospective workshop participants at least 7 days prior to the workshop date. The purpose of the Pack was to describe the proposed berth layouts and to confirm the methodology, terminology, and process for the HAZID Workshop.

It was assumed that the participants had read the contents of the pack and will be familiar with the project and the NRA procedure prior to attendance.

After this period of preparation, a HAZID Workshop was convened at the Cunard Building, Liverpool, on Monday 11th June 2018. The attendees at the HAZID were:

Name	Position /Organisation
John Navaratnam	Liverpool City Council
Peter Murney	Liverpool City Council
Joe Blythe	Peel Ports
Martin McKeown (Part Time)	McLaughlin & Harvey
Russell Butcher (Part Time)	Ramboll
Janice McDowall	Isle of Man Steam Packet Company
Chris Booker	Liverpool Pilots
Neil Reid	Briggs Marine Liverpool
Roy Glenton	AECOM
Alistair Chan	AECOM
David Meikle	AECOM
Jill Meikle	AECOM– Workshop Facilitator

Table 1: Table 2: List of participants in the HAZID Workshop

The workshop was run by an AECOM Workshop Facilitator (WF), Jill Meikle. The process was carried out using a custom spreadsheet in order to keep a record and also to allow a rapid comparison of effects. During the one day workshop the participants used their knowledge and past experience to:-

- Identify hazards (HAZID) as an open forum and such hazards were listed and grouped by the WF;
- Individually assess the likelihood or probability of each hazard occurring using the sheet 1 of the spread sheet shown in Figure A 2. This was converted to an consensus average by sheet 2 the spreadsheet shown in Figure A 3;
- Individually assess the consequence of the occurrence of each hazard using the sheet 1 shown in Figure A 2. This was converted to a consensus average by sheet 2 of the spreadsheet shown in Figure A 3;
- Participants agreed the resulting average probability and consequence for each hazard as generated by the spreadsheet;
- Sheet 2 provided a Base line risk for each hazard;
- Risk base line scores were reviewed in turn in open forum and either accepted or if unacceptably high, then set aside to consider mitigation measures;
- For the hazards requiring mitigation, the cause and occurrences was discussed in more detail and possible mitigation measure listed;
- Mitigation measures were discussed in open forum and agreed estimates made of how such mitigation can reduce C and/or P;
- Reduction percentages were entered in the spreadsheet sheet 3 given in Figure A 4. The sheet was used to compute the compound effect of such measures. This continues until all risks become acceptable. This is done by embedded non liners algorithms which are based on probability functions. Particularly for likelihood when dealing with frequent hazards it is necessary to utilise high levels of risk reduction to significantly change the risk.

3.4 Risk Matrix and Risk Categories

As stated above, the definitions of the likelihood and consequence of a hazard occurrence are contained within an industry standard 5 x 5 matrix, which also shows the resultant risk categorisation ranging from:-

- Extreme Risk;
- High Risk;
- Moderate Risk;
- Minor Risk;
- Slight Risk.

Whilst all hazards should be kept under review, it may be considered that a hazard categorised as Moderate, Minor, or Slight is already As Low As Reasonably Practicable (ALARP). Hazards categorised as Extreme or High Risk must have some suitable mitigations or Risk Control Options (RCO's) to reduce the risk score until the residual risk is ALARP.

The Risk Matrix, with the risk tolerance definitions, and an Excel scoring matrix is shown in Appendix A.

3.5 Navigational Risk Assessment Assumptions

This NRA is limited to the hazards and risks associated with the design and operation of the IOMFT berths only – not the hazards and risks associated with the transit of ships in the Mersey Estuary as they transit from the open sea and Liverpool. It is assumed that The Mersey Docks and Harbour Company Limited (MDHC), as both the Statutory Harbour Authority (SHA) and Competent Harbour Authority (CHA) for the Port of Liverpool, has in place an existing Port Marine Safety Code (PMSC) compliant Marine Safety Management System (MSMS) together with appropriate risk control measures including Pilotage covering normal navigation of vessels within the port limits.

Accordingly, this NRA focuses on scenarios where the IOMFT ship is already in the River Mersey, ready to berth at its nominated IOMFT facility, instead of how the ship arrived at that position.

In support of the overall HAZID and NRA process, it has also been assumed that the following will form part of the development of IOMFT once it is operating. It is assumed that Peel Ports, Liverpool City Council or the contracted terminal operator will:-

- Develop and implement a Maritime and Coastguard Agency (MCA) approved Oil Spill Response Plan (OSRP), drawn upon the MCA's Contingency Planning for Marine Pollution Preparedness and Response (Guidelines for Ports), and will be compliant with Peel Port approvals for oil spill response;
- Develop and implement terminal-specific Waste Management Plans in accordance with the requirements of the Merchant Shipping (Port Waste Reception Facilities) Regulations 1997 and Peel Port requirements;
- Develop and implement a terminal-specific Security Plan in accordance with the requirements of the International Port Facility and Security (ISPS) Code, and Peel Port requirements;
- Develop and implement comprehensive Terminal Operations and Safety Plan which will reflect the policies, practices, and working methods of IOMFT. Part of that plan will include a commitment to ensure that ships using IOMFT are fully aware of the physical and operational characteristics of the facility.

3.6 NRA Results – Summary

As an open forum the workshop participants agreed a list of 46 Hazards for discussion. Appendix A contains the output from the NRA workshop for the Liverpool Cruise Terminal and Appendix B contains the combined Isle of Man Ferry Terminal and Liverpool Cruise Terminal NRA output.

These hazards affect the Isle Of Man and/or the Liverpool Cruise Terminal and are as follows:-

Nr	Hazard
1	Contact with own berth or extended wharfage area downstream while berthing, unberthing
2	Contact with adjacent berths or vessels.
3	Contact with Adjacent Wharfage (IOMFT)
4	Contact with Adjacent Wharfage (LCT)
5	Vessels Grounding moving on/off berth
6	Vessel breaking away from berth and striking other vessels/berths
7	Passing vessels striking berth or moored ship (IOMFT)
8	Passing non -cruise vessels striking berth or moored ship (LCT)
9	Strong Winds causing mooring to part (IOMFT)
10	Strong Winds causing mooring to part (LCT)
11	Linkspan in the Water (IOMFT)
12	Linkspan Hung Up on Support Piles (LCT)
13	Gangway and PBB failure (IOMFT)
14	Gangway failure (LCT)
15	Fire on Board Vessel - In River - (IOMFT)
16	Fire on Board Vessel - In River - (LCT)
17	Fire on Board Vessel - Alongside (IOMFT)
18	Fire on Board Vessel - Alongside (LCT)
19	Bunker Barge - Alongside (LCT)
20	Bunker Barge - Alongside (IOMFT)
21	Fire on shoreside - (IOMFT)
22	Fire on shoreside - (LCT)
23	Dropped line fouls bow thruster or vessel propellers (IOMFT)
24	Dropped line fouls bow thruster or vessel propellers (LCT)
25	Partial Mechanical Failure on Vessel - (IOMFT)
26	Partial Mechanical Failure on Vessel - (LCT)
27	Full Mechanical Failure on Vessel - (IOMFT)
28	Full Mechanical Failure on Vessel - (LCT)
29	Medical emergency to key member of the bridge team - (IOMFT)
30	Medical emergency on board Pilot - (LCT)
31	Commercial Traffic in the River
32	Leisure craft Traffic in the River
33	Fishing Boats in vicinity Of the berths
34	Terrorism - In River (IOMFT)
35	Terrorism - Alongside (IOMFT)
36	Terrorism - In River (LCT)
37	Terrorism - Alongside (LCT)
38	Port Communications Failure Loss of VHF
39	Tug Failure (mechanical, line)
40	Person in the Water
41	Pontoon Sinking (LCT)
42	Mooring Dolphin Impact with Linkspan (LCT)
43	Direct Bow contact with Berth (Perpendicular)
44	Restricted Visibility (Rain and Fog)
45	Shoreside 'man-over' Board
46	Failure of Aids to Navigation

3.6.1 Base Line Risk Score for each Hazard

Individual workshop participants separately and individually assessed the likelihood and consequence of each hazard in turn, in accordance with the risk matrix. These were averaged together during the workshop to give a Base Line Risk Score for each hazard.

The results summary was as follows:-

Category	Baseline scores : Nr of hazards	Comment
Extreme	4	All Relating to terrorism
High		
Moderate	32	
Minor	10	
Slight		
Total	**46**	

3.6.2 Mitigation

Although some risk scores were lower than others, ALL of the hazards were considered for mitigation.

Full details of the mitigation against each hazard can be seen from the sections of the risk spread sheet include in this report as a pdf. However there were some recurrent mitigations.

The Port of Liverpool is a well-established and closely controlled port. There are therefore “standing orders” and procedures in place which cover all aspect of shipping berthing, movements and safety. The mitigations were found to rely heavily on these and the Port control systems and the pilots services in the river.
A summary of recurrent mitigations found is as follows: -

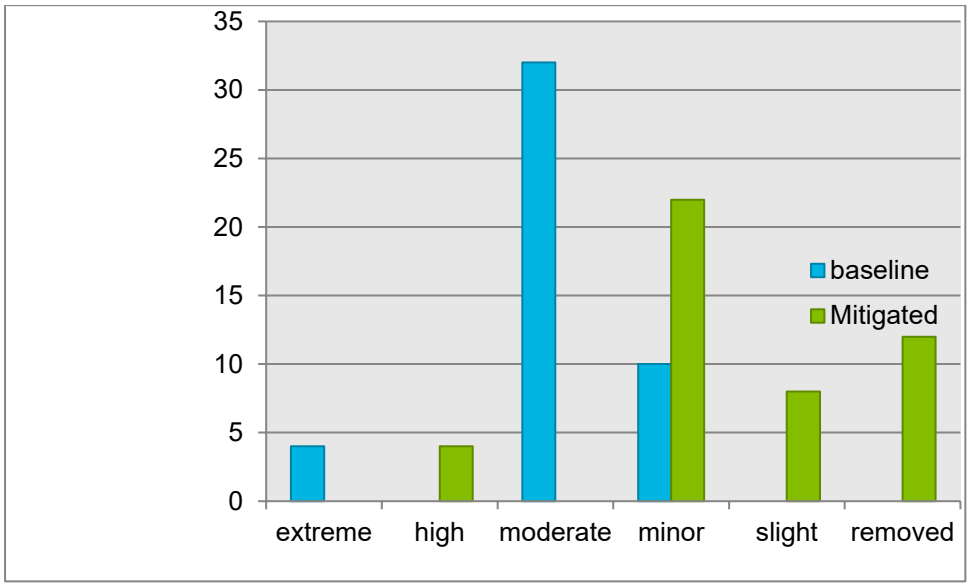
- Compulsory Pilotage and PEC holders (experienced) on the bridge;
- Detailed operation guidelines in place;
- Port emergency procedure and plans;
- Ship and shore procedure in place for fire;
- Ship manifest hazardous cargo;
- Mersey VTS communications and notifications;
- Exclusion zones;
- Notices to mariners;
- Stakeholder engagement (leisure users);
- Timetables broadcast to river users;
- Police river in special events;
- Use of tugs;
- Maintenance and replacement of tugs;
- Certification of tugs and experienced skippers;
- Regular berth maintenance;
- Regular weather updates, and accounting for prevailing winds;
- Detailed mooring analysis and mooring plans;
- Agreed detailed berthing procedures in place;
- Maintenance and revision on Navigation lights and Aids to Navigation;
- Security checking cargo and persons;

- ISPS;
- Intelligence from security services;
- Secure shore boundary ;

Following the workshop open forum mitigation exercise the revised risk scores were as follows:-

Category	Baseline scores : Nr of hazards	Comment
Extreme	0	
High	4	All Relating to terrorism
Moderate	0	
Minor	22	
Slight	8	
Hazard removed	12	Not a Nav risk agreed by consensus
Total	**46**	

A graphical summary of the shift from the baseline scores to the mitigated scores in shown below



3.6.3 Summary

By mitigation and general agreement within the workshop, and all hazards (except those related to terrorism) were all downgraded from moderate to either minor or slight.

For terrorism, the workshop agreed that a terrorism risk in the UK is ALWAYS extreme at the present in line with the government's own published risk advice. Also mitigation against terrorism is by its nature extremely difficult and uncertain due to the random nature of the hazard. The workshop discussed this is some detail, but did not feel that a mitigated score could fall below "High".

3.6.4 Conclusions

The workshop was closed by AECOM with a brief general commentary on the above results and the participants all agreed that in their view the procedure and the results were reasonable and acceptable.

Appendices

Appendix A – Liverpool Cruise Terminal NRA Output from Workshop

RISK ASSESSMENT MATRIX: RISK CRITERIA		FREQUENCY				
		Level 1	Level 2	Level 3	Level 4	Level 5
		Rare	Unlikely	Possible	Likely	Almost Certain
		One or more times greater than 100	One or more times 100 year	One or more times in 10 years	One or more times per year	Ten or more times per year
Consequnece	5 – Loss of vessel or severe damage to vessel / environment. Multiple fatalities International news coverage.	Moderate (5)	High (10)	Extreme (15)	Extreme (20)	Extreme (25)
	4 – Major damage to vessel / environment. Single Fatality. National news coverage.	Minor (4)	Moderate (8)	High (12)	Extreme (16)	Extreme (20)
	3 – Moderate damage to vessel / environment. Moderate / major injury Regional news coverage.	Minor (3)	Moderate (6)	Moderate (9)	High (12)	Extreme (15)
	2 - Minor or superficial damage to vessel / environment. Minor injuries and local news coverage.	Slight (2)	Minor (4)	Moderate (6)	Moderate (8)	High (10)
	1 - Insignificant or no damage to vessel / equipment / environment. No injuries.	Slight (1)	Slight (2)	Minor (3)	Minor (4)	Moderate (5)

ACTION KEY	
Slight (1 – 2)	No Action is required
Minor (3 – 4)	No additional controls are required, monitoring is required to ensure no changes in circumstances
Moderate (5 – 9)	Efforts should be made to reduce risk to 'As low as reasonably practicable' (ALARP), but activity may be undertaken
High (10 – 14)	Efforts should be made to reduce risk to 'As low as reasonably practicable' (ALARP). Activity can only be undertaken with further additional controls.
Extreme (15 – 25)	Intolerable risk. Activity not authorised

Figure A 1: HAZARD Matrix

Project: LIVERPOOL CRUISE TERMINAL
Works: HAZARD SURVEY
PREPARED BY: Roy Glenton
Date: of NRA Workshop

AECOM
Marine Glasgow

Nr	Hazard
1	Contact with own berth or extended wharfage area downstream while berthing, unberthing
2	Contact with adjacent berths or vessels. 3
4	Contact with Adjacent Wharfage (LCT)
5	Vessels Grounding moving on/off berth
6	Vessel breaking away from berth and striking other vessels/berths 7
8	Passing non -cruise vessels striking berth or moored ship (LCT)
9	
10	Strong Winds causing mooring to part (LCT) 11
12	Linkspan Hung Up on Support Piles (LCT)
13	
14	Gangway failure (LCT) 15
16	Fire on Board Vessel - In River - (LCT)
17	
18	Fire on Board Vessel - Alongside (LCT)
19	Bunker Barge - Alongside (LCT) 20
21	
22	Fire on shoreside - (LCT) 23
24	Dropped line fouls bow thruster or vessel propellers (LCT)
25	
26	Partial Mechanical Failure on Vessel - (LCT) 27
28	Full Mechanical Failure on Vessel - (LCT)
29	
30	Medical emergency on board Pilot - (LCT)
31	Commercial Traffic in the River
32	Leisure craft Traffic in the River
33	Fishing Boats in vicinity Of the berths
34	
35.	
36	Terrorism - In River (LCT)
37	Terrorism - Alongside (LCT)
38	Port Communications Failure Loss of VHF
39	Tug Failure (mechanical, line)
40	Person in the Water
41	Pontoon Sinking (LCT)
42	Mooring Dolphin Impact with Linkspan (LCT)
43	Direct Bow contact with Berth (Perpendicular)
44	Restricted Visibility (Rain and Fog)
45	Shoreside 'man-over' Board
46	Failure of Aids to Navigation

Figure A 2: NRA Sheet 1 Collected Hazard Frequency and Consequence Survey

Nr	AGREE HAZARDS	HAZARD BASE LINE																BASE LINE		
	Workshop Attendees	JN		PM		DWM		JMcD		CB		JB		AC		RG		average	average	RISK
	Freq/Cons	Freq	Cons	Freq	Cons	Freq	Cons	Freq	Cons	Freq	Cons	Freq	Cons	Freq	Cons	Freq	Cons	Frequency	Cons	F*Cons
1	Contact with own berth or extended wharfage area downstream while berthing, unberthing	1	2	2	2	3	4	1	3	1	2	5	4	2	4	3	2	2.3	2.9	6.5
2	Contact with adjacent berths or vessels.	2	2	1	3	2	4	1	2	1	2	5	4	2	4	3	3	2.1	3.0	6.4
3	0	2	4	1	3	3	4	1	2	1	1	5	4	2	5	3	3	2.3	3.3	7.3
4	Contact with Adjacent Wharfage (LCT)	1	1	1	3	2	4	1	2	1	1	5	4	2	5	3	3	2.0	2.9	5.8
5	Vessels Grounding moving on/off berth	1	-	-	5	2	3	1	3	1	3	5	3	1	5	1	1	1.7	3.3	5.6
6	Vessel breaking away from berth and striking other vessels/berths	2	3	1	2	2	4	1	2	1	3	5	2	2	4	3	4	2.1	3.0	6.4
7	0	2	3	1	2	2	3	1	3	1	3	5	4	2	4	1	3	1.9	3.1	5.9
8	Passing non -cruise vessels striking berth or moored ship (LCT)	-	3	1	2	2	3	1	3	1	3	5	4	3	4	1	3	2.0	3.1	6.3
9	0	1	3	-	*	2	4	1	2	1	2	3	3	3	3	1	3	1.7	2.9	4.9
10	Strong Winds causing mooring to part (LCT)	1	2	3	5	2	4	1	2	1	2	3	3	3	3	3	3	2.1	3.0	6.4
11	0	-	-	-	*	3	3	1	3	1	3	-	-	2	4	1	1	1.6	2.8	4.5
12	Linkspan Hung Up on Support Piles (LCT)	-	-	1	1	3	3	1	3	1	3	-	-	2	4	1	1	1.5	2.5	3.8
13	0	1	-	*	*	2	2	1	2	1	2	5	4	4	1	1	4	2.1	2.5	5.4
14	Gangway failure (LCT)	1	-	1	1	2	2	1	3	1	1	5	4	3	2	1	3	1.9	2.3	4.3
15	0	1	-	-	-	2	3	1	4	1	4	5	5	3	4	1	3	2.0	3.8	7.7
16	Fire on Board Vessel - In River - (LCT)	1	2	1	3	2	3	1	3	1	4	5	5	3	4	1	3	1.9	3.4	6.3
17	0	1	2	-	-	2	3	1	2	1	4	5	5	3	3	1	3	2.0	3.1	6.3
18	Fire on Board Vessel - Alongside (LCT)	1	2	1	2	2	4	1	2	1	4	5	5	3	3	1	3	1.9	3.1	5.9
19	Bunker Barge - Alongside (LCT)	1	2	2	5	2	3	1	2	3	2	4	4	5	5	3	4	2.6	3.4	8.9
20	0	1	2	2	5	2	4	1	2	2	2	4	4	5	5	3	4	2.5	3.5	8.8
21	0	1	2	1	2	3	3	1	2	1	3	-	-	2	4	1	1	1.4	2.4	3.5
22	Fire on shoreside - (LCT)	1	3	1	2	3	3	1	2	1	3	-	-	2	4	1	1	1.4	2.6	3.7
23	0	1	3	1	2	3	2	1	3	2	2	5	2	3	2	2	4	2.3	2.5	5.6
24	Dropped line fouls bow thruster or vessel propellers (LCT)	1	2	1	2	3	2	1	3	2	2	5	2	3	2	2	4	2.3	2.4	5.3
25	0	2	3	2	3	3	3	1	3	2	2	5	3	3	3	1	4	2.4	3.0	7.1
26	Partial Mechanical Failure on Vessel - (LCT)	2	2	2	3	3	3	1	3	2	2	5	3	3	3	1	4	2.4	2.9	6.8
27	0	1	2	1	5	3	3	1	4	2	3	3	4	2	4	1	5	1.8	3.8	6.6
28	Full Mechanical Failure on Vessel - (LCT)	1	3	1	5	3	2	1	4	2	3	3	4	2	4	1	5	1.8	3.8	6.6
29	0	1	3	3	1	3	1	1	2	1	1	5	1	2	4	1	2	2.1	1.9	4.0
30	Medical emergency on board Pilot - (LCT)	1	2	3	1	3	1	1	2	1	1	5	1	2	4	1	2	2.1	1.8	3.7
31	Commercial Traffic in the River	2	2	4	2	3	3	1	2	2	3	5	2	5	1	1	3	2.9	2.3	6.5
32	Leisure craft Traffic in the River	2	2	4	2	3	3	1	3	2	1	5	2	5	1	1	3	2.9	2.1	6.1
33	Fishing Boats in vicinity Of the berths	2	2	4	2	4	3	1	3	2	1	5	3	5	1	1	3	3.0	2.3	6.8
34	0	3	2	3	5	3	5	3	5	3	5	5	5	3	5	3	3	3.3	4.4	14.2
35	0	3	3	3	5	3	5	3	5	3	5	5	5	3	5	3	3	3.3	4.5	14.6
36	Terrorism - In River (LCT)	3	2	3	5	3	5	3	5	3	5	5	5	3	5	3	3	3.3	4.4	14.2
37	Terrorism - Alongside (LCT)	3	3	3	5	3	5	3	5	3	5	5	5	3	5	3	3	3.3	4.5	14.6
38	Port Communications Failure Loss of VHF	1	2	2	1	3	2	1	3	2	1	5	2	2	3	1	4	2.1	2.3	4.8

39	Tug Failure (mechanical, line)	2	2	2	3	3	2	1	4	2	2	5	3	3	3	1	4	2.4	2.9	6.8
40	Person in the Water	1	1	1	5	3	2	1	3	1	1	5	5	3	2	1	2	2.0	2.6	5.3
41	Pontoon Sinking (LCT)	1	1	2	3	2	3	1	4	2	1	3	4	2	3	1	4	1.8	2.9	5.0
42	Mooring Dolphin Impact with Linkspan (LCT)	1	1	2	2	2	4	1	3	2	2	-	-	2	3	1	4	1.6	2.7	4.3
43	Direct Bow contact with Berth (Perpendicular)	1	5	2	5	1	5	1	4	1	4	2	4	1	5	1	5	1.3	4.6	5.8
44	Restricted Visibility (Rain and Fog)	2	3	3	2	4	1	2	3	3	1	3	3	5	2	2	3	3.0	2.3	6.8
45	Shoreside 'man-over' Board	1	1	2	3	3	1	1	1	2	1	2	5	2	3	1	3	1.8	2.3	3.9
46	Failure of Aids to Navigation	1	3	1	2	2	1	1	1	1	1	3	4	2	1	1	3	1.5	2.0	3.0

Figure A 3: NRA sheet 2 Averaging Sheet for Hazard Frequency and Consequence Survey Sheet

LIVERPOOL CRUISE TERMINAL NAVIGATIONAL RISK ASSESSEMENT

Hzd Nr.	AGREED HAZARD	Workshop Survey Averaged Likelihood	Workshop Survey Averaged CON	BASE LINE	HAZARD Likelihood/Cause	HAZARD CONSequence	MITIGATION Y/N	RISK Control measures	% reduce Likelihood USER ASSESSED	%reduce Con USER ASSESSED	INDIVIDUAL RISK CONTROL	CUMULATIVE RISK SCORE MITIGATED	Result
1	Contact with own berth or extended wharfage area downstream while berthing, unberthing	2.3	2.9	6.5			Y	`			6.5	6.4	Moderate
					master error	damage to vessel or structure	y	put compusary pilotage	80	0	4.5	4.4	
					mechanical malfunction	Risk of Pollution	y	operation guideline	25	0	6.1	4.1	
					bad weather		y	Appropriated Pilots/ Consultations	25	0	6.1	3.7	
							n		25	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	Minor
2	Contact with adjacent berths or vessels.	2.1	3.0	6.4			Y	`			6.4	6.4	Moderate
					master error	damage to vesssel or structure	y	put compusary pilotage	80	0	4.3	4.3	
					mechanical malfunction	Risk of Pollution	y	operation guideline	25	0	6.0	3.9	
					bad weather		n	Appropriated Pilots/ Consultations	25	0		3.9	
							y	experiende of skipper * training	25	0	6.0	3.5	
							n		0	0		3.5	
							n		0	0		3.5	
							n		0	0		3.5	
							n		0	0		3.5	
							n		0	0		3.5	
							n		0	0		3.5	Minor
3	0												
4	Contact with Adjacent Wharfage (LCT)	2.0	2.9	5.8			y	`			5.8	5.7	Moderate
					master error	damage to vesssel or structure	y	put compusary pilotage	80	0	3.7	3.7	
					mechanical malfunction	damage to vessel	y	operation guideline	25	0	5.4	3.3	
					bad weather	Risk of Pollution	y	Appropriated Pilots/ Consultations	25	0	5.4	3.0	
							y	experiende of skipper * training	25	0	5.4	2.8	
							n		0	0		2.8	
							n		0	0		2.8	
							n		0	0		2.8	
							n		0	0		2.8	
							n		0	0		2.8	
							n		0	0		2.8	Minor
5	Vessels Grounding moving	1.7	3.3	5.6			Y	`			5.6	5.6	Moderate
					master error	injury to public	y	Use correct bath charts	25	0	5.2	5.2	
					mechanical malfunction	damage to vessel	y	Regular berth maintenance sonar	25	0	5.2	4.8	
					bad weather	Risk of Pollution	y	Depth sounder procedure on vessel	25	0	5.2	4.4	
							y	Weather updates	25	0	5.2	4.0	

Figure A 4: NRA Sheet 3 Mitigation Sheet

LIVERPOOL CRUISE TERMINAL NAVIGATIONAL RISK ASSESSEMENT

	on/off berth						**y**	Appropriated Pilots/ Consultations	80	0	3.3	**3.3**		
							y	Tide Gauges	25	0	5.2	**3.3**		
							y	put compusary pilotage	25	0	5.2	**3.3**		
							n		0	0		**3.3**		
							n		0	0		**3.3**		
							n		0	0		**3.3**	**Minor**	
6	**Vessel breaking away from berth and striking other vessels/berths**	2.1	3.0	**6.4**			**Y**	`			6.4	**6.4**	**Moderate**	
					master error	injury to public	**y**	Prevailing Wind	25	0	6.0	**6.0**		
					mechanical malfunction	damage to vessel	**y**	Regular berth maintenance	25	0	6.0	**5.6**		
					bad weather	Risk of Pollution	**y**	Geography and location	50	0	5.5	**4.7**		
							y	Weather updates	25	0	6.0	**4.3**		
							y	Mooring Plans	25	0	6.0	**4.0**		
							y	Cruise Terminal Guidelines	75	0	4.6	**3.0**		
							n	IOM Berthing Procedures	0	0		**3.0**		
							n	*Suggestion of Sacrificial Piles	0	0		**3.0**		
							n		0	0		**3.0**		
							n		0	0		**3.0**	**Minor**	
7	**0**													
8	**Passing non -cruise vessels striking berth or moored ship (LCT)**	2.0	3.1	**6.3**			**y**				6.3	**6.2**	**Moderate**	
						Damage To Vessels	**y**	Compulsary Pilotage	80	0	4.1	**4.1**		
						Damage to Structure	**y**	Pilotage Execmption certificate	50	0	5.3	**3.1**		
						Risk of Pollution	**y**	VTS and notification	75	0	4.4	**3.1**		
							y	Port Directions and byelaws	75	0	4.4	**3.1**		
							n		0	0		**3.1**		
							n		0	0		**3.1**		
							n		0	0		**3.1**		
							n		0	0		**3.1**		
							n		0	0		**3.1**		
							n		0	0		**3.1**	**Minor**	
9	**0**													
10	**Strong Winds causing mooring to part (LCT)**	2.1	3.0	**6.4**			**y**	`			6.4	**6.4**	**Moderate**	
						injury to public	**y**	Prevailing Wind	25	0	6.0	**6.0**		
						damage to vessel	**y**	Regular berth maintenance	25	0	6.0	**5.6**		
							y	Geography and location	50	0	5.5	**4.7**		
							y	Weather updates	25	0	6.0	**4.3**		
							y	Mooring Plans	25	0	6.0	**4.0**		
							y	Cruise Terminal Guidelines	75	0	4.6	**3.0**		
							n		0	0		**3.0**		
							n		0	0		**3.0**		
							n		0	0		**3.0**		
							n		0	0		**3.0**	**Minor**	

Figure A 4: NRA Sheet 3 Mitigation Sheet

LIVERPOOL CRUISE TERMINAL NAVIGATIONAL RISK ASSESSEMENT

11	0													
12	Linkspan Hung Up on Support Piles (LCT)	1.5	2.5	3.8			Y	`			3.8	3.7	Minor
							n		25	0		3.7	
						REMOVE	n		25	25		3.7	
							n		25	25		3.7	
							n		34	0		3.7	
							n					3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	Minor
13	0													
14	Gangway failure (LCT)	1.9	2.3	4.3			Y				4.3	4.3	Minor
							n		25	0		4.3	
						REMOVE	n		25	25		4.3	
							n		25	25		4.3	
							n		34	0		4.3	
							n					4.3	
							n		0	0		4.3	
							n		0	0		4.3	
							n		0	0		4.3	
							n		0	0		4.3	
							n		0	0		4.3	Minor
15	0													
16	Fire on Board Vessel - In River - (LCT)	1.9	3.4	6.3			y	`			6.3	6.3	Moderate
						Damage to Vessel	y	Compulsary Pilotage/PEC	75	0	4.3	4.3	
						Risk of loss of life	y	Port Emergency Procedures and Plans	75	0	4.3	3.4	
						Risk of Pollution	y	Ships Procedures for Fire	75	0	4.3	3.4	
							n		0	0		3.4	
							n		0	0		3.4	
							n		0	0		3.4	
							n		0	0		3.4	
							n		0	0		3.4	

Figure A 4: NRA Sheet 3 Mitigation Sheet

LIVERPOOL CRUISE TERMINAL NAVIGATIONAL RISK ASSESSEMENT

							n		0	0		3.4	
							n		0	0		3.4	Minor
17	0												
18	Fire on Board Vessel - Alongside (LCT)	1.9	3.1	5.9			Y	`			5.9	5.8	Moderate
						Damage to Vessel	y	Port Emergency Procedures and Plans	25	0	5.5	5.5	
						Risk of loss of life	y	Ships Procedures for Fire	75	0	4.0	3.6	
						Damage to Terminal	y	Temrinal Operature Procedures	50	0	4.9	3.1	
						Damage to shoreside infrstructure	n		0	0		3.1	
						Risk of Pollution	n					3.1	
							n		0	0		3.1	
							n		0	0		3.1	
							n		0	0		3.1	
							n		0	0		3.1	
							n		0	0		3.1	Minor
19	Bunker Barge - Alongside (LCT)	2.6	3.4	8.9			y	`			8.9	8.9	Moderate
						Risk of Pollution	y	PEC Holders	75	0	6.8	6.8	
						Risk of Fire	y	Ports Bunkering Guideline (ISGOTT)	75	0	6.8	4.8	
						Risk of Impact damage	y	Ports Directions and Byelaws	75	0	6.8	3.4	
						Risk of Injury/Loss of life	y	Pilots	80	0	6.5	3.4	
						Risk of Passing vessel breaking mooring/hose/	y	VTS and notification	75	0	6.8	3.4	
							y	Ship Procures for bunkering	75	0	6.8	3.4	
							n		0	0		3.4	
							n		0	0		3.4	
							n		0	0		3.4	
							n		0	0		3.4	Minor
20	0												
21	0												
							Y	`			3.7	3.7	Minor
						REMOVE	n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	

Figure A 4: NRA Sheet 3 Mitigation Sheet

LIVERPOOL CRUISE TERMINAL NAVIGATIONAL RISK ASSESSEMENT

22	Fire on shoreside - (LCT)	1.4	2.6	3.7			n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	Minor
23	0												
24	Dropped line fouls bow thruster or vessel propellers (LCT)	2.3	2.4	5.3			Y				5.3	5.2	Moderate
						Damage to Vessel	y	Crew Training	75	0	3.9	3.8	
						Damage to Terminal Facility	y	Ships procedures	75	0	3.9	2.4	
						Potential Inury/Loss of Life	y	Terminal Procedures	75	0	3.9	2.3	
						Risk of Pollution	y	Mooring Plans	75	0	3.9	2.3	
							y	Lines man Training	75	0	3.9	2.3	
							y	Use of Floating Lines	75	0	3.9	2.3	
							n		0	0		2.3	
							n		0	0		2.3	
							n		0	0		2.3	
							n		0	0		2.3	Slight
25	0												
26	Partial Mechanical Failure on Vessel - (LCT)	2.4	2.9	6.8			Y				6.8	6.8	Moderate
						Damage to Vessel	y	Compulsary Pilotage	75	0	5.1	5.0	
						Damage to Terminal Facility	y	Mersey VTS and notification	50	0	6.0	4.2	
						Potential Inury/Loss of Life	y	Ships Procedures	50	0	6.0	3.3	
						Risk of Pollution	y	Port Procedures/Emergency Planning	50	0	6.0	2.8	
						Loss of Power	y	Use of Anchors	75	0	5.1	2.8	
							y	Tug Assistance	40	0	6.2	2.8	
							n		0	0		2.8	
							n		0	0		2.8	
							n		0	0		2.8	
							n		0	0		2.8	Minor
27	0												
							Y				6.6	6.6	Moderate

Figure A 4: NRA Sheet 3 Mitigation Sheet

LIVERPOOL CRUISE TERMINAL NAVIGATIONAL RISK ASSESSEMENT

28	**Full Mechanical Failure on Vessel - (LCT)**	1.8	3.8	**6.6**		Damage to Vessel	y	Compulsary Pilotage	75	0	4.3	**4.3**	
						Damage to Terminal Facility	y	Mersey VTS and notification	50	0	5.4	**3.7**	
						Potential Inury/Loss of Life	y	Ships Procedures	50	0	5.4	**3.7**	
						Risk of Pollution	y	Port Procedures/Emergency Planning	50	0	5.4	**3.7**	
						Loss of Power	y	Use of Anchors	75	0	4.3	**3.7**	
							y	Tug Assistance	40	0	5.7	**3.7**	
							n		0	0		**3.7**	
							n		0	0		**3.7**	
							n		0	0		**3.7**	
							n		0	0		**3.7**	**Minor**
29	**0**												
30	**Medical emergency on board Pilot - (LCT)**	2.1	1.8	**3.7**			**Y**	`			3.7	**4.3**	**Minor**
						Damage to Vessel	y	VTS and notification	50	0	3.2	**3.6**	
						Damage to Terminal Facility	y	Ship Procedures	75	0	2.7	**2.4**	
						Potential Inury/Loss of Life	y	ENG1 Medical or equivalent	75	0	2.7	**2.0**	
						Risk of Pollution	y	min 3 personel, Bridge Team	90	0	2.0	**2.0**	
							y	Availability of alternative pilots	25	0	3.5	**2.0**	
							n		0	0		**2.0**	
							n		0	0		**2.0**	
							n		0	0		**2.0**	
							n		0	0		**2.0**	
							n		0	0		**2.0**	**Slight**
31	**Commercial Traffic in the River**	2.9	2.3	**6.5**			y	`			6.5	**6.6**	**Moderate**
						Risk has been assessed	**n**		0	0		**6.6**	
							n		0	0		**6.6**	
							n		0	0		**6.6**	
							n		0	0		**6.6**	
							n		0	0		**6.6**	
							n		0	0		**6.6**	
							n		0	0		**6.6**	
							n		0	0		**6.6**	
							n		0	0		**6.6**	
							n		0	0		**6.6**	**Moderate**
32	**Leisure craft Traffic in the River**	2.9	2.1	**6.1**			**Y**				6.1	**5.8**	**Moderate**
						Damage to Leisure Craft	y	Compulsary Pilotage/PEC	75	0	4.8	**4.5**	
						Potential Inury/Loss of Life (Leisure Craft)	y	VTS and notification	75	0	4.8	**3.3**	
						Risk of Pollution (From Leisure Craft)	y	Port Guilines, Procedures and Byelaws	50	0	5.5	**2.7**	
						Risk to Public Reputation	y	Exclusion zones	25	0	5.8	**2.5**	
							y	Notice to Mariners	25	0	5.8	**2.2**	
							y	Stakeholder Engagement (Leisure Users Forum)	15	0	6.0	**2.1**	
							y	Timetables and broadcast to River users	60	0	5.3	**2.0**	
							y	River is policed for events	15	0	6.0	**2.0**	
							n		0	0		**2.0**	
							n		0	0		**2.0**	**Slight**
							Y				6.8	**6.9**	**Moderate**
						Damage to Fishing Boats	y	Compulsary Pilotage/PEC	75	0	5.4	**5.5**	
						Potential Inury/Loss of Life (Fishing Boats)	y	VTS and notification	75	25	5.1	**3.9**	

Figure A 4: NRA Sheet 3 Mitigation Sheet

LIVERPOOL CRUISE TERMINAL NAVIGATIONAL RISK ASSESSEMENT

33	Fishing Boats in vacinity Of the berths	3.0	2.3	6.8		Risk of Pollution (From fishing Boats)	y	Port Guilines, Procedures and Byelaws	50	25	5.7	3.1	
						Risk to Public Reputation	n	Exclusion zones	25	0		3.1	
							y	Notice to Mariners	25		6.5	2.8	
							n	Stakeholder Engagement (Leisure Users Forum)	15	0		2.8	
							y	Timetables and broadcast to River users	60	0	5.9	2.1	
							n	River is policed for events	15	0		2.1	
							n		0	0		2.1	
							n		0	0		2.1	Slight
34	0												
35	0	3.3	4.5	14.6			Y				14.6	14.6	Extreme
						Damage to Vessel	y	Intelligence from Security Services/Police	50	0	13.3	13.3	
						Damage to Terminal Facility	y	ISPS	25	0	14.1	12.7	
						Potential Inury/Loss of Life	y	Terminal Procedures (Training)	25	0	14.1	12.1	
						Risk of Pollution	y	Ship Procedures	25	0	14.1	11.6	
						Risk of Kidnapping	n		0	0		11.6	
						Risk of Sinking Vessel	n		0	0		11.6	
						Risk of Public Reputation	n		0	0		11.6	
						Risk of Closure to Port	n		0	0		11.6	
							n		0	0		11.6	
							n		0	0		11.6	High
36	Terrorism - In River (LCT)	3.3	4.4	14.2			Y				14.2	14.2	Extreme
						Damage to Vessel	n	Automatic Identification System	0	0		14.2	
						Damage to Terminal Facility	y	Ship Procedures	25	25	13.3	13.3	
						Potential Inury/Loss of Life	n	Port Procedures/Emergency Planning	50	25		13.3	
						Risk of Pollution	n	VTS and notification	0	0		13.3	
						Risk of Kidnapping	y	Secutiry Check	25		13.7	12.8	
						Risk of Sinking Vessel	y	ISPS	0	0	14.2	12.8	
						Risk of Public Reputation	y	Intelligence from Security Services/Police	50	0	12.9	11.5	
						Risk of Closure to Port	n		0	0		11.5	
							n		0	0		11.5	
							n		0	0		11.5	High
37	Terrorism - Alongside (LCT)	3.3	4.5	14.6			Y				14.6	14.6	Extreme
						Damage to Vessel	y	Intelligence from Security Services/Police	50	0	13.3	13.3	
						Damage to Terminal Facility	y	ISPS	50	0	13.3	11.9	
						Potential Inury/Loss of Life	y	Terminal Procedures (Training)	25	0	14.1	11.4	
						Risk of Pollution	y	Ship Procedures	25	0	14.1	10.8	
						Risk of Kidnapping	n		0	0		10.8	
						Risk of Sinking Vessel	n		0	0		10.8	
						Risk of Public Reputation	n		0	0		10.8	
						Risk of Closure to Port	n		0	0		10.8	
							n		0	0		10.8	
							n		0	0		10.8	High
							Y				4.8	4.9	Moderate
						Lack Awareness of Others Vessels	y	Compulsary Pilotage/PEC Holders (experienced)	75	0	3.4	3.5	
						Lack of confidence in the System	y	Mobile Phones	75	0	3.4	2.3	
							y	Possible use of different channel	75	0	3.4	2.3	

Figure A 4: NRA Sheet 3 Mitigation Sheet

38	Port Communications Failure Loss of VHF	2.1	2.3	4.8			y	Backup systems	75	0	3.4	2.3	
							n		0	0		2.3	
							n		0	0		2.3	
							n		0	0		2.3	
							n		0	0		2.3	
							n		0	0		2.3	
							n		0	0		2.3	Slight
39	Tug Failure (mechanical, line)	2.4	2.9	6.8			Y				6.8	6.8	Moderate
						Damage to Vessel	y	Compulsary Pilotage/PEC Holders (experienced)	75	0	5.1	5.0	
						Damage to Terminal Facility	y	Use of Anchors	35	0	6.3	4.5	
						Potential Inury/Loss of Life	y	Use of Other tugs	25	0	6.5	4.2	
						Risk of Pollution	y	Maintence and replacement of tugs	75	0	5.1	2.8	
							y	Certification of Tugs	50		6.0	2.8	
							y	Experience and knowledge of River (tug skippers)	75	0	5.1	2.8	
							y	Spare Line	75	0	5.1	2.8	
							y	Engine redundancy (Twin Engine)	75	0	5.1	2.8	
							n		0	0		2.8	
							n		0	0		2.8	Minor
40	Person in the Water	2.0	2.6	5.3			Y				5.3	5.2	Moderate
						Remove	n		0	0		5.2	
							n		0	0		5.2	
							n		0	0		5.2	
							n		0	0		5.2	
							n		0	0		5.2	
							n		0	0		5.2	
							n		0	0		5.2	
							n		0	0		5.2	
							n		0	0		5.2	
							n		0	0		5.2	Moderate
41	Pontoon Sinking (LCT)	1.8	2.9	5.0			Y				5.0	5.0	Moderate
						Remove	n		25	0		5.0	
							n		25	25		5.0	
							n		25	25		5.0	
							n		34	0		5.0	
							n					5.0	
							n		0	0		5.0	
							n		0	0		5.0	
							n		0	0		5.0	
							n		0	0		5.0	
							n		0	0		5.0	Moderate
42	Mooring Dolphin Impact with Linkspan (LCT)	1.6	2.7	4.3			Y				4.3	4.2	Minor
						Remove	n		25	0		4.2	
							n		25	25		4.2	
							n		25	25		4.2	
							n		34	0		4.2	
							n					4.2	
							n		0	0		4.2	
							n		0	0		4.2	
							n		0	0		4.2	
							n		0	0		4.2	
							n		0	0		4.2	Minor
43	Direct Bow contact with Berth (Perpendicular)	1.3	4.6	5.8			Y				5.8	5.8	Moderate
						This has been assessed above	n		25	0		5.8	
							n		25	25		5.8	
							n		25	25		5.8	
							n		34	0		5.8	
							n					5.8	
							n		0	0		5.8	
							n		0	0		5.8	
							n		0	0		5.8	
							n		0	0		5.8	
							n		0	0		5.8	Moderate

Figure A 4: NRA Sheet 3 Mitigation Sheet

LIVERPOOL CRUISE TERMINAL NAVIGATIONAL RISK ASSESSEMENT

							Y				6.8	6.9	Moderate
						Damage to Vessel	y	Weather updates	0	0	6.8	6.9	
						Damage to Terminal Facility	y	Pilotage and PEC Holders	80	0	5.2	5.3	
						Potential Inury/Loss of Life	y	VTS and notification	50	0	6.1	4.6	
						Risk of Pollution	y	Aids to Navigation	90	0	4.5	2.3	
44	Restricted Visibility (Rain and Fog)	3.0	2.3	6.8			y	Port Directions and byelaws	40	0	6.3	2.3	
							n		0	0		2.3	
							n		0	0		2.3	
							n		0	0		2.3	
							n		0	0		2.3	
							n		0	0		2.3	Slight
							Y				3.9	4.0	Minor
						Remove	n		25	0		4.0	
							n		25	25		4.0	
							n		25	25		4.0	
							n		34	0		4.0	
45	Shoreside 'man-over' Board	1.8	2.3	3.9			n					4.0	
							n		0	0		4.0	
							n		0	0		4.0	
							n		0	0		4.0	
							n		0	0		4.0	
							n		0	0		4.0	Minor
							Y				3.0	3.0	Minor
						Not Assessed	n		25	0		3.0	
							n		25	25		3.0	
							n		25	25		3.0	
							n		34	0		3.0	
46	Failure of Aids to navigation	1.5	2.0	3.0			n					3.0	
							n		0	0		3.0	
							n		0	0		3.0	
							n		0	0		3.0	
							n		0	0		3.0	
							n		0	0		3.0	Minor

Figure A 4: NRA Sheet 3 Mitigation Sheet

Appendix B - Combined Isle of Man Ferry Terminal/Liverpool Cruise Terminal NRA Output from Workshop

RISK ASSESSMENT MATRIX: RISK CRITERIA		FREQUENCY				
		Level 1	Level 2	Level 3	Level 4	Level 5
		Rare	Unlikely	Possible	Likely	Almost Certain
		One or more times greater than 100	One or more times 100 year	One or more times in 10 years	One or more times per year	Ten or more times per year
Consequnece	5 – Loss of vessel or severe damage to vessel / environment. Multiple fatalities International news coverage.	Moderate (5)	High (10)	Extreme (15)	Extreme (20)	Extreme (25)
	4 – Major damage to vessel / environment. Single Fatality. National news coverage.	Minor (4)	Moderate (8)	High (12)	Extreme (16)	Extreme (20)
	3 – Moderate damage to vessel / environment. Moderate / major injury Regional news coverage.	Minor (3)	Moderate (6)	Moderate (9)	High (12)	Extreme (15)
	2 - Minor or superficial damage to vessel / environment. Minor injuries and local news coverage.	Slight (2)	Minor (4)	Moderate (6)	Moderate (8)	High (10)
	1 - Insignificant or no damage to vessel / equipment / environment. No injuries.	Slight (1)	Slight (2)	Minor (3)	Minor (4)	Moderate (5)

ACTION KEY	
Slight (1 – 2)	No Action is required
Minor (3 – 4)	No additional controls are required, monitoring is required to ensure no changes in circumstances
Moderate (5 – 9)	Efforts should be made to reduce risk to 'As low as reasonably practicable' (ALARP), but activity may be undertaken
High (10 – 14)	Efforts should be made to reduce risk to 'As low as reasonably practicable' (ALARP). Activity can only be undertaken with further additional controls.
Extreme (15 – 25)	Intolerable risk. Activity not authorised

Figure B 1: HAZARD Matrix

Project: LIVERPOOL CRUISE TERMINAL
Works: HAZARD SURVEY
PREPARED BY _____
Date: of NRA workshop

AECOM
Marine Glasgow

Nr	Hazard
1	Contact with own berth or extended wharfage area downstream while berthing, unberthing1
2	Contact with adjacent berths or vessels.
3	Contact with Adjacent Wharfage (IOMFT)
4	Contact with Adjacent Wharfage (LCT)
5	Vessels Grounding moving on/off berth
6	Vessel breaking away from berth and striking other vessels/berths
7	Passing vessels striking berth or moored ship (IOMFT)
8	Passing non -cruise vessels striking berth or moored ship (LCT)
9	Strong Winds causing mooring to part (IOMFT)
10	Strong Winds causing mooring to part (LCT)
11	Linkspan in the Water (IOMFT)
12	Linkspan Hung Up on Support Piles (LCT)
13	Gangway and PBB failure (IOMFT)
14	Gangway failure (LCT)
15	Fire on Board Vessel - In River - (IOMFT)
16	Fire on Board Vessel - In River - (LCT)
17	Fire on Board Vessel - Alongside (IOMFT)
18	Fire on Board Vessel - Alongside (LCT)
19	Bunker Barge - Alongside (LCT)
20	Bunker Barge - Alongside (IOMFT)
21	Fire on shoreside - (IOMFT)
22	Fire on shoreside - (LCT)
23	Dropped line fouls bow thruster or vessel propellers (IOMFT)
24	Dropped line fouls bow thruster or vessel propellers (LCT)
25	Partial Mechanical Failure on Vessel - (IOMFT)
26	Partial Mechanical Failure on Vessel - (LCT)
27	Full Mechanical Failure on Vessel - (IOMFT)
28	Full Mechanical Failure on Vessel – (LCT)
29	Medical Emergency to key member of the bridge team - (IOMFT)
30	Medical emergency on board Pilot - (LCT)
31	Commercial Traffic in the River
32	Leisure craft Traffic in the River
33	Fishing Boats in vicinity Of the berths
34	Terrorism - In River (IOMFT)
35	Terrorism - Alongside (IOMFT)
36	Terrorism - In River (LCT)
37	Terrorism - Alongside (LCT)
38	Port Communications Failure Loss of VHF
39	Tug Failure (mechanical, line)
40	Person in the Water
41	Pontoon Sinking (LCT)
42	Mooring Dolphin Impact with Linkspan (LCT)
43	Direct Bow contact with Berth (Perpendicular)
44	Restricted Visibility (Rain and Fog)
45	Shoreside 'man-over' Board
46	Failure of Aids to Navigation

Figure B 2: NRA sheet 1 collected hazard frequency and consequence survey sheet

Nr	AGREE HAZARDS	HAZARD BASE LINE																BASE LINE		
	Workshop Attendees	JN		PM		DWM		JMcD		CB		JB		AC		RG		average	average	RISK
	Freq/Cons	Freq	Cons	Freq	Cons	Freq	Cons	Freq	Cons	Freq	Cons	Freq	Cons	Freq	Cons	Freq	Cons	Frequency	Cons	F*Cons
1	Contact with own berth or extended wharfage area downstream while berthing, unberthing	1	2	2	2	3	4	1	3	1	2	5	4	2	4	3	2	2.3	2.9	6.5
2	Contact with adjacent berths or vessels.	2	2	1	3	2	4	1	2	1	2	5	4	2	4	3	3	2.1	3.0	6.4
3	Contact with Adjacent Wharfage (IOMFT)	2	4	1	3	3	4	1	2	1	1	5	4	2	5	3	3	2.3	3.3	7.3
4	Contact with Adjacent Wharfage (LCT)	1	1	1	3	2	4	1	2	1	1	5	4	2	5	3	3	2.0	2.9	5.8
5	Vessels Grounding moving on/off berth	1	-	-	5	2	3	1	3	1	3	5	3	1	5	1	1	1.7	3.3	5.6
6	Vessel breaking away from berth and striking other vessels/berths	2	3	1	2	2	4	1	2	1	3	5	2	2	4	3	4	2.1	3.0	6.4
7	Passing vessels striking berth or moored ship (IOMFT)	2	3	1	2	2	3	1	3	1	3	5	4	2	4	1	3	1.9	3.1	5.9
8	Passing non -cruise vessels striking berth or moored ship (LCT)	-	3	1	2	2	3	1	3	1	3	5	4	3	4	1	3	2.0	3.1	6.3
9	Strong Winds causing mooring to part (IOMFT)	1	3	-	*	2	4	1	2	1	2	3	3	3	3	1	3	1.7	2.9	4.9
10	Strong Winds causing mooring to part (LCT)	1	2	3	5	2	4	1	2	1	2	3	3	3	3	3	3	2.1	3.0	6.4
11	Linkspan in the Water (IOMFT)	-	-	-	*	3	3	1	3	1	3	-	-	2	4	1	1	1.6	2.8	4.5
12	Linkspan Hung Up on Support Piles (LCT)	-	-	1	1	3	3	1	3	1	3	-	-	2	4	1	1	1.5	2.5	3.8
13	Gangway and PBB failure (IOMFT)	1	-	*	*	2	2	1	2	1	2	5	4	4	1	1	4	2.1	2.5	5.4
14	Gangway failure (LCT)	1	-	1	1	2	2	1	3	1	1	5	4	3	2	1	3	1.9	2.3	4.3
15	Fire on Board Vessel - In River - (IOMFT)	1	-	-	-	2	3	1	4	1	4	5	5	3	4	1	3	2.0	3.8	7.7
16	Fire on Board Vessel - In River - (LCT)	1	2	1	3	2	3	1	3	1	4	5	5	3	4	1	3	1.9	3.4	6.3
17	Fire on Board Vessel - Alongside (IOMFT)	1	2	-	-	2	3	1	2	1	4	5	5	3	3	1	3	2.0	3.1	6.3
18	Fire on Board Vessel - Alongside (LCT)	1	2	1	2	2	4	1	2	1	4	5	5	3	3	1	3	1.9	3.1	5.9
19	Bunker Barge - Alongside (LCT)	1	2	2	5	2	3	1	2	3	2	4	4	5	5	3	4	2.6	3.4	8.9
20	Bunker Barge - Alongside (IOMFT)	1	2	2	5	2	4	1	2	2	2	4	4	5	5	3	4	2.5	3.5	8.8
21	Fire on shoreside - (IOMFT)	1	2	1	2	3	3	1	2	1	3	-	-	2	4	1	1	1.4	2.4	3.5
22	Fire on shoreside - (LCT)	1	3	1	2	3	3	1	2	1	3	-	-	2	4	1	1	1.4	2.6	3.7
23	Dropped line fouls bow thruster or vessel propellers (IOMFT)	1	3	1	2	3	2	1	3	2	2	5	2	3	2	2	4	2.3	2.5	5.6
24	Dropped line fouls bow thruster or vessel propellers (LCT)	1	2	1	2	3	2	1	3	2	2	5	2	3	2	2	4	2.3	2.4	5.3
25	Partial Mechanical Failure on Vessel - (IOMFT)	2	3	2	3	3	3	1	3	2	2	5	3	3	3	1	4	2.4	3.0	7.1
26	Partial Mechanical Failure on Vessel - (LCT)	2	2	2	3	3	3	1	3	2	2	5	3	3	3	1	4	2.4	2.9	6.8
27	Full Mechanical Failure on Vessel - (IOMFT)	1	2	1	5	3	3	1	4	2	3	3	4	2	4	1	5	1.8	3.8	6.6
28	Full Mechanical Failure on Vessel - (LCT)	1	3	1	5	3	2	1	4	2	3	3	4	2	4	1	5	1.8	3.8	6.6
29	Medical emergency to key member of the bridge team - (IOMFT)	1	3	3	1	3	1	1	2	1	1	5	1	2	4	1	2	2.1	1.9	4.0
30	Medical emergency on board Pilot - (LCT)	1	2	3	1	3	1	1	2	1	1	5	1	2	4	1	2	2.1	1.8	3.7
31	Commercial Traffic in the River	2	2	4	2	3	3	1	2	2	3	5	2	5	1	1	3	2.9	2.3	6.5
32	Leisure craft Traffic in the River	2	2	4	2	3	3	1	3	2	1	5	2	5	1	1	3	2.9	2.1	6.1
33	Fishing Boats in vicinity Of the berths	2	2	4	2	4	3	1	3	2	1	5	3	5	1	1	3	3.0	2.3	6.8
34	Terrorism - In River (IOMFT)	3	2	3	5	3	5	3	5	3	5	5	5	3	5	3	3	3.3	4.4	14.2
35	Terrorism - Alongside (IOMFT)	3	3	3	5	3	5	3	5	3	5	5	5	3	5	3	3	3.3	4.5	14.6
36	Terrorism - In River (LCT)	3	2	3	5	3	5	3	5	3	5	5	5	3	5	3	3	3.3	4.4	14.2
37	Terrorism - Alongside (LCT)	3	3	3	5	3	5	3	5	3	5	5	5	3	5	3	3	3.3	4.5	14.6
38	Port Communications Failure Loss of VHF	1	2	2	1	3	2	1	3	2	1	5	2	2	3	1	4	2.1	2.3	4.8
39	Tug Failure (mechanical, line)	2	2	2	3	3	2	1	4	2	2	5	3	3	3	1	4	2.4	2.9	6.8

40	Person in the Water	1	1	1	5	3	2	1	3	1	1	5	5	3	2	1	2	2.0	2.6	5.3
41	Pontoon Sinking (LCT)	1	1	2	3	2	3	1	4	2	1	3	4	2	3	1	4	1.8	2.9	5.0
42	Mooring Dolphin Impact with Linkspan (LCT)	1	1	2	2	2	4	1	3	2	2	-	-	2	3	1	4	1.6	2.7	4.3
43	Direct Bow contact with Berth (Perpendicular)	1	5	2	5	1	5	1	4	1	4	2	4	1	5	1	5	1.3	4.6	5.8
44	Restricted Visibility (Rain and Fog)	2	3	3	2	4	1	2	3	3	1	3	3	5	2	2	3	3.0	2.3	6.8
45	Shoreside 'man-over' Board	1	1	2	3	3	1	1	1	2	1	2	5	2	3	1	3	1.8	2.3	3.9
46	Failure of Aids to Navigation	1	3	1	2	2	1	1	1	1	1	3	4	2	1	1	3	1.5	2.0	3.0

Figure B 3: NRA sheet 2 Averaging sheet for hazard frequency and consequence survey sheet

LIVERPOOL CRUISE TERMINAL NAVIGATIONAL RISK ASSESSEMENT

NAVIGATIONAL RISK ASSESSEMENTS													
Hzd Nr.	AGREED HAZARD	Workshop Survey Averaged Likelihood	Workshop Survey Averaged CON	BASE LINE	HAZARD Likelihood/Cause	HAZARD CONSequence	MITIGATION Y/N	RISK Control measures	% reduce Likelihood USER ASSESSED	%reduce Con USER ASSESSED	INDIVIDUAL RISK CONTROL	CUMULATIVE RISK SCORE MITIGATED	Result
1	Contact with own berth or extended wharfage area downstream while berthing, unberthing	2.3	2.9	6.5			Y	`			6.5	6.4	Moderate
					master error	damage to vessel or structure	y	put compusary pilotage	80	0	4.5	4.4	
					mechanical malfunction	Risk of Pollution	y	operation guideline	25	0	6.1	4.1	
					bad weather		y	Appropriated Pilots/ Consultations	25	0	6.1	3.7	
							n		25	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	Minor
2	Contact with adjacent berths or vessels.	2.1	3.0	6.4			Y	`			6.4	6.4	Moderate
					master error	damage to vesssel or structure	y	put compusary pilotage	80	0	4.3	4.3	
					mechanical malfunction	Risk of Pollution	y	operation guideline	25	0	6.0	3.9	
					bad weather		n	Appropriated Pilots/ Consultations	25	0		3.9	
							y	experiende of skipper * training	25	0	6.0	3.5	
							n		0	0		3.5	
							n		0	0		3.5	
							n		0	0		3.5	
							n		0	0		3.5	
							n		0	0		3.5	
							n		0	0		3.5	Minor
3	Contact with Adjacent Wharfage (IOM)	2.3	3.3	7.3			Y	`			7.3	7.3	Moderate
					master error	damage to vesssel or structure	y	put compusary pilotage	80	0	5.0	5.1	
					mechanical malfunction	Risk of Pollution	y	operation guideline	25	0	6.9	4.6	
					bad weather		n	Appropriated Pilots/ Consultations	25	0		4.6	
							y	experiende of skipper * training	25	0	6.9	4.2	
							n		0	0		4.2	
							n		25	0		4.2	
							n		0	0		4.2	
							n		0	0		4.2	
							n		0	0		4.2	
							n		0	0		4.2	Minor
4	Contact with Adjacent Wharfage (LCT)	2.0	2.9	5.8			y	`			5.8	5.7	Moderate
					master error	damage to vesssel or structure	y	put compusary pilotage	80	0	3.7	3.7	
					mechanical malfunction	damage to vessel	y	operation guideline	25	0	5.4	3.3	
					bad weather	Risk of Pollution	y	Appropriated Pilots/ Consultations	25	0	5.4	3.0	
							y	experiende of skipper * training	25	0	5.4	2.8	
							n		0	0		2.8	
							n		0	0		2.8	
							n		0	0		2.8	
							n		0	0		2.8	
							n		0	0		2.8	
							n		0	0		2.8	Minor
							Y	`			5.6	5.6	Moderate
					master error	injury to public	y	Use correct bath charts	25	0	5.2	5.2	
					mechanical malfunction	damage to vessel	y	Regular berth maintenance sonar	25	0	5.2	4.8	

Figure B4: NRA sheet 3 Mitigation sheet

LIVERPOOL CRUISE TERMINAL NAVIGATIONAL RISK ASSESSEMENT

5	Vessels Grounding moving on/off berth	1.7	3.3	5.6	bad weather	Risk of Pollution	y	Depth sounder procedure on vessel	25	0	5.2	4.4	
							y	Weather updates	25	0	5.2	4.0	
							y	Appropriated Pilots/ Consultations	80	0	3.3	3.3	
							y	Tide Gauges	25	0	5.2	3.3	
							y	put compusary pilotage	25	0	5.2	3.3	
							n		0	0		3.3	
							n		0	0		3.3	
							n		0	0		3.3	Minor
6	Vessel breaking away from berth and striking other vessels/berths	2.1	3.0	6.4			Y	`			6.4	6.4	Moderate
					master error	injury to public	y	Prevailing Wind	25	0	6.0	6.0	
					mechanical malfunction	damage to vessel	y	Regular berth maintenance	25	0	6.0	5.6	
					bad weather	Risk of Pollution	y	Geography and location	50	0	5.5	4.7	
							y	Weather updates	25	0	6.0	4.3	
							y	Mooring Plans	25	0	6.0	4.0	
							y	Cruise Terminal Guidelines	75	0	4.6	3.0	
							n	IOM Berthing Procedures	0	0		3.0	
							n	*Suggestion of Sacrificial Piles	0	0		3.0	
							n		0	0		3.0	
							n		0	0		3.0	Minor
7	Passing vessels striking berth or moored ship (IOM)	1.9	3.1	5.9			y	`			5.9	5.8	Moderate
						Damage To Vessels	y	Compulsary Pilotage	80	0	3.7	3.7	
						Damage to Structure	y	Pilotage Execmption certificate	50	0	4.9	3.1	
						Risk of Pollution	y	VTS and notification	75	0	4.0	3.1	
							y	Port Directions and byelaws	75	0	4.0	3.1	
							n		0	0		3.1	
							n		0	0		3.1	
							n		0	0		3.1	
							n		0	0		3.1	
							n		0	0		3.1	
							n		0	0		3.1	Minor
8	Passing non -cruise vessels striking berth or moored ship (LCT)	2.0	3.1	6.3			y				6.3	6.2	Moderate
						Damage To Vessels	y	Compulsary Pilotage	80	0	4.1	4.1	
						Damage to Structure	y	Pilotage Execmption certificate	50	0	5.3	3.1	
						Risk of Pollution	y	VTS and notification	75	0	4.4	3.1	
							y	Port Directions and byelaws	75	0	4.4	3.1	
							n		0	0		3.1	
							n		0	0		3.1	
							n		0	0		3.1	
							n		0	0		3.1	
							n		0	0		3.1	
							n		0	0		3.1	Minor
9	Strong Winds causing mooring to part (IOM)	1.7	2.9	4.9			Y	`			4.9	4.9	Moderate
						injury to public	y	Prevailing Wind	25	0	4.5	4.5	
						damage to vessel	y	Regular berth maintenance	25	0	4.5	4.2	
							y	Geography and location	50	0	4.0	3.3	
							y	Weather updates	25	0	4.5	3.0	
							y	Mooring Plans	25	0	4.5	2.8	
							y	IOM Berthing Procedures	75	0	3.2	2.8	
							n		0	0		2.8	
							n	*Suggestion of Sacrificial Piles	0	0		2.8	
							n		0	0		2.8	
							n		0	0		2.8	Minor
10	Strong Winds causing mooring to part (LCT)	2.1	3.0	6.4			y	`			6.4	6.4	Moderate
						injury to public	y	Prevailing Wind	25	0	6.0	6.0	
						damage to vessel	y	Regular berth maintenance	25	0	6.0	5.6	
							y	Geography and location	50	0	5.5	4.7	
							y	Weather updates	25	0	6.0	4.3	
							y	Mooring Plans	25	0	6.0	4.0	
							y	Cruise Terminal Guidelines	75	0	4.6	3.0	
							n		0	0		3.0	
							n		0	0		3.0	
							n		0	0		3.0	

Figure B4: NRA sheet 3 Mitigation sheet

LIVERPOOL CRUISE TERMINAL NAVIGATIONAL RISK ASSESSEMENT

							n		0	0		3.0	Minor
11	Linkspan in the Water (IOM)	1.6	2.8	4.5			Y				4.5	4.4	Minor
							y	Navigation Lights	50	0	3.6	3.6	
						Obstruction to Navigation	y	Reported to Crown Estates	50	0	3.6	2.8	
						Change of Port Infrstructure	y	AID to Navigation	50	0	3.6	2.8	
							n		0	0		2.8	
							n		0	0		2.8	
							n		0	0		2.8	
							n		0	0		2.8	
							n		0	0		2.8	
							n		0	0		2.8	
							n		0	0		2.8	Minor
12	Linkspan Hung Up on Support Piles (LCT)	1.5	2.5	3.8			Y	`			3.8	3.7	Minor
							n		25	0		3.7	
						REMOVE	n		25	25		3.7	
							n		25	25		3.7	
							n		34	0		3.7	
							n					3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	Minor
13	Gangway and PBB failure (IOM)	2.1	2.5	5.4			y	`			5.4	5.3	Moderate
							n		25	0		5.3	
						REMOVE	n		25	25		5.3	
							n		25	25		5.3	
							n		34	0		5.3	
							n					5.3	
							n					5.3	
							n		0	0		5.3	
							n		0	0		5.3	
							n		0	0		5.3	
							n		0	0		5.3	Moderate
14	Gangway failure (LCT)	1.9	2.3	4.3			Y				4.3	4.3	Minor
							n		25	0		4.3	
						REMOVE	n		25	25		4.3	
							n		25	25		4.3	
							n		34	0		4.3	
							n					4.3	
							n		0	0		4.3	
							n		0	0		4.3	
							n		0	0		4.3	
							n		0	0		4.3	
							n		0	0		4.3	Minor
15	Fire on Board Vessel - In River - (IOM)	2.0	3.8	7.7			Y	`			7.7	7.7	Moderate
						Damage to Vessel	y	Compulsary Pilotage/PEC	75	0	5.4	5.4	
						Risk of loss of life	y	Port Emergency Procedures and Plans	75	0	5.4	3.8	
						Risk of Pollution	y	Ships Procedures for Fire	75	0	5.4	3.8	
							y	Ship Manifest/Hazardous Cargo	25	50	6.6	3.5	
							n	Ports Directions and Byelaws	0	0		3.5	
							n		0	0		3.5	
							n		0	0		3.5	
							n		0	0		3.5	
							n		0	0		3.5	
							n		0	0		3.5	Minor
16	Fire on Board Vessel - In River - (LCT)	1.9	3.4	6.3			y	`			6.3	6.3	Moderate
						Damage to Vessel	y	Compulsary Pilotage/PEC	75	0	4.3	4.3	
						Risk of loss of life	y	Port Emergency Procedures and Plans	75	0	4.3	3.4	
						Risk of Pollution	y	Ships Procedures for Fire	75	0	4.3	3.4	
							n		0	0		3.4	
							n		0	0		3.4	

Figure B4: NRA sheet 3 Mitigation sheet

LIVERPOOL CRUISE TERMINAL NAVIGATIONAL RISK ASSESSEMENT

							n		0	0		3.4	
							n		0	0		3.4	
							n		0	0		3.4	
							n		0	0		3.4	
							n		0	0		3.4	Minor
17	Fire on Board Vessel - Alongside (IOM)	2.0	3.1	6.3			Y				6.3	6.3	Moderate
						Damage to Vessel	y	Port Emergency Procedures and Plans	25	0	5.9	5.9	
						Risk of loss of life	y	Ships Procedures for Fire	75	0	4.4	4.0	
						Damage to Terminal	y	Temrinal Operature Procedures	50	0	5.3	3.1	
						Damage to shoreside infrastructure	y	Ship Manifest/Hazardous Cargo	25	50	5.3	2.8	
						Damage to Property/cargo	n		0			2.8	
						Risk of Pollution	n		0	0		2.8	
							n		0	0		2.8	
							n		0	0		2.8	
							n		0	0		2.8	
							n		0	0		2.8	Minor
18	Fire on Board Vessel - Alongside (LCT)	1.9	3.1	5.9			Y	`			5.9	5.8	Moderate
						Damage to Vessel	y	Port Emergency Procedures and Plans	25	0	5.5	5.5	
						Risk of loss of life	y	Ships Procedures for Fire	75	0	4.0	3.6	
						Damage to Terminal	y	Temrinal Operature Procedures	50	0	4.9	3.1	
						Damage to shoreside infrstructure	n		0	0		3.1	
						Risk of Pollution	n					3.1	
							n		0	0		3.1	
							n		0	0		3.1	
							n		0	0		3.1	
							n		0	0		3.1	
							n		0	0		3.1	Minor
19	Bunker Barge - Alongside (LCT)	2.6	3.4	8.9			y	`			8.9	8.9	Moderate
						Risk of Pollution	y	PEC Holders	75	0	6.8	6.8	
						Risk of Fire	y	Ports Bunkering Guideline (ISGOTT)	75	0	6.8	4.8	
						Risk of Impact damage	y	Ports Directions and Byelaws	75	0	6.8	3.4	
						Risk of Injury/Loss of life	y	Pilots	80	0	6.5	3.4	
						Risk of Passing vessel breaking mooring/hose/	y	VTS and notification	75	0	6.8	3.4	
							y	Ship Procures for bunkering	75	0	6.8	3.4	
							n		0	0		3.4	
							n		0	0		3.4	
							n		0	0		3.4	
							n		0	0		3.4	Minor
20	Bunker Barge - Alongside (IOM)	2.5	3.5	8.8			Y				8.8	8.8	Moderate
						Risk of Pollution	y	PEC Holders	75	0	6.6	6.6	
						Risk of Fire	y	Ports Bunkering Guideline (ISGOTT)	75	25	6.4	4.4	
							y	Ports Directions and Byelaws	75	25	6.4	3.3	
						Risk of Injury/Loss of life	y	Pilots	80	0	6.3	3.3	
						Risk of Passing vessel breaking mooring/hose/	y	VTS and notification	75		6.6	3.3	
							n	Ship Procures for bunkering	75	0		3.3	
							n	*Mooring Plan Required	0	0		3.3	
							n		0	0		3.3	
							n		0	0		3.3	
							n		0	0		3.3	Minor
21	Fire on shoreside - (IOM)	1.4	2.4	3.5			Y	`			3.5	3.5	Minor
						REMOVE	n		0	0		3.5	
							n		0	0		3.5	
							n		0	0		3.5	
							n		0	0		3.5	
							n		0	0		3.5	
							n		0	0		3.5	

Figure B4: NRA sheet 3 Mitigation sheet

							n		0	0		3.5	
							n		0	0		3.5	
							n		0	0		3.5	
							n		0	0		3.5	Minor
22	Fire on shoreside - (LCT)	1.4	2.6	3.7			Y	`			3.7	3.7	Minor
						REMOVE	n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	Minor
23	Dropped line fouls bow thruster or vessel propellers (IOM)	2.3	2.5	5.6			y	`			5.6	5.6	Moderate
						Damage to Vessel	y	Crew Training	75	0	4.1	4.1	
						Damage to Terminal Facility	y	Ships procedures	75	0	4.1	2.6	
						Potential Inury/Loss of Life	y	Terminal Procedures	75	0	4.1	2.5	
						Risk of Pollution	y	Mooring Plans	75	0	4.1	2.5	
							y	Lines man Training	75	0	4.1	2.5	
							y	Use of Floating Lines	75	0	4.1	2.5	
							n		0	0		2.5	
							n		0	0		2.5	
							n		0	0		2.5	
							n		0	0		2.5	Slight
24	Dropped line fouls bow thruster or vessel propellers (LCT)	2.3	2.4	5.3			Y				5.3	5.2	Moderate
						Damage to Vessel	y	Crew Training	75	0	3.9	3.8	
						Damage to Terminal Facility	y	Ships procedures	75	0	3.9	2.4	
						Potential Inury/Loss of Life	y	Terminal Procedures	75	0	3.9	2.3	
						Risk of Pollution	y	Mooring Plans	75	0	3.9	2.3	
							y	Lines man Training	75	0	3.9	2.3	
							y	Use of Floating Lines	75	0	3.9	2.3	
							n		0	0		2.3	
							n		0	0		2.3	
							n		0	0		2.3	
							n		0	0		2.3	Slight
25	Partial Mechanical Failure on Vessel - (IOM)	2.4	3.0	7.1			Y	`			7.1	7.1	Moderate
						Damage to Vessel	y	PEC Holders (experienced)	75	0	5.3	5.3	
						Damage to Terminal Facility	y	Mersey VTS and notification	50	0	6.2	4.4	
						Potential Inury/Loss of Life	y	Ships Procedures	50	0	6.2	3.5	
						Risk of Pollution	y	Port Procedures/Emergency Planning	50	0	6.2	3.0	
						Loss of Power	y	Use of Anchors	75	0	5.3	3.0	
							y	Tug Assistance	25	0	6.8	3.0	
							n		0	0		3.0	
							n		0	0		3.0	
							n		0	0		3.0	
							n		0	0		3.0	Minor
26	Partial Mechanical Failure on Vessel - (LCT)	2.4	2.9	6.8			Y	`			6.8	6.8	Moderate
						Damage to Vessel	y	Compulsary Pilotage	75	0	5.1	5.0	
						Damage to Terminal Facility	y	Mersey VTS and notification	50	0	6.0	4.2	
						Potential Inury/Loss of Life	y	Ships Procedures	50	0	6.0	3.3	
						Risk of Pollution	y	Port Procedures/Emergency Planning	50	0	6.0	2.8	
						Loss of Power	y	Use of Anchors	75	0	5.1	2.8	
							y	Tug Assistance	40	0	6.2	2.8	
							n		0	0		2.8	
							n		0	0		2.8	
							n		0	0		2.8	
							n		0	0		2.8	Minor
							y	`			6.6	6.6	Moderate
						Damage to Vessel	y	PEC Holders (experienced)	75	0	4.3	4.3	
						Damage to Terminal Facility	y	Mersey VTS and notification	50	0	5.4	3.7	

Figure B4: NRA sheet 3 Mitigation sheet

LIVERPOOL CRUISE TERMINAL NAVIGATIONAL RISK ASSESSEMENT

27	Full Mechanical Failure on Vessel - (IOM)	1.8	3.8	6.6		Potential Inury/Loss of Life	y	Ships Procedures	50	0	5.4	3.7	
						Risk of Pollution	y	Port Procedures/Emergency Planning	50	0	5.4	3.7	
						Loss of Power	y	Use of Anchors	75	0	4.3	3.7	
							y	Tug Assistance	25	0	6.1	3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	Minor
28	Full Mechanical Failure on Vessel - (LCT)	1.8	3.8	6.6			Y				6.6	6.6	Moderate
						Damage to Vessel	y	Compulsary Pilotage	75	0	4.3	4.3	
						Damage to Terminal Facility	y	Mersey VTS and notification	50	0	5.4	3.7	
						Potential Inury/Loss of Life	y	Ships Procedures	50	0	5.4	3.7	
						Risk of Pollution	y	Port Procedures/Emergency Planning	50	0	5.4	3.7	
						Loss of Power	y	Use of Anchors	75	0	4.3	3.7	
							y	Tug Assistance	40	0	5.7	3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	
							n		0	0		3.7	Minor
29	Medical emergency to key member of the bridge team - (IOM)	2.1	1.9	4.0			Y				4.0	4.3	Minor
						Damage to Vessel	y	ENG1 Medical or equivalent	75	0	2.9	3.0	
						Damage to Terminal Facility	y	min 3 personel, Bridge Team	90	0	2.1	2.0	
						Potential Inury/Loss of Life	y	VTS and notification	50	0	3.4	2.0	
						Risk of Pollution	y	Ship Procedures	50	0	3.4	2.0	
							y	Availability of pilots	25	0	3.8	2.0	
							n		0	0		2.0	
							n		0	0		2.0	
							n		0	0		2.0	
							n		0	0		2.0	
							n		0	0		2.0	Slight
30	Medical emergency on board Pilot - (LCT)	2.1	1.8	3.7			Y				3.7	4.3	Minor
						Damage to Vessel	y	VTS and notification	50	0	3.2	3.6	
						Damage to Terminal Facility	y	Ship Procedures	75	0	2.7	2.4	
						Potential Inury/Loss of Life	y	ENG1 Medical or equivalent	75	0	2.7	2.0	
						Risk of Pollution	y	min 3 personel, Bridge Team	90	0	2.0	2.0	
							y	Availability of alternative pilots	25	0	3.5	2.0	
							n		0	0		2.0	
							n		0	0		2.0	
							n		0	0		2.0	
							n		0	0		2.0	
							n		0	0		2.0	Slight
31	Commercial Traffic in the River	2.9	2.3	6.5			y				6.5	6.6	Moderate
						Risk has been assessed	n		0	0		6.6	
							n		0	0		6.6	
							n		0	0		6.6	
							n		0	0		6.6	
							n		0	0		6.6	
							n		0	0		6.6	
							n		0	0		6.6	
							n		0	0		6.6	
							n		0	0		6.6	
							n		0	0		6.6	Moderate
32	Leisure craft Traffic in the River	2.9	2.1	6.1			Y				6.1	5.8	Moderate
						Damage to Leisure Craft	y	Compulsary Pilotage/PEC	75	0	4.8	4.5	
						Potential Inury/Loss of Life (Leisure Craft)	y	VTS and notification	75	0	4.8	3.3	
						Risk of Pollution (From Leisure Craft)	y	Port Guilines, Procedures and Byelaws	50	0	5.5	2.7	
						Risk to Public Reputation	y	Exclusion zones	25	0	5.8	2.5	
							y	Notice to Mariners	25	0	5.8	2.2	
							y	Stakeholder Engagement (Leisure Users Forum)	15	0	6.0	2.1	

Figure B4: NRA sheet 3 Mitigation sheet

							y	Timetables and broadcast to River users	60	0	5.3	2.0		
							y	River is policed for events	15	0	6.0	2.0		
							n		0	0		2.0		
							n		0	0		2.0	Slight	
33	Fishing Boats in vacinity Of the berths	3.0	2.3	6.8			Y				6.8	6.9	Moderate	
						Damage to Fishing Boats	y	Compulsary Pilotage/PEC	75	0	5.4	5.5		
						Potential Inury/Loss of Life (Fishing Boats)	y	VTS and notification	75	25	5.1	3.9		
						Risk of Pollution (From fishing Boats)	y	Port Guilines, Procedures and Byelaws	50	25	5.7	3.1		
						Risk to Public Reputation	n	Exclusion zones	25	0		3.1		
							y	Notice to Mariners	25		6.5	2.8		
							n	Stakeholder Engagement (Leisure Users Forum)	15	0		2.8		
							y	Timetables and broadcast to River users	60	0	5.9	2.1		
							n	River is policed for events	15	0		2.1		
							n		0	0		2.1		
							n		0	0		2.1	Slight	
34	Terrorism - In River (IOM)	3.3	4.4	14.2			Y				14.2	14.2	Extreme	
						Damage to Vessel	n	Automatic Identification System	0	0		14.2		
						Damage to Terminal Facility	y	Ship Procedures	25	0	13.7	13.7		
						Potential Inury/Loss of Life	n	Port Procedures/Emergency Planning	50	0		13.7		
						Risk of Pollution	n	VTS and notification	0	0		13.7		
						Risk of Kidnapping	y	Secutiry Check	25	0	13.7	13.1		
						Risk of Sinking Vessel	y	ISPS check on Isle of Man	0	0	14.2	13.1		
						Risk of Public Reputation	y	Intelligence from Security Services/Police	50	0	12.9	11.8		
						Risk of Closure to Port	n		0	0		11.8		
							n		0	0		11.8		
							n		0	0		11.8	High	
35	Terrorism - Alongside (IOM)	3.3	4.5	14.6			Y				14.6	14.6	Extreme	
						Damage to Vessel	y	Intelligence from Security Services/Police	50	0	13.3	13.3		
						Damage to Terminal Facility	y	ISPS	25	0	14.1	12.7		
						Potential Inury/Loss of Life	y	Terminal Procedures (Training)	25	0	14.1	12.1		
						Risk of Pollution	y	Ship Procedures	25	0	14.1	11.6		
						Risk of Kidnapping	n		0	0		11.6		
						Risk of Sinking Vessel	n		0	0		11.6		
						Risk of Public Reputation	n		0	0		11.6		
						Risk of Closure to Port	n		0	0		11.6		
							n		0	0		11.6		
							n		0	0		11.6	High	
36	Terrorism - In River (LCT)	3.3	4.4	14.2			Y				14.2	14.2	Extreme	
						Damage to Vessel	n	Automatic Identification System	0	0		14.2		
						Damage to Terminal Facility	y	Ship Procedures	25	25	13.3	13.3		
						Potential Inury/Loss of Life	n	Port Procedures/Emergency Planning	50	25		13.3		
						Risk of Pollution	n	VTS and notification	0	0		13.3		
						Risk of Kidnapping	y	Secutiry Check	25		13.7	12.8		
						Risk of Sinking Vessel	y	ISPS	0	0	14.2	12.8		
						Risk of Public Reputation	y	Intelligence from Security Services/Police	50	0	12.9	11.5		
						Risk of Closure to Port	n		0	0		11.5		
							n		0	0		11.5		
							n		0	0		11.5	High	
							Y				14.6	14.6	Extreme	
						Damage to Vessel	y	Intelligence from Security Services/Police	50	0	13.3	13.3		
						Damage to Terminal Facility	y	ISPS	50	0	13.3	11.9		
						Potential Inury/Loss of Life	y	Terminal Procedures (Training)	25	0	14.1	11.4		

Figure B4: NRA sheet 3 Mitigation sheet

37	Terrorism - Alongside (LCT)	3.3	4.5	14.6		Risk of Pollution	y	Ship Procedures	25	0	14.1	10.8	
						Risk of Kidnapping	n		0	0		10.8	
						Risk of Sinking Vessel	n		0	0		10.8	
						Risk of Public Reputation	n		0	0		10.8	
						Risk of Closure to Port	n		0	0		10.8	
							n		0	0		10.8	
							n		0	0		10.8	High
38	Port Communications Failure Loss of VHF	2.1	2.3	4.8			Y				4.8	4.9	Moderate
						Lack Awareness of Others Vessels	y	Compulsary Pilotage/PEC Holders (experienced)	75	0	3.4	3.5	
						Lack of confidence in the System	y	Mobile Phones	75	0	3.4	2.3	
							y	Possible use of different channel	75	0	3.4	2.3	
							y	Backup systems	75	0	3.4	2.3	
							n		0	0		2.3	
							n		0	0		2.3	
							n		0	0		2.3	
							n		0	0		2.3	
							n		0	0		2.3	
							n		0	0		2.3	Slight
39	Tug Failure (mechanical, line)	2.4	2.9	6.8			Y				6.8	6.8	Moderate
						Damage to Vessel	y	Compulsary Pilotage/PEC Holders (experienced)	75	0	5.1	5.0	
						Damage to Terminal Facility	y	Use of Anchors	35	0	6.3	4.5	
						Potential Inury/Loss of Life	y	Use of Other tugs	25	0	6.5	4.2	
						Risk of Pollution	y	Maintence and replacement of tugs	75	0	5.1	2.8	
							y	Certification of Tugs	50		6.0	2.8	
							y	Experience and knowledge of River (tug skippers)	75	0	5.1	2.8	
							y	Spare Line	75	0	5.1	2.8	
							y	Engine redundancy (Twin Engine)	75	0	5.1	2.8	
							n		0	0		2.8	
							n		0	0		2.8	Minor
40	Person in the Water	2.0	2.6	5.3			Y				5.3	5.2	Moderate
						Remove	n		0	0		5.2	
							n		0	0		5.2	
							n		0	0		5.2	
							n		0	0		5.2	
							n		0	0		5.2	
							n		0	0		5.2	
							n		0	0		5.2	
							n		0	0		5.2	
							n		0	0		5.2	
							n		0	0		5.2	
							n		0	0		5.2	Moderate
41	Pontoon Sinking (LCT)	1.8	2.9	5.0			Y				5.0	5.0	Moderate
						Remove	n		25	0		5.0	
							n		25	25		5.0	
							n		25	25		5.0	
							n		34	0		5.0	
							n					5.0	
							n		0	0		5.0	
							n		0	0		5.0	
							n		0	0		5.0	
							n		0	0		5.0	
							n		0	0		5.0	Moderate
42	Mooring Dolphin Impact with Linkspan (LCT)	1.6	2.7	4.3			Y				4.3	4.2	Minor
						Remove	n		25	0		4.2	
							n		25	25		4.2	
							n		25	25		4.2	
							n		34	0		4.2	
							n					4.2	
							n		0	0		4.2	
							n		0	0		4.2	
							n		0	0		4.2	
							n		0	0		4.2	

Figure B4: NRA sheet 3 Mitigation sheet

							n		0	0		4.2	Minor
43	Direct Bow contact with Berth (Perpendicular)	1.3	4.6	5.8			Y				5.8	5.8	Moderate
						This has been assessed above	n		25	0		5.8	
							n		25	25		5.8	
							n		25	25		5.8	
							n		34	0		5.8	
							n					5.8	
							n		0	0		5.8	
							n		0	0		5.8	
							n		0	0		5.8	
							n		0	0		5.8	
							n		0	0		5.8	Moderate
44	Restricted Visibility (Rain and Fog)	3.0	2.3	6.8			Y				6.8	6.9	Moderate
						Damage to Vessel	y	Weather updates	0	0	6.8	6.9	
						Damage to Terminal Facility	y	Pilotage and PEC Holders	80	0	5.2	5.3	
						Potential Inury/Loss of Life	y	VTS and notification	50	0	6.1	4.6	
						Risk of Pollution	y	Aids to Navigation	90	0	4.5	2.3	
							y	Port Directions and byelaws	40	0	6.3	2.3	
							n		0	0		2.3	
							n		0	0		2.3	
							n		0	0		2.3	
							n		0	0		2.3	
							n		0	0		2.3	Slight
45	Shoreside 'man-over' Board	1.8	2.3	3.9			Y				3.9	4.0	Minor
						Remove	n		25	0		4.0	
							n		25	25		4.0	
							n		25	25		4.0	
							n		34	0		4.0	
							n					4.0	
							n		0	0		4.0	
							n		0	0		4.0	
							n		0	0		4.0	
							n		0	0		4.0	
							n		0	0		4.0	Minor
46	Failure of Aids to navigation	1.5	2.0	3.0			Y				3.0	3.0	Minor
						Not Assessed	n		25	0		3.0	
							n		25	25		3.0	
							n		25	25		3.0	
							n		34	0		3.0	
							n					3.0	
							n		0	0		3.0	
							n		0	0		3.0	
							n		0	0		3.0	
							n		0	0		3.0	
							n		0	0		3.0	Minor

Figure B4: NRA sheet 3 Mitigation sheet

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Appendix 6.1a: Piling and Construction Methodology

	IMS Doc Ref No:	PO/2/3/3/6-1253(1)
	Process Objective:	To determine safe working methods for specific work activities.
	Process Owner:	Group Head of SHEQ

Method Statement

Project Title:	Liverpool Cruise Terminal	**Project Number:**	5143
Method Statement No.:	LCT/MS/001	**Revision:**	Outline – 30 Oct 2018
Project/Site Manager:	William John Cunningham	**Contact Details:**	07876647523
Written by (PRINT):	William John Cunningham	**Role on Project:**	Project Manager
Approved by (PRINT):	Martin McKeown	**Role on Project:**	Contract Manager
Title of Task:	Existing Jetty Demolition		

Introduction

This Method Statement describes the specific safe working methods which will be used to carry out the task required.

It gives details of how the work will be carried out and what Safety, Health, Environmental and Quality issues and controls are required.

The content of this Method Statement reflects the findings of the relevant Risk Assessment(s).

Description of Work

Purpose of the Work (Description of the Contract):

The demolition of the existing jetties off the front of Princes Parade as part of the enabling works for the construction of the new Liverpool Cruise Terminal.

Details of Type and Scope of Work Being Carried Out (Include Working Hours):

The demolition will take place using floating plant from the Mersey. There are two distinct elements of the existing jetty which are required to be demolished;

- Traditional timber jetty
- Suspended concrete deck on timber piles

The scope is as detailed below;

- Retrieval of significant historical artefacts, identified prior to works commencing.
- Archaeological watching brief to be in place during the works.
- Complete removal of both structures, including the extraction of the piles.
- Disposal or recycling of all materials arising from the demolition.
- Making good of areas where the existing structure tied into the existing River Wall.
  Works will be tidal and although the plan is to complete the works during the hours 0700-1900hrs over a 7-day working week. These hours may need to change to make best use of the tides and complete in a reasonable timeframe. It is anticipated that low noise works will be required outside these hours in preparation for demolition works and piling works the following day. Refer to 'Summary of Plant' and 'Plant Sequencing' documents for further details. Such activities may include: -
  - Moving of barge to required location
  - Positioning of crash decks
  - Moving of service barges for disposal of debris

Sequence of the Works/Work Method:

This method Statement outlines the general procedures which will be undertaken, however before the works commence the detail Method Statement will be produced with input from the relevant subcontractor and these will be approved by the Liverpool City Council team and Peel Ports. The detailed method statement will rely on the outcome of further surveys of the structures to determine the connections which will then inform the exact methodology. However, whilst it is not expected that the plant required will change from this method statement, there may be some changes to the sequencing of the works.

Prior to the works commencing a meeting will be arranged with the Harbour Master to advise Peel Ports of the extent of the works and in association with this Method Statement will then be able to disseminate the information to the relevant stakeholders on the Mersey and the wider Maritime Community via a Notice to Mariners.

It is not expected that the works themselves will have an impact on the current navigation on the Mersey. The existing structures are in a position where they are clear of the channel. The main impact of the works is expected to be on movements to and from the pilot station (located at Pontoon D). The Cruise Liner pontoon could also be impacted with demolition works programmed from February 2019 to August 2019. Whilst the barges will not be in the path of vessels during the works, movements of the barges and the movement of tugs and service barges will use the navigation channel and will therefore require co-ordination which will be done via Mersey VTS on VHF Channel 12.

All movements will take place in accordance with the Harbour Master's requirements and the general rules and by-laws applicable to the Mersey and Mersey Docks and Harbour Company (MDHC).

Based on preliminary investigations we expect to use the following equipment to undertake the works, refer to the 'Summary of Plant' document for further details.;

- 2 No. Floating spud leg or Jackup barges (approx. 60m long x 20m beam) each with the following plant on board;
    - Long reach Excavator with grab, rock breaker and saw attachments
    - Crawler crane with vibro hammer
    - Welfare units
    - The necessary navigation lighting and day marks for "restricted in ability to manoeuvre
    - 43m Articulating Boom Lift
- Diamond wire sawing equipment (Remote)
- Crash deck and floating boom to retain debris within work site
- Workboat – likely to be a multicat, to clear materials in the boom and act as safety vessel
- 2 No. service barges (for removal of materials arising)
- Stand by tug – to move barges and
- Land based crawler crane to unload barges (processing yard – off site)
- 40t Excavator with grab for Material processing (processing yard – off site)

The floating plant will be towed to site separately to a position on the Mersey (TBC) where the crane and the excavators will be loaded. The barges will have been checked that they are stable and fit to take the loading from the plant and the relevant temporary works measures will be in place prior to loading. Once the plant is loaded it will be brought to site.

Before the works commence an Archaeology Level 3 survey and report will be conducted. This is to create a record of the existing survey prior to the demolition commencing. This is a difficult task, given the condition of the structure initial access will be limited and the survey will rely on photos from distance and the 3D point cloud survey. To ensure all areas have been covered an Archaeological watching brief will be applied during the works. This will require the archaeologist to access to the barge and take additional photographs as the works progress.

Also prior to the start of the works, the structure will also be checked for the presence of services. If services are identified they will be eliminated before the demolition starts.

The sequence outlined below is based on the use of marine plant and long reach excavators to safely demolish the structure with no operatives accessing the structure and has been developed to mitigate the risks associated with the demolition:

1. The final demolition methodology and associated temporary works will be agreed and Risk Assessments and Method Statements developed and approved.

2. Noise and vibration monitoring equipment will be put in place to monitor background levels prior to commencement of demolition.

3. A boom will also be in place surrounding the equipment during demolition works. Any material arising during the works will be trapped within the boom and can be recovered by the workboat.

4. Barge 1 will be mobilised to site and positioned to avoid any obstruction to the Mersey Navigation channel or landing stage.

5. The first task will be to retrieve materials identified in the archaeological survey. The retrieval of these items will be planned to occur at High Water. Operatives will use the articulating boom lift from the barge to access the deck and whilst remaining in the basket attach slings to the artefact and then also to the crane. Taking great care, these artefacts will be loaded to the service barge and taken ashore to be stored in a place to be identified by Liverpool City Council.

6. Demolition works will be carried out on up to 2 work fronts simultaneously.

7. Works will commence on the northern section of the jetty with a timber deck. Starting from the top down the deck horizontal members and bracing along the outer perimeter will be removed, leaving one member spanning in each direction to retain support to the pile in the temporary condition. This will be done using a combination of the excavator cutting and the crane to remove the members and place in the barge.

8. Care must be taken where horizontal members intersect the existing River wall. Due to the sensitive nature of the River Wall these members will be cut a maximum of 500mm proud of the river wall and the River wall should not be disturbed by these works.

9. All removed timber sections will be loaded onto a separate barge and taken away for offloading/recycling at a nearby load out facility.

10. Barge masters will be in continual radio communication with the Mersey VTS on VHF channel 12 and a daily / weekly schedules of planned vessel movements will be issued in advance.

11. Once enough horizontal members have been removed the barge will be manoeuvred into position and the crane mounted vibro-hammer attached to the pile. Once connected the adjacent Long reach will remove the bracing and the crane will then extract the pile. It will be preferred to fully remove the piles which are anticipated to have been driven into the upper layers of weathered sandstone, rather than cutting off the piles at or below bed level which will leave the risk of clashes with the new pile installation and remove any requirement for divers to enter the water, a high-risk operation given the nature of the Mersey tidal flows. These steps are shown in *Image 1*.

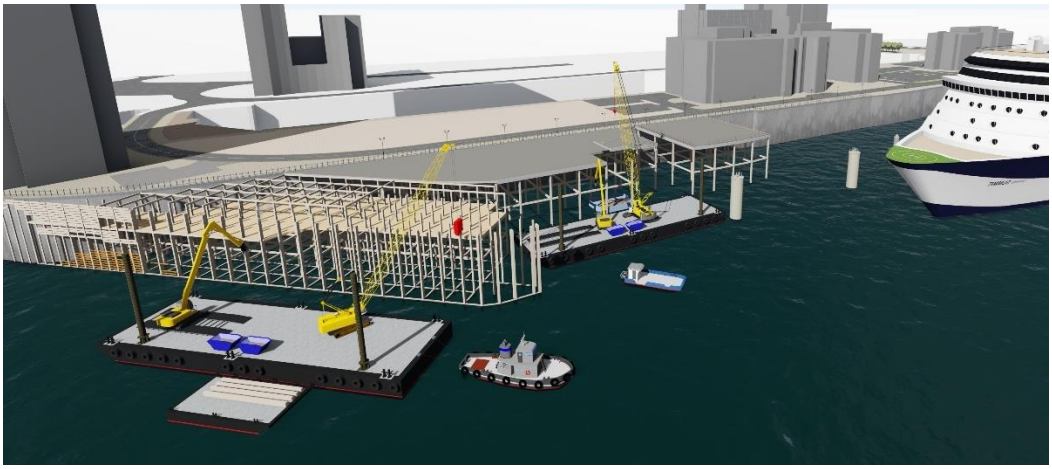


Image 1 – Demolition of the timber jetty

12. The process will continue stripping the deck, the bracing and pulling the piles from the outside of the structure towards the centre/shore

13. Whilst these works are ongoing Barge 2 will be manoeuvred into position adjacent to the southern jetty section with suspended concrete deck, as shown in *Image 2*.

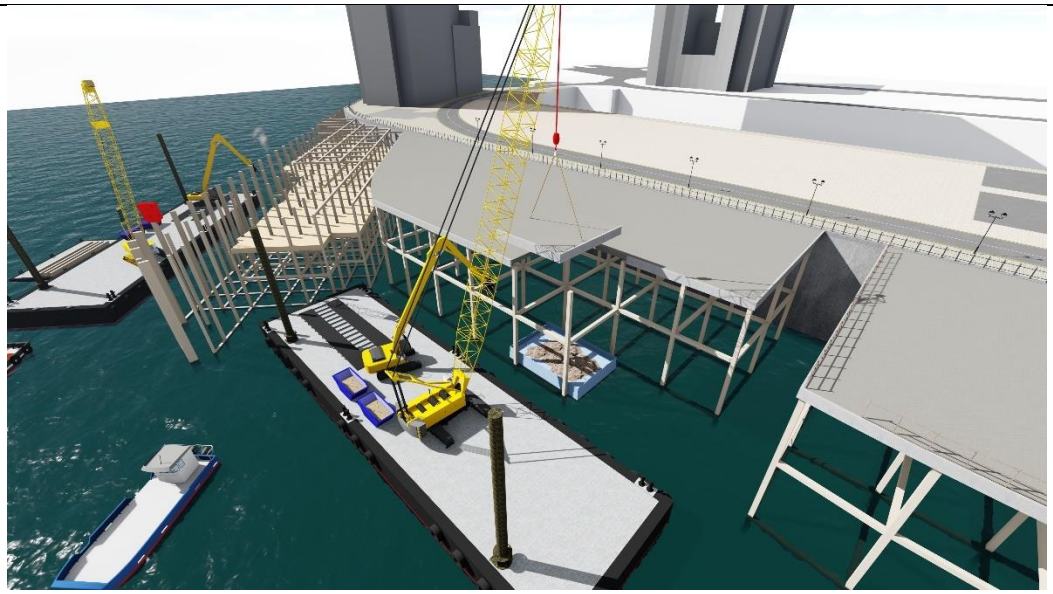


Image 2 – Demolition of both structures concurrently

14. The suspended concrete deck demolition will process in a different manner. This will commence with the crawler crane lifting an access platform to the existing deck, holes will be cored by operatives working from this platform at locations which will be determined following completion of the detailed survey.

15. Once the holes have been cored a remotely operated diamond wire saws will be fed through the holes and the crane will be attached to the section of concrete which is to be cut.

16. With the crane attached the saws will commence and cut the section from the deck.

17. Once completed the saws will be stopped and the section which has been released will be lifted clear and loaded onto the service barge, as shown in *Image 3*. If there are any snags the long reach will deploy a rock breaker to release the section and allow the crane to remove.

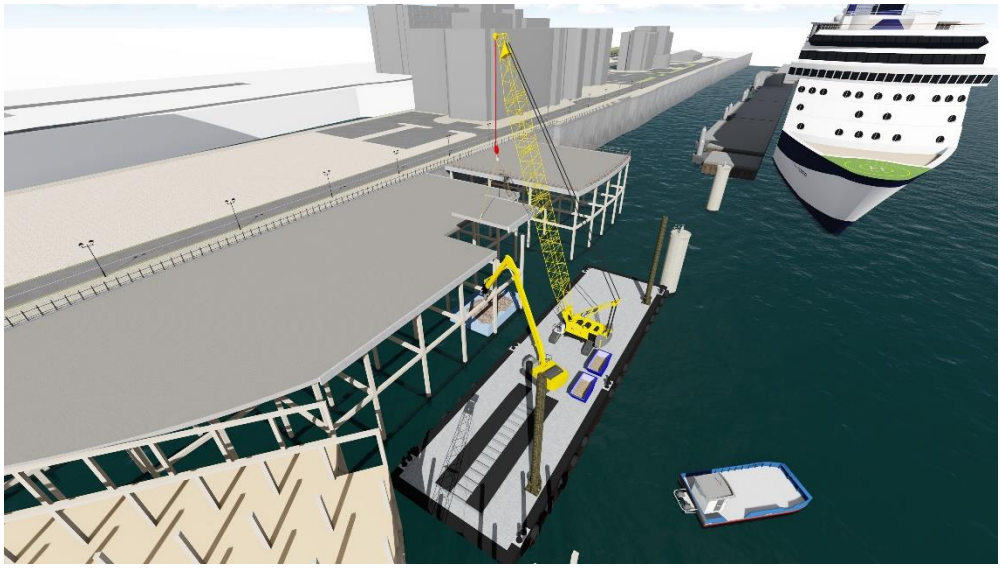


Image 3 – Demolition of the suspended concrete deck

18. In a similar manner to the other structure the deck will be removed and stripped from the perimeter working inwards.

19. Once the deck has been removed in a section the crane/long reach barge will approach and remove the final horizontal members and piles as described in points 5-8, above. Once the deck and bracing units have been removed this barge and excavator will be demobilised.

20. At this point and prior to demobilising the long reach excavator we would propose to undertake a final 3D side scan sonar survey to confirm the presence of any obstructions on the river bed that had been there prior to jetty demolition or may have dropped during demolition. This will also allow a detailed survey of the below water condition of the quay wall to be undertaken and any potential remedial works undertaken. Any obstructions or debris on the river bed can then be removed by the barge mounted long reach prior to demobilisation. The completed demolition works is shown in Image 4, below.

Image 4 – Completed Demolition Works

How the Work will be Carried Out:	
Pre-Start Check:	Prior to works commencing the following checks will take place • Consents to be in place as identified in the *"Permits"* section • All personnel inducted and to have the Skills, Knowledge, Experience and training required for their role • All monitoring of the River wall to be setup and in place before works commence • Peel to have accepted the methodology • Archaeological surveys to have taken place and items to be retrieved to be identified • All stakeholders to be informed that the works are to commence
Plant & Equipment Details:	Demolition works will be carried out on 2 marine work fronts. The plant and equipment outlined below is to be provided at each work front. Refer to the 'Summary of Plant' document for further details. • Floating spud leg / Jackup barge (approx. 60m long x 20m beam) • 75t long reach excavator, i.e. CAT 345C – with grab, rock breaker & saw attachments • Crawler Crane with lifting tackle & vibro hammer – Kobelco CKE800G or Liebherr LR 1160 • 1000hp standby Tug for spud leg / jackup barge • Service Barge (approx. 30m x 20m) • 1000hp Tug to accompany service barge • 300hp workboat / safety vessel • 60-100kVA generator • 2nr Mobile tower lights • 2nr welding plants • Welfare & Accommodation – Canteen, Drying Room, Office, Toilet Block • 2nr Power Washers • MEWPs In addition to the above, the following are required at the off-site processing yard: • Land based crawler crane to unload barges (processing yard – off site) • 40t Excavator with grab for Material processing (processing yard – off site)

Materials, Including Weights:	Material Weights to be confirmed by the detailed 3D point cloud survey. This will inform the exact sizes of the plant required.
Deliveries and Site Access:	All access to the site will be via the Mersey There will be no land access during the Demolition phase of the works
Duration of Work:	Planned programme of works is as detailed below – note, this is subject to change based on HRO receipt. • Jetty Demolition: February 2019 to August 2019 (25 weeks)
Resources:	
Personnel and Copies of Certificates:	Will be provided prior to the works commencing
Training and Competence:	Will be provided prior to the works commencing
Other Site Operations/Third Parties:	Will be provided prior to the works commencing

Location of Work

Site Address and Precise Location on Site Where Work is to be Carried Out:

The works will occur on the river Mersey in front of Princes Parade. The land address is;

Princes Parade
Liverpool
L3 1BF

Image 5, below, shows the location of the works and the extent of the demolition. The Blue section represents the timber Jetty and the orange represents the suspended concrete deck on timber piles.

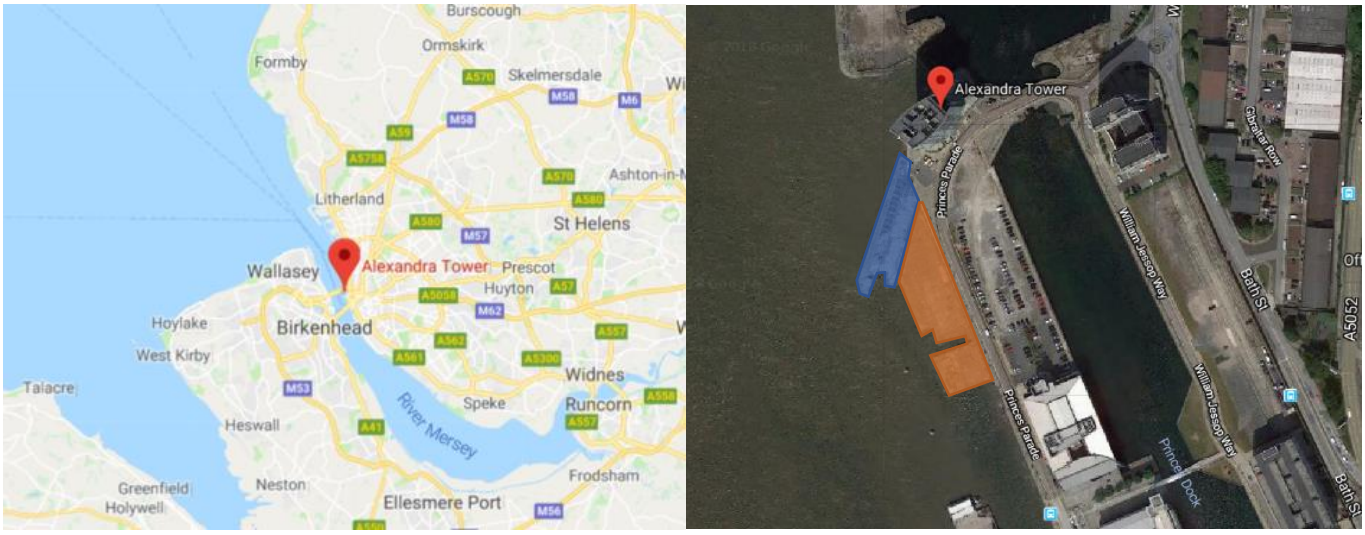


Image 5 – Location of the works

Site Specific Hazards:

Site Specific Hazards are briefed to the workforce as part of their daily briefings and inductions. Signage and control measures are put in place to highlight any known hazards on site when appropriate.

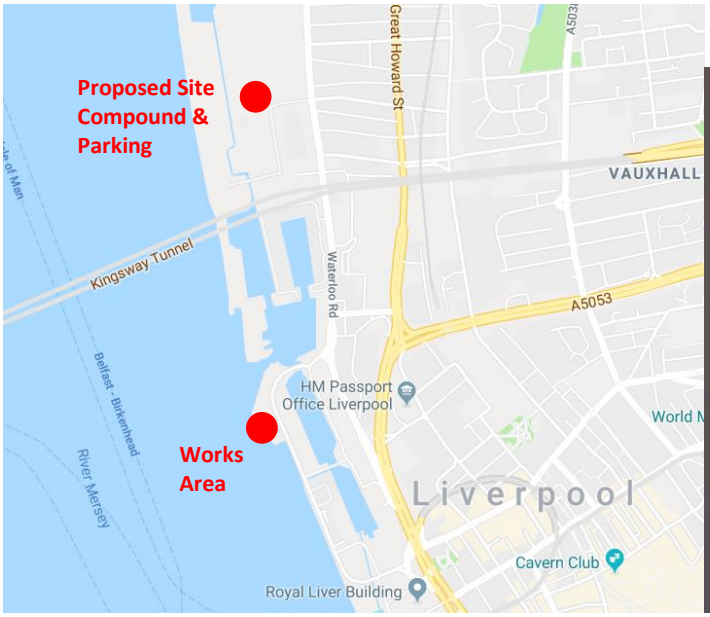
- Interface with the public
- Proximity to other works sites
- Proximity to residential property and businesses
- Interface with River traffic, cruise liners and the pilot operations
- Working around a condemned structure
- Interface with the River Wall
- The presence of UXOs
- Tidal factors – current and rise and fall

- Potential for Asbestos in the structure
- Working with Greenheart timber
- Noise and creating a nuisance
- Working at Height and over water
- Exposed site – wind and weather conditions

Access and Egress:

There will be no direct access to the site itself from Princes Parade as all works will be conducted remotely from floating plant. However, we will seek agreement from Liverpool City Council to use the Landing Stage as a place of pick up and set down for anyone requiring access to the barges.

Proposed site compound, parking, offices, welfare and works area are outlined in the figures below.



Space is limited at the works area and proposed site office / welfare facilities; therefore, staff will park at the proposed site compound located approximately 0.5 miles north of the site (postcode L3 0BS). McLH will provide a minibus/shuttle bus to transport workers between the car park and the site.

Details of any other Locations in the Proximity of the Works which may affect the Safety of the Work or be affected by the Work and what measures will be used to control these risks e.g. Segregation, Warning Notices, Fencing:

- Full Segregation will be erected along the rear of the River Wall to prevent unauthorised access. A barrier is already in place at this location and may therefore be sufficient.
- Signage will be erected to warn of the dangers
- The Landing Stage is the river side infrastructure which has the most potential to be impacted by the works. Regular liaison meetings will be conducted between McL&H, Liverpool Cruise, Peel Land and Property and Peel Ports to coordinate these activities.

Health, Safety, Quality & Environmental Management and Control Measures

Risk Assessments:	The Risk Assessments listed below have been carried out for each activity associated with this work and are appended to this Method Statement: • *A full list of RAs will be prepared once the detailed Method Statements have been finalised.* Operatives are required to read each Risk Assessment.
Site Rules:	

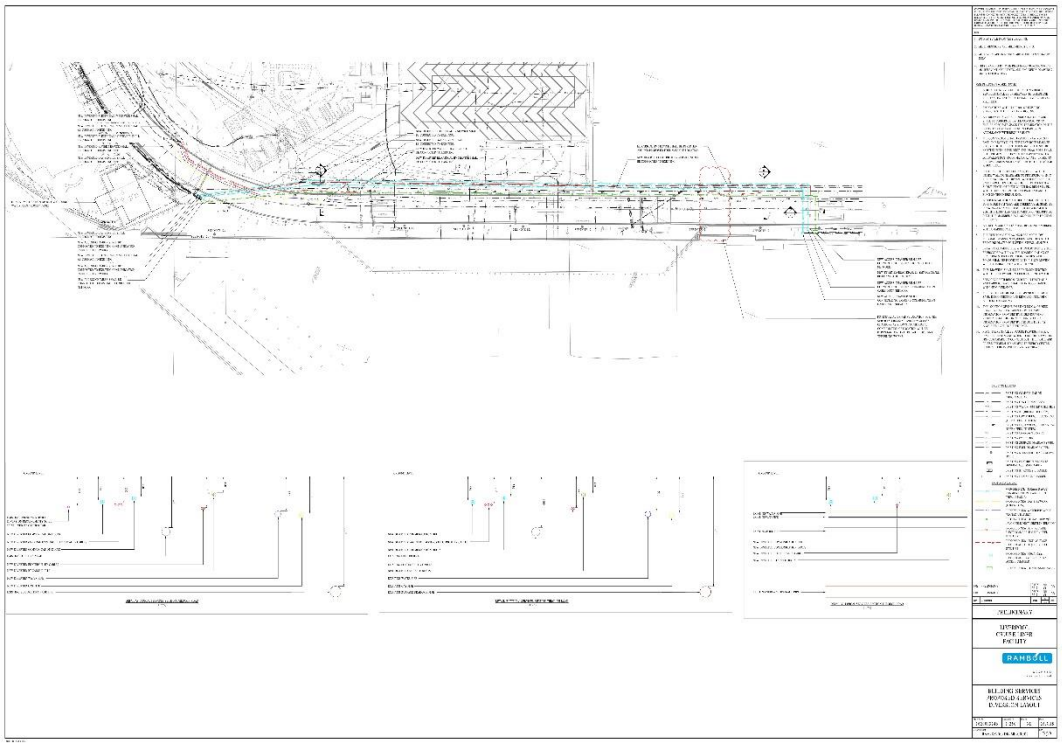
	Site Rules are briefed to the workforce as part of their daily briefings, inductions and are displayed on the site notice board.
Permits:	Permits required for this task, as identified in the relevant standard work instructions are listed below: • Access Permit – Peel Land and Property • Access Permit – Peel Ports • River Wall Permit – Peel Ports • Planning Permission – Liverpool City Council • Harbour Revision Order (HRO) – Parliament • Notice to Mariners – Harbour Master (Peel Ports) • Heritage Conditions – Heritage England • Listed Building Application – Liverpool City Council • Marine Licence – Marine Management Organisation (MMO) Other Stakeholders to be consulted; • Environment Agency • Duchy of Lancaster • Mersey Tunnels • MEAS • Liverpool Cruise • Isle of Man Steam Packet • World Heritage • Places Matter • CEFAS
Plant & Equipment (Including Scaffolding):	Plant and Equipment required for this work is listed below: Demolition works will be carried out on 2 marine work fronts. The plant and equipment outlined below is to be provided at each work front. Refer to the 'Summary of Plant' document for further details. • Floating spud leg / Jackup barge (approx. 60m long x 20m beam) • 75t long reach excavator, i.e. CAT 345C – with grab, rock breaker & saw attachments • Crawler Crane with lifting tackle & vibro hammer – Kobelco CKE800G or Liebherr LR 1160 • 1000hp standby Tug for spud leg / jackup barge • Service Barge (approx. 30m x 20m) • 1000hp Tug to accompany service barge • 300hp workboat / safety vessel • 60-100kVA generator • 2nr Mobile tower lights • 2nr welding plants • Welfare & Accommodation – Canteen, Drying Room, Office, Toilet Block • 2nr Power Washers • MEWPs In addition to the above, the following are required at the off-site processing yard: • Land based crawler crane to unload barges (processing yard – off site) • 40t Excavator with grab for Material processing (processing yard – off site) Plant and Operator Certification must be inspected by **William-John Cunningham (Project Manager)** prior to them being used. Non-Certified Plant must not be used. Operators who do not possess the appropriate skills and certification must not use that item of plant.
Inspections:	The following safety inspections must be carried out for this work task: • Inspection and Approval of Subcontractor RAMS • Daily Plant Checks

	• All certification of all plant and equipment • Training and competency checks on all operatives and supervisors
Supervision:	The person responsible for the onsite supervision of this work task is **William-John Cunningham (Project Manager)**, who will be the point of contact for any queries arising from carrying out the work task.
Hazardous Substances:	This work task necessitates the use of the undernoted hazardous substances: • Possible Asbestos • Greenheart timber • Concrete dust • Diesel • Petrol • Hydraulic Oil • Grease A COSHH assessment will be completed for any substance considered hazardous to health and made available to operatives. Operatives will be taken through the control measures required. Any materials delivered to site must be accompanied by the safety data sheet.

Hold Points:	Hold points relating to this work task, as identified in the relevant work instructions, are listed below:
	
	• No works can commence until the following is in place;
	  • All Consents and permits approved
	  • Health and Safety Checks completed
	  • Plant and equipment must not be loaded onto or advanced forward to a new section of Temporary Works Deck until the setup has been signed off by the Temporary Works supervisor
	
	Work must not proceed beyond any hold point until authorised by **William-John Cunningham (Project Manager)** to do so.

Personal Protective Equipment (PPE):	In addition to the minimum PPE requirements for the project, Operatives must wear the PPE identified in the relevant Risk/COSHH Assessment as listed below: • Hi Visibility Vest • Hard Hat – BS EN 397 • Gloves – Cut Factor 5, BS EN 388 • Safety Footwear – BS EN 347 • Safety Glasses – BS EN 166 Task specific PPE: • 150N Lifejacket – for Marine works only or working on the new deck structure • Harness – for terminal building construction when working at height • Hearing protection – task specific • RPE – Face fit testing to be conducted for staff operating tools causing dust – certification to be issued Operatives must use this equipment in accordance with any training and instruction provided.
Third Parties:	Third Parties who may be exposed to risk as a consequence of this work task are identified in the relevant risk assessment and are listed below, together with the control measures required for each category: • Members of public – fence and warning signs to prevent access • Visitors to the café and tenants in Alexandra Tower – fence and warning signs to prevent access • Worker in properties along Princes Parade – fence and warning signs to prevent access • Wates – Working on the hotel site adjacent the works • Other Contractors working locally on the Liverpool Waters projects

	• Peel Ports • Peel Land & Property • Liverpool City Council (LCC) • ABP • Existing Cruise Liner Terminal Management at LCC
Services:	The undernoted services have been identified and are located in the vicinity of this work task. Control Measures are noted with each listed service: • It is not expected that there are any live services on the existing structure. However, prior to works commencing check will be conducted as some services, especially, water and electrical services may be present. • Refer to existing services drawing reference RAM-XX-00-DR-ME-00001  All services will be diverted in advance of the works (refer to drawing reference RAM-XX-00-DR-ME-00002) with provision made for connection to the new buildings – Cruise Terminal and Hotel.

	
Welfare Facilities:	The following welfare facilities have been made available to the workforce: • Each barge and vessel will have its own welfare facilities and accommodation for the full crew • Separate Canteen, drying room, toilets and office facilities will be made available on shore. Location TBC but likely to be with Plot 11.
Records and Certifications:	Records and Certifications required for this task, as identified in the relevant standard work instructions, are listed below: • Archaeological Assessment as required by Heritage England
SHEQ Emergency Arrangements:	The measures to be taken in the event of an emergency have been prepared and are displayed on the site notice board. This will also be provided on each barge. Refer to SHEQ Plan for further details of: • First Aid provision • Emergency Services • Man-in-Water procedure • Emergency Spill Response procedure
Specifications:	The specification relevant to this task is: • ***LCT-RAM-03-ZZ-SP-N-00001-Demolition Specification***
Materials Management - Quality Control Inspections:	All goods and/or materials delivered to site for this work task will be inspected by **William-John Cunningham (Project Manager)** for compliance with the specification, damage and dimensional accuracy. Goods and materials found to be out with specification shall be returned on the delivery vehicle or alternatively clearly marked do not use and be placed in a designated area.

Materials Management - Handling and Storage:	Goods and materials to be incorporated into the permanent or temporary works shall be handled and stored in accordance with any specification requirements and the manufacturer's recommendations in a designated storage area. Materials specific to this work task are listed below: • As this is an enabling package at this stage we do not expect that materials will be required to conduct the works

Nuisance Control Measures:	The measures to be taken to control nuisance are listed below:
	
	• Noise and Vibration monitoring will be conducted before the works to gather background information and then throughout the works. Noise and Vibration monitoring equipment will be set up as outlined in 'Proposed Monitoring Locations' layout LCT-MLH-XX-XX-DR-W-01100.
	• An investigation is ongoing to determine the expected vibration levels will be during the works. This will determine the measures that need to be put in place.
	• It is anticipated that vibration limit will be 9mm/s,
	• Airborne noise and underwater noise and will be monitored prior to construction, to establish baseline levels, and throughout construction works to ensure works do not exceed limits. Monitoring equipment will operate a red, amber and green system with live SMS and email notifications/alerts sent to the McLH Site Management Team when levels approach set limits. This will enable the Site Team to address site operations before exceedance of limit.
	• A noise evaluation assessment will be carried out to predict the likely noise expected to be developed as a result of demolition and construction works. This will be based on the proposed construction plant.
	• Noise Monitoring Equipment:
	  ○ Airborne noise shall be monitored using a sound level meter at locations noted below for the duration of the piling works.
	  ○ Underwater noise shall be monitored using a hydrophone at the location noted below for the duration of the piling works.
	• Potential use of acoustic barriers on piling barge to mitigate noise from piling operations at source.
	• Parking facilities will be available at the welfare setup, however, should these be insufficient for the numbers of operatives required to construct the terminal then a satellite compound will be established and works transported to and from the site by bus. It is highly likely that this will be required. Refer to 'Access and Egress' section above.
	• To ensure services are unaffected or disrupted by the works they will diverted into a safe location in advance. During the diversion works provision will also be made for the connection of the new buildings to the networks.
	• Lighting will be required especially during the winter months. When lighting is required, it will be as un-intrusive as possible with walkways having minor lighting and brighter task lighting setup where required. Due care and attention will be given to residents in this instance. Furthermore, care will be taken to ensure that task lighting will not interfere with navigation on the Mersey and all RAMS will be discussed with Peel before the works commence.
	• Lighting will be required during marine related and barge works throughout the night.

Pollution Control Measures:	The measures to be taken to control pollution are listed below: • A boom will be in place around all floating plant during the works and any material arising will be collected and disposed. • Spill Kits will be available on the barges to retain oil lost through burst hoses etc • Biodegradable Oil will be used where possible • All waste arising from the works will be taken ashore and disposed or recycled
Waste Control Measures:	• Recycle materials where possible – to included timber and concrete arising from the demolition process • Timber arising from the demolition works will be recycled for reuse either as a timber product or processed in some form

Amendments and Additional Information

Amendments to the Method Statement:
Should any part of this Method Statement and its supporting documentation require amendment or alteration, this must be notified for agreement to all relevant parties prior to it being enforced. This Method Statement will be reviewed and amended as and when necessary by **William-John Cunningham (Project Manager)**
Communications of Method Statement:
This Method Statement shall be communicated to all relevant parties (via toolbox talk) and signed by all personnel below to confirm that the briefing has taken place.

Method Statement Declaration Record

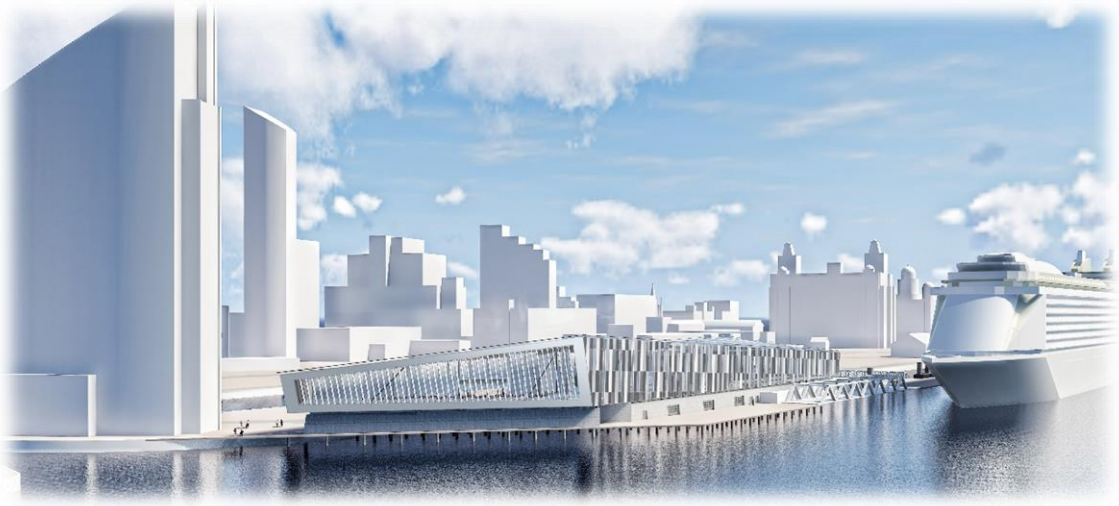
I, the undersigned, confirm that I have read and understood this Method Statement and its supporting documentation contained therein, and agree to work in accordance with their provisions.

I will notify **William-John Cunningham (Project Manager)** of any non-compliant/unsafe work practices or defective plant and equipment.

Name (PRINT):	Company:	Signature:	Date:

McLaughlin & Harvey

Method Statement MS005 – Construction of new jetty structure and terminal building



Liverpool Cruise Terminal

Method Statement

Project Title:	Liverpool Cruise Terminal	**Project Number:**	5143
Method Statement No.:	LCT/MS/005	**Revision:**	Planning RAMS – 29 Oct 2018
Project/Site Manager:	William John Cunningham	**Contact Details:**	07876647523
Written by (PRINT):	William John Cunningham	**Role on Project:**	Project Manager
Approved by (PRINT):	Martin McKeown	**Role on Project:**	Contract Manager
Title of Task:	Construction of new jetty structure and terminal building		

Introduction

This Method Statement describes the specific safe working methods which will be used to carry out the task required.

It gives details of how the work will be carried out and what Safety, Health, Environmental and Quality issues and controls are required.

The content of this Method Statement reflects the findings of the relevant Risk Assessment(s).

Programme:

Planned programme of works is as detailed below – note, this is subject to change based on HRO receipt.

- Suspended Deck: April 2019 to June 2020
- Terminal Building Structural Steel: March 2020 to August 2020
- Terminal Building Roof & Cladding: June 2020 to January 2021

Description of Work

Purpose of the Work (Description of the Contract):

The construction of the new Liverpool Cruise Terminal. To include, the piling works, installation of precast beams and slabs, casting of the insitu concrete deck and subsequent construction of the new steel frame structure with associated activities.

Details of Type and Scope of Work Being Carried Out (Include Working Hours):

The works will commence with piling operations using a rotary bored piling rig to the landside of the existing seawall. Works will then be focussed on the marine structure. The piles will be installed using jack up barges with rotary piling rigs and associated cranes. Deliveries of piles will be from sea. When several bents of piles have been installed the installation of precast concrete will commence. This will be installed working from a second jackup barge at a separate work front to the piling works. Precast will be installed to GL M and Bent 3, and the insitu concrete works will then commence. Once a section of the insitu deck is completed then a 130t crane and 42m concrete pump will use this as a platform to continue with rebar placement and insitu concrete works to form the deck. This process will be followed until enough of the new structure has been completed to allow the building works to commence. At this point there will be an overlap between the civils works and the building works.

The building works will commence using a 100t mobile crane to stand the steel frame. This will be followed by the precast cladding panels at ground levels then the roof and remaining cladding works. Works will also be progressing at this point with numerous M&E operations within the building with many trades involved.

The works will proceed during the hours 0700hrs – 1900hrs, 7 days per week with some tidal works occurring outside these hours. It is anticipated that low noise works will be required outside these hours in preparation for piling works, precast and insitu works the following day. Refer to 'Summary of Plant' and 'Plant Sequencing' documents for further details. Such activities may include: -

- Moving of barge to required location and jack-up
- Setup of temporary pile gates
- Placement of reinforcement cages
- Moving of service barges for disposal of arisings and material supply

Sequence of the Works/Work Method:

This method Statement outlines the general procedures which will be undertaken, however before the works commence the detail Method Statement will be produced with input from the relevant subcontractor and these will be approved by the Liverpool City Council team and Peel Ports. The detailed method statement will rely on the outcome of further Ground Investigation surveys and the conclusion of the Ramboll design which will then inform the exact methodology.

Prior to the works commencing a meeting will be arranged with the Harbour Master to advise Peel Ports of the extent of the works and in association with this Method Statement will then be able to disseminate the information to the relevant stakeholders on the Mersey and the wider Maritime Community via a Notice to Mariners.

It is not expected that the works themselves will have an impact on the current navigation on the Mersey. With the works progressing using the top down methodology then the impact on Mersey traffic will be minimised. However, should there be a requirement for any small vessels to access the works then this will be agreed in advance and Mersey VTS will be contacted for all movements on VHF Channel 12.

It has been considered to divert a section of Princes Parade during the works. This would allow better access to the landside of the River Wall. Although this would be very beneficial, but it is hugely dependant on other works. The proposed route is illustrated in red in *image 1*, below. There are plans for a hotel development for Plot 11, which is the location where we have proposed to divert the road. The Hotel construction is to be undertaken by Wates. We have already been in contact with Wates and we will continue to develop this relationship during construction and liaise with each other on a regular basis.

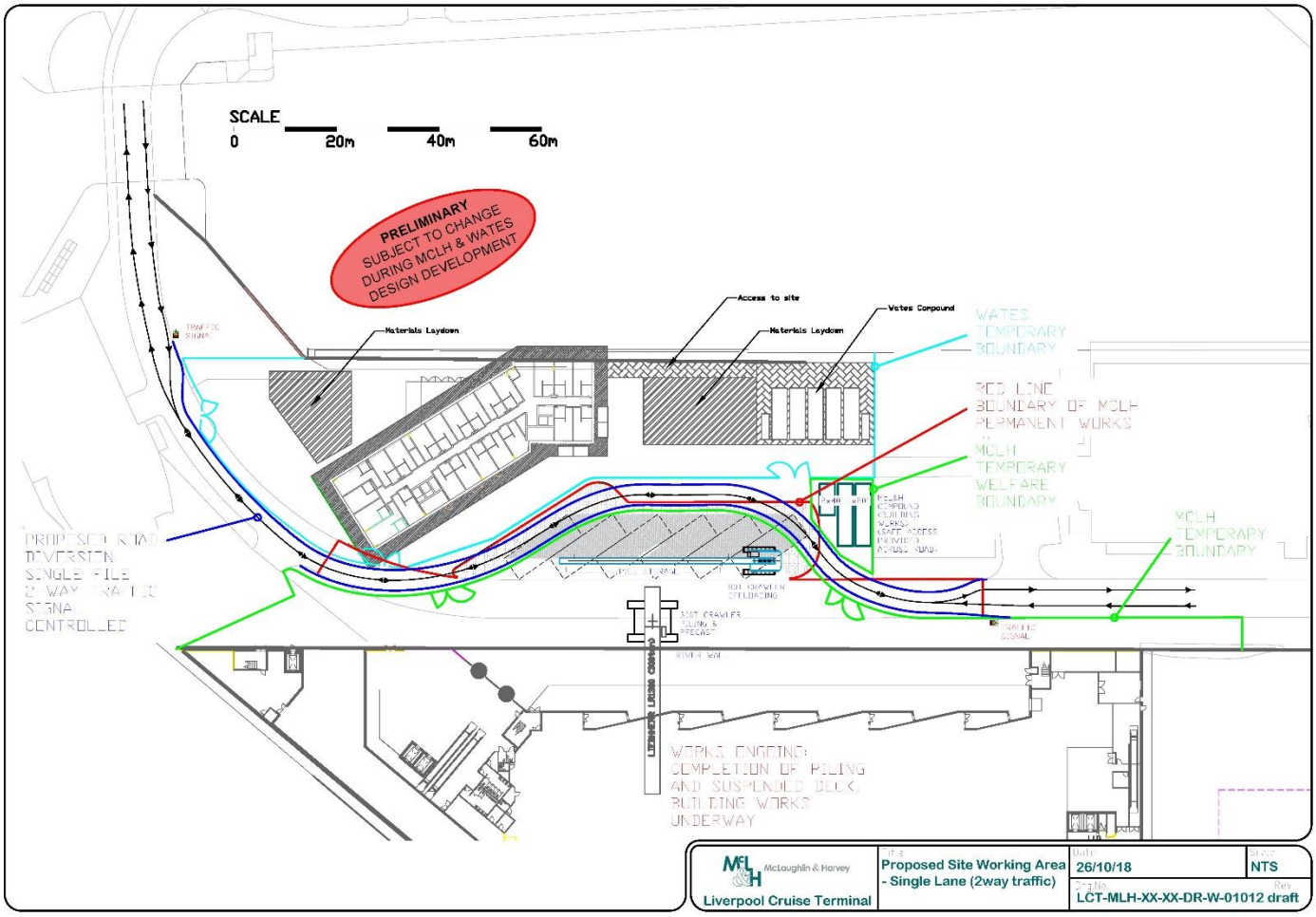


Image 1 – Proposed diversion route for Princes Parade

With other works progressing nearby under the Liverpool Waters Project then it is important that regular coordination meetings are undertaken and this will be hosted by Peel Land and Property, who are also the landlords for the majority of the businesses along Princes parade so good coordination is key to preventing potential impacts on each other's operations.

Visualisations have been prepared to demonstrate the key stages of works, however, given the level of design development they remain indicative only.
The outline methodology assumed sufficient landside space will be available at commencement and is discussed below:

Suspended Deck:

- Prior to commencement on site the design of the piles and pre-cast beams the methodology will be finalised, along with our temporary works design and fabrication of the piling gates to facilitate pile installation, with the permanent works design accommodating the proposed sequence.

- Site establishment and mobilisation of plant to site. As discussed previously it is likely that in order to facilitate commencement on site as early as possible that an advance partial purchase of piles, pre-cast beams and temporary works will be required to avoid excessive lead in times delaying commencement.

- It is anticipated that in order to achieve the required production rates piles will be installed on up to 2 fronts simultaneously.

- Plant will include 2nr. 200t and 130t crawler cranes, Rotary bored piling rigs and attendant tracked excavators (TBC). Site clearance will be carried out including taking down and removing to store existing historic lighting columns, railings and signs along Princess Parade.

- Works will commence with the installation of the landward piles to the rear of the river wall. This will be conducted using a Casagrande B300 rotary bored piling rig (or similar) and an attending crawler crane. the rig will first install the casing, followed by the pile rebar and then the concrete. The rig will work sequentially starting at the southern end of the site working towards the north as shown in *image 2*.

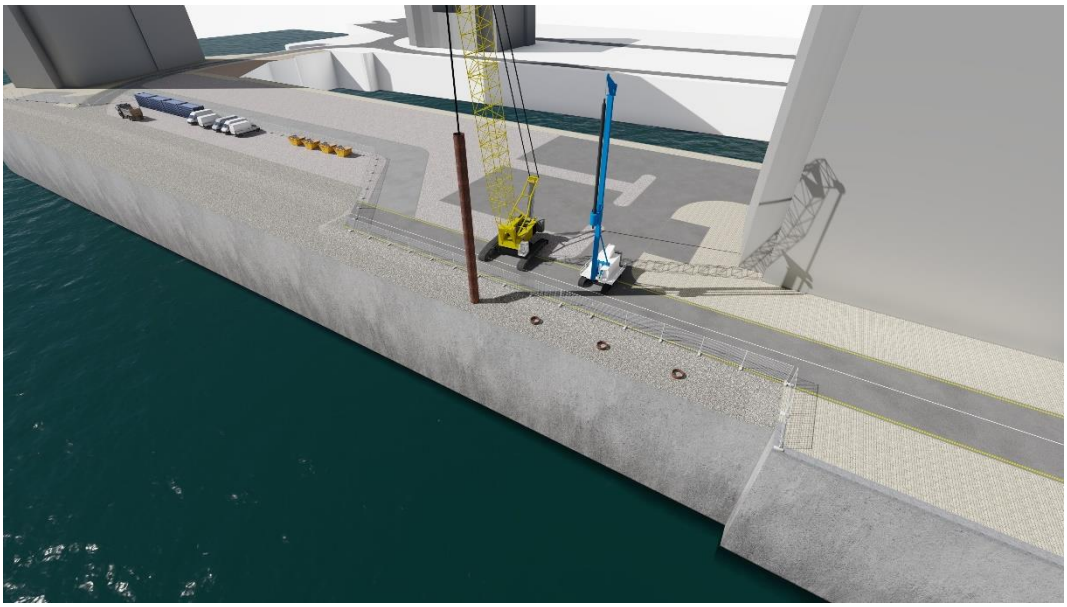


Image 2 – Installation of the landside piles

- Once the Landward piles have progressed far enough ahead the marine piling can commence. These works will be carried out using marine plant consisting of a jackup barge with 180t crawler crane and Casagrande B300 rotary bored piling rig (or similar). The works will commence at the southern end of the site and work towards the northern end.

- Prior to jack up legs being deployed a UXO survey will be completed.

- The jack up rig will setup so that the working side is parallel to the river wall, the gate will be setup for 3no. piles. The piles will then be delivered to the jackup by a service barge and lifted by the crane, they will then be pitched through the gate by the crane. The piles will have been prefabricated with cutting teeth on the bottom edge and a “crown” on the pile head. The Piling rig will lock onto the top of the pile and using the crown, screw it into the seabed and penetrate the rock head.

- Marine piling methodology will adopt a drilling / casing technique that will minimise impact on protected species, Starlet Anemone. The piling process will utilise a soft-start that will occur in three main stages. Firstly, the permanent casing with cutting teeth is incrementally lowered from deck level until it lightly touches the seabed. The permanent casing will then be started at an extremely low rotation velocity in order to dislodge and disperse any Starlet Anemone located a short distance away from the vicinity of the drilling location. The

speed of the permanent casing rotation will then be incrementally increased until reaching the required toe level as per the design. Following the installation of the permanent casing the piling rig shall deploy a digging bucket down the inside of the permanent casing, and drill a predetermined socket in the rock as per the design.

- Once the 3 No. piles in the setup have been installed the piling rig will then drill the sockets. The material arising from this will be placed into a skip. Then the crane will lift the skip onto the service barge to be taken away for disposal. Once the sockets have been drilled then the pile cages for the 3 No. piles will be installed. This will be followed by placement of concrete.

- Concrete will be pumped using a truck mounted pump from the land so far as possible. On the outer piles it may be required to pump the concrete to a service barge and use pumps in series to transfer the concrete to the pile. Concrete will be tremmied from the bottom of the pile to the top. This will mean that there will be water above the head of concrete when it reaches the top of the pile. The water and grout mixture will be caught in a trough around the perimeter of the pile and disposed off in a dedicated concrete skip to prevent run-off into the River Mersey.

- The piles will require support until the concrete cures so temporary bracing will be installed between them. This will allow the jackup and plant to move on to the next setup.

- The piling will progress in grids of 3 No. piles working away from the riverwall before moving to the next setup. On the perimeter piles bracing will be installed, this will also be done from the marine plant. The piling method is shown indicatively in *Image 3*.

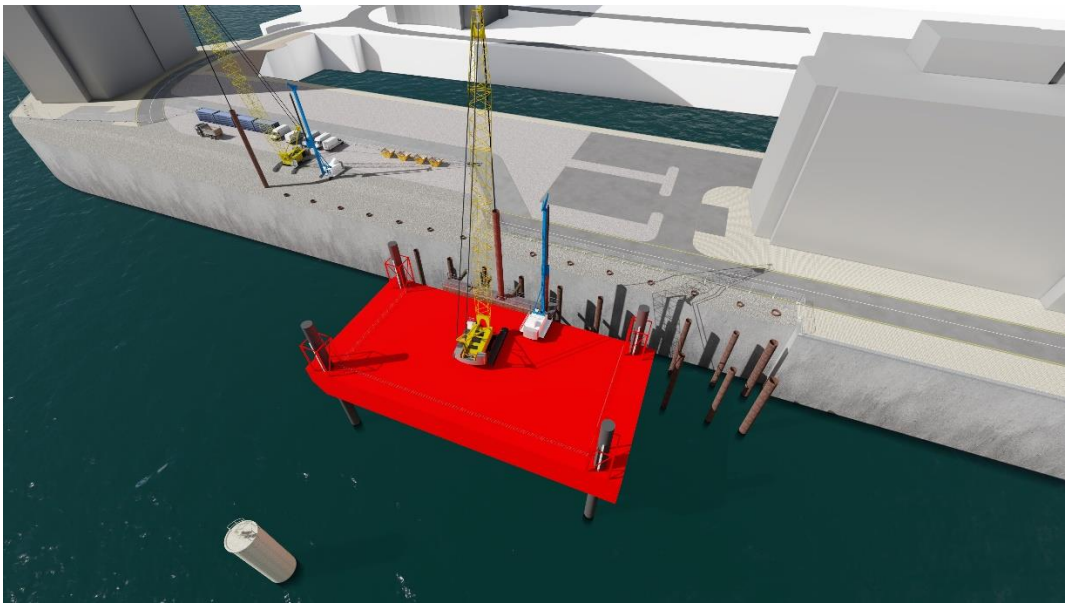


Image 3 – Piling using marine plant

- Precast concrete members will be installed using a 200t crawler crane operating off a jackup barge on a separate work front to the ongoing marine piling works. The precast units will be delivered to site in accordance with the site delivery plan and will most likely be delivered from a satellite storage compound via a service barge, with exact details to be confirmed. The precast throughs running perpendicular to the river wall will be installed first, these will then be overlain by prestressed precast concrete planks spanning between the troughs.

- The precast units will be installed initially from GL X-M along Bent 0-1, eventually progressing outwards from the quay until the first 3 bents have been completed. Once the precast units have been installed at GL X-M along Bents 0-3, and installation of precast units have commenced from Bent 3-4 onwards, the insitu concrete works will commence. This will consist of steel fixers working on the deck with rebar fed to them by a 130t crawler crane on the land followed by joiners and then concrete placing operatives. The Insitu deck will be progressed at Bents 0 to 3 along grid lines X to M in the first instance, while the precast unit installation continues to be progressed along Bents 4 to 7 at GL X-M.

- With the concrete deck cast to GL M on Bents 0 to 3, it will be given sufficient time to cure before the 130t crawler crane and concrete pump are mobilised onto the new structure to progress with insitu concrete works. The insitu concrete works will be carried out from the new deck structure while piling works and precast installations proceed from marine based plant, via 2 jackup barges. The construction is shown indicatively in *Image 4*.

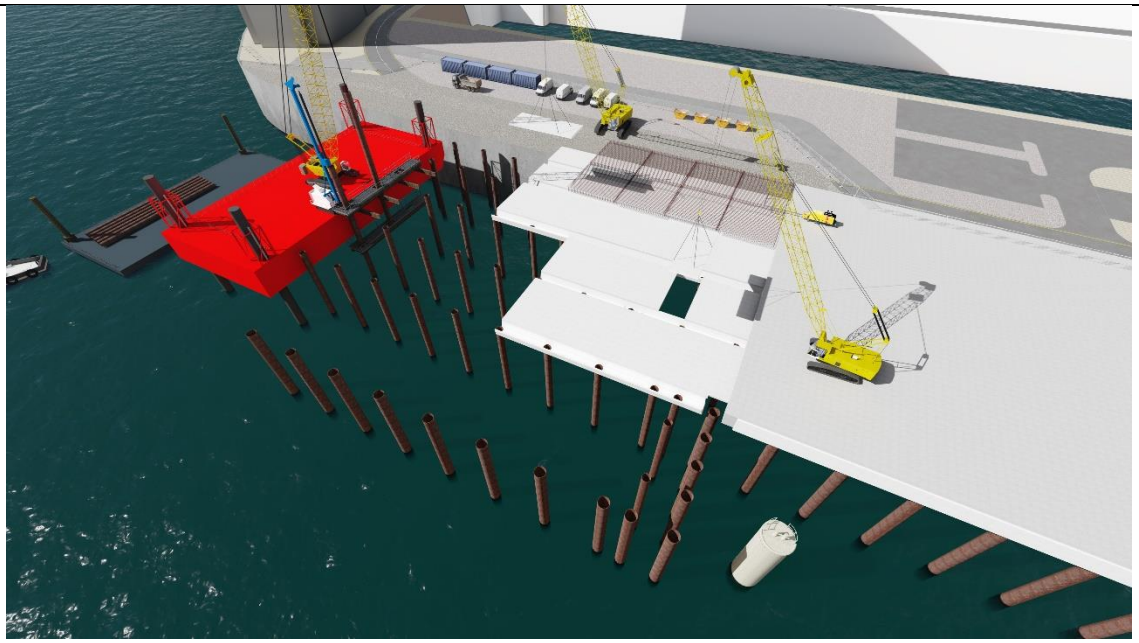


Image 4 – Status of the project with piling and deck construction

- Construction of the new deck will continue in this manner until, complete with the leading activities such as the piling completing and demobilising and the precast concrete installation continuing working towards the northern end of the site as shown in *Image 5* below.

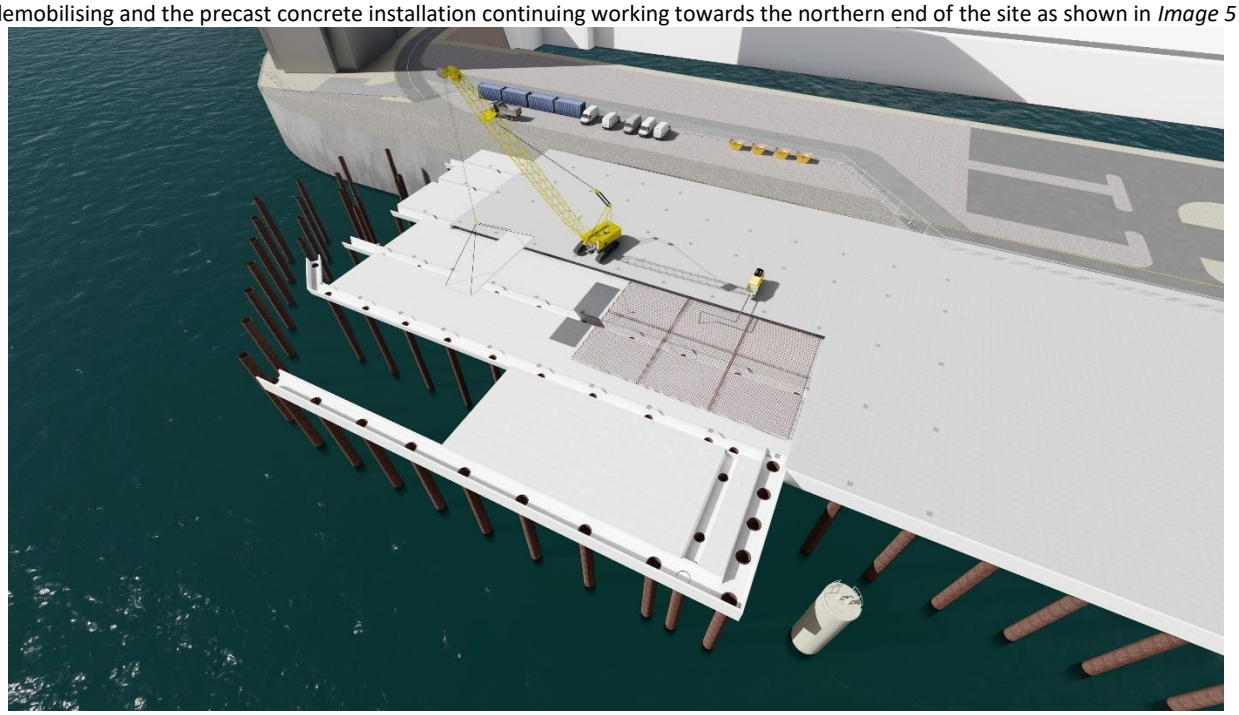


Image 5 – Piling Complete and precast and insitu works reaching the northern end of the site

- These works will proceed but at this point works will have progressed far enough to allow the construction of the building to commence. The southern end of the deck will have been completed as shown in *image* 6 and the works will proceed as outlined in the following section of the method Statement.

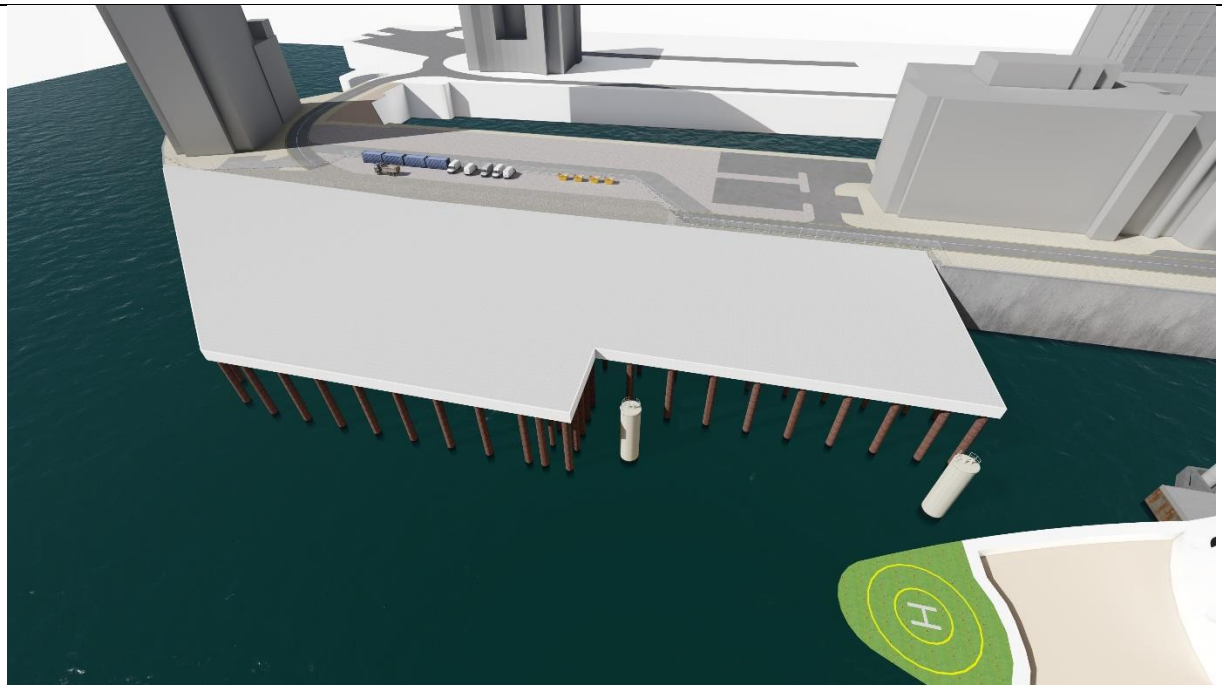


Image 6 – Southern end of the deck completed to allow works on the building to commence (note the deck will never look as open as this as the building frame will have commenced at this stage.

Terminal Building Steel Erection:

(Building Frame Construction – This will be completed by a specialist Subcontractor with outline Method Statement similar to that below)

Site Logistics

- Each working front (erection gang) will have a designated offloading location and load out plan and no deliveries will be received outside of this location. The load out plan for each floor determines locations for steel, decking bundles and bolt boxes to be placed. The off-loading team will place the packs in the most efficient manner; reducing crane slewing operations and hook time.

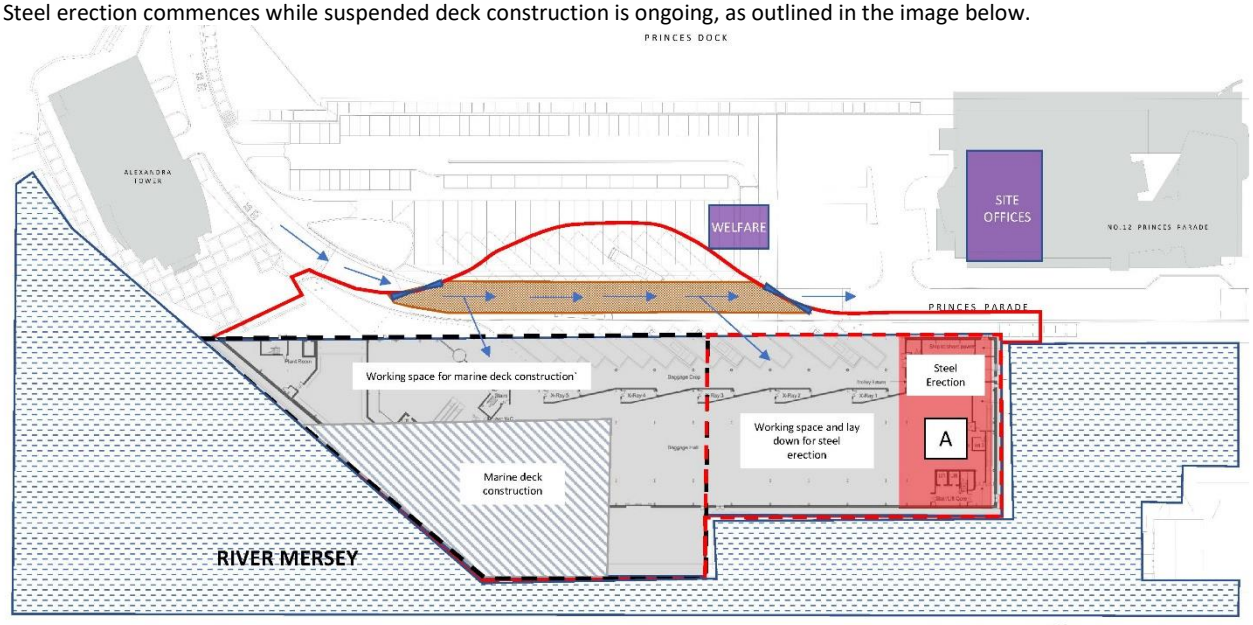
Erection

- Steelwork elements will be erected using standard designed lifting brackets bolted to holes drilled in the steelwork at the centre of gravity position. Columns will be erected using designed lifting brackets at the top of the column.
- The erection foreman works 1 piece ahead of the erection squad and is responsible for identifying and slinging the next piece to be erected.
- 100% tool tethering policy will be implemented. All materials are also securely tethered until secured in position at their final location.

- The corrosion protection system will be repaired once units are plumbed, lined and levelled.

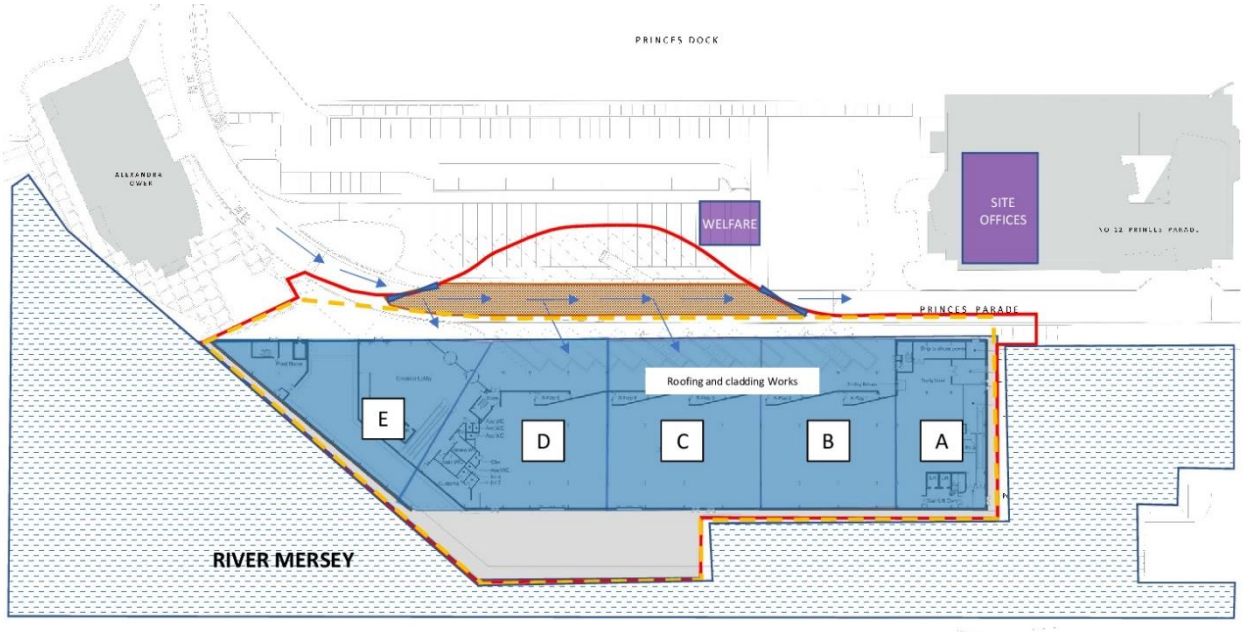
Construction Sequencing

- Steel erection commences while suspended deck construction is ongoing, as outlined in the image below.

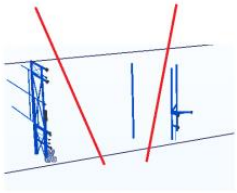


- The following table and diagram outline the phasing areas and piece count for the erection of the terminal building frame.

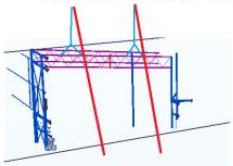
Area	Steel	Trusses	C.Rolled Sides	C.Rolled Roof
A	295	19	82	78
B	202	16	81	120
C	213	16	82	126
D	258	17	86	126
E	376	15	82	140
F	441			
	1785	**83**	**413**	**590**



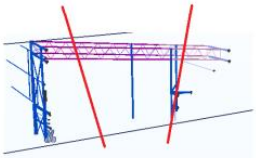
- Outline build sequence:



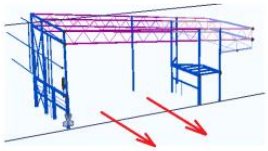
1. 2No. Cranes erect side steel



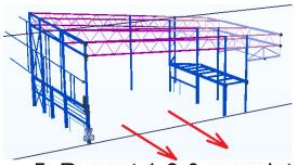
2. 2No. Cranes erect half trusses



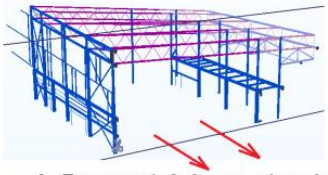
3. 1 No. Crane erect Infill steel
   1 No. Crane erect cantilever truss



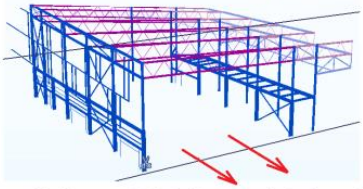
4. Repeat 1-3 & complete bay by bay



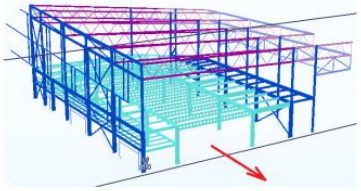
5. Repeat 1-3 & complete bay by bay



6. Repeat 1-3 & complete bay by bay



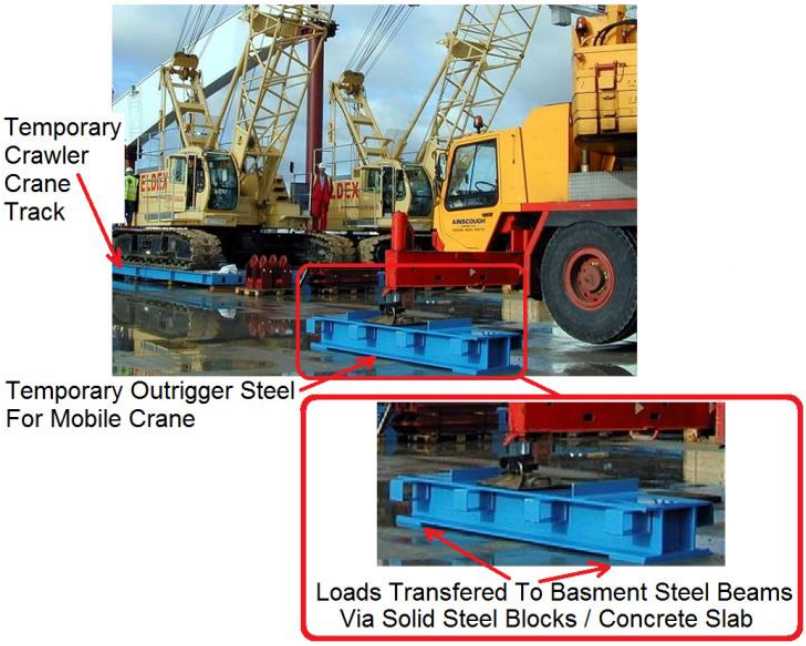
7. Repeat 1-3 & complete bay by bay



8. 1 No. Crane follows on erecting floor steel

- Example of half truss assembly and flying splice connections:

- Temporary Crane Grillage for Mobile Crane:



Access and Scaffold

- Mechanical access aids such as, static/mobile elevated working platforms, man riding baskets, suspended cradles and zip-up scaffolds will be utilised on site.
- Temporary power will be provided and maintained to the erection front at all times.
- Designated pedestrian walkways will be provided at ground level, linked to vertical access to each of the floors, enabling access to the work front. Vertical access will be provided by means of haki stairs or hoists.

Edge Protection

- Each working area will have pre-engineered edge protection except the 'leading' edge of the decking operation.

Openings

- Openings are to be protected by purpose made temporary covers of temporary edge protection. It is proposed that any small planned openings are covered with permanent steel decking with the opening formed by edge formers. The concrete would be cast around the opening, formed by the edge former, and the decking in the opening cut away once required by a subsequent trade at a later date.

Steel decking and stud welding

- The delivery installation of the steel decking forms an integral part of the construction sequence. Deliveries and hoisting will be co-ordinated with the steelwork erection.
- The decking will be progressed in tiers of two floors at a time. There is no requirement to leave any section of steel framing in order to place bundles of decking as the bundles can be adequately fed through from the lower floor to the upper floor.
- All shear studs to be fixed by through-deck stud welding after the metal decking has been laid.

Terminal Building Roof & Cladding Works

Cladding will be phased with the roof construction, again this will be done by a specialist subcontractor. The Cladding works will have a longer programme than the steel erection so will be continuous when commenced compared to the phased approach to the steel frame erection.

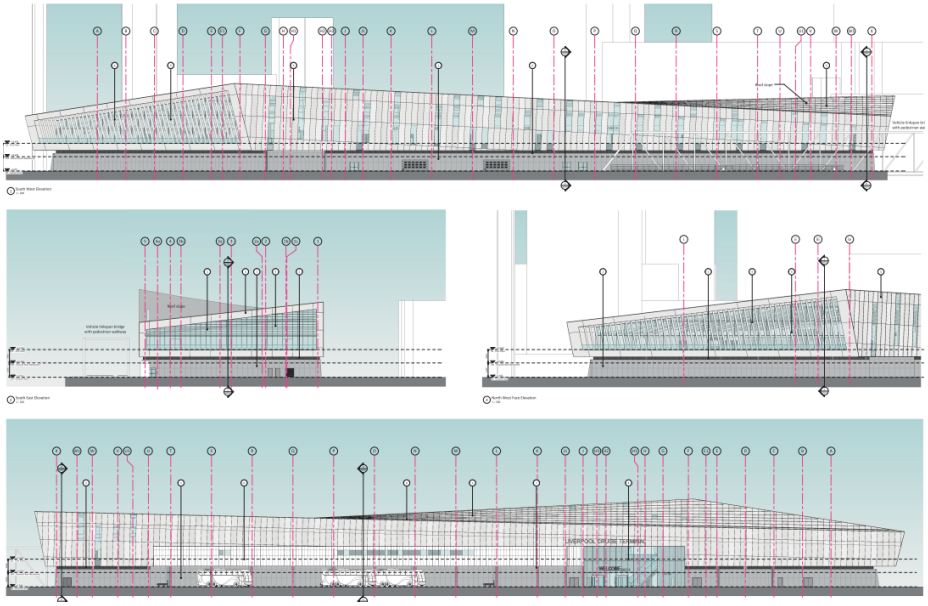
Note: the method statement below has been prepared for a VM Zinc roof, the roof design is still under development through RIBA Stage 4 so this may change in time but the approach will be similar to that outlined below;

Scope and Objective of Work

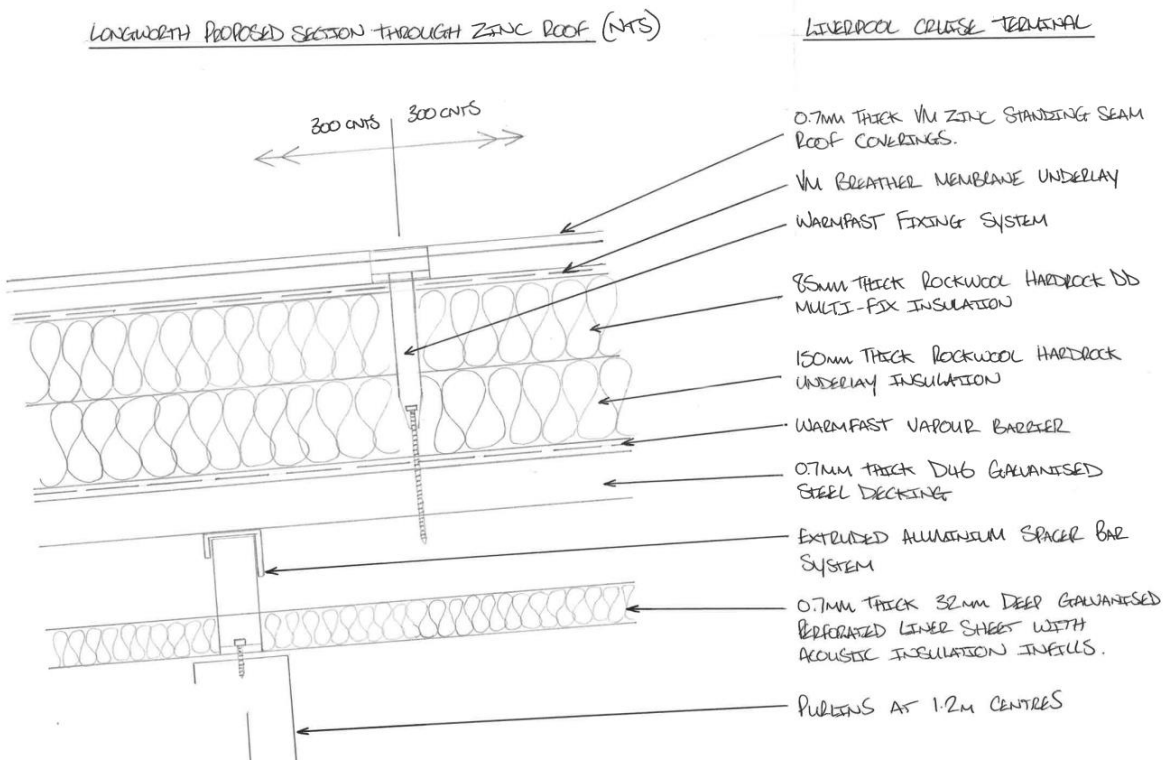
- Installation of Zinc Standing Seam Roofing on to substrate consisting of 235mm thick Rockwool Hardrock insulation with underlying fully sealed Warmfast Vapour Control Layer, laid on to a D46 profiled Galvanised Steel decking sheet, fixed to Aluminium Spacer Bar system, fixed to 32mm thick Galvanised Steel perforated liner sheet, fixed into steel purlins. This work will be carried out to a high standard of quality, on programme and to a high standard of safe working practices

Methodology

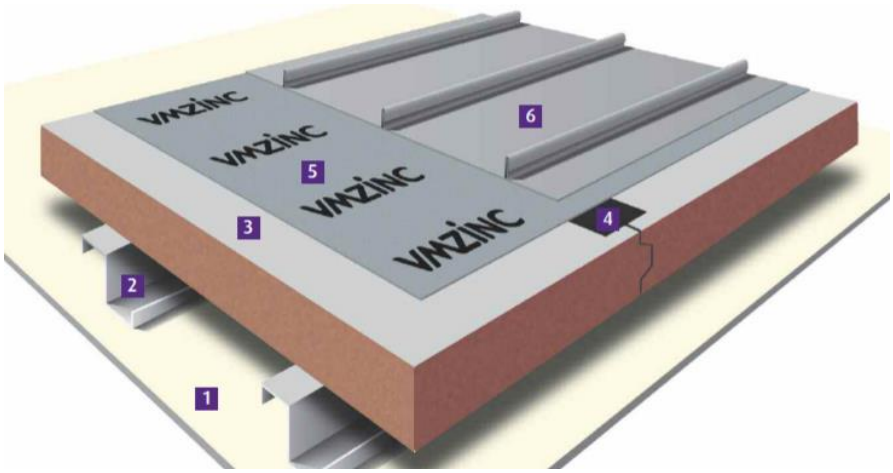
- The installation of safety nets will be covered under a separate set of RAMS prepared by the subcontractor.
- Access to the various roof areas will initially be from an external scaffold. The upper level of scaffold will be positioned just below the eaves position of each roof area. This scaffold is to be set at 2m nominal lifts and will be set at a distance away from the building structure so as not to impede the installation of the wall cladding.
- Scaffolding alterations and checking to be carried out by competent and suitably trained/qualified operatives only.
- Any areas that are to be accessed via MEWP's i.e. Gable end cladding will be carried out by operatives with the relevant training to use the access equipment. Proof of training to be keep in site SHEQ file.



- All substrate materials required at the various roof areas will be palletised or stacked so that they can be loaded either on directly on to the relevant roof area or on to a loading bay situated on the upper level of scaffold. A mobile crane or Telescopic Fork Lift will be used to place the roofing materials at the work face. Materials will then be manually handled to the relevant work area.
- Once the 0.7mm thick x 32mm deep Galvanised Steel perforated liner sheets have been fully fixed to the underlying steel purlins, the Acoustic Insulation infills will be installed. The extruded Aluminium Spacer Bar system will be installed at the recommended centres. A D46 Galvanised Steel decking sheet is then fully fixed to the spacer bar system. Once the deck is fully fixed a sealed Warmfast Vapour Control Layer will be adhered to the upper face of the steel deck. Then 2no layers of Rockwool Hardrock insulation will be installed on to the vapour control layer. This will consist of a 150mm thick layer, followed by an 85mm thick layer of Rockwool Hardrock DD Multi – Fix insulation. This insulation will be laid in a brick bond method and each board will be tightly butt jointed to the next.
- A layer of VM Underlay will be laid directly on to the Rockwool insulation with each run of underlay fully lapped and sealed with the appropriate VM Underlay tape.
- The VM Zinc roof sheets will be manufactured at roof level. The Zinc coil will be placed on a de-coiler and fed into the standing seam profile machine.
- The VM Zinc roof sheets are then laid on to the Warmfast insulation and held in place with stainless steel fixed and expansion clips set at a nominal 300mm centres. These clips are held fixed to the Warmfast insulation itself with drilling stainless steel fixings. All Zinc details will be installed as per VM Zinc's standard methods and as seen on Longworth detail drawings.
- Proposed roof construction:



- Proposed wall construction:



  - While the VM zinc is in coil form it must be kept in a safe and dry storage container. A dedicated 20ft storage container is to be sited as close to the work area as possible.
  - Process Inspection forms will be completed by the McLH Site Management team as the works progress and sections of installation can be signed off at specific hold points prior to substrate works being covered.

The sequence of deliveries will be: -

1) Safety nets, edge protection and access
2) 0.7mm x 32mm deep Galvanised Steel perforated liner sheet
3) Acoustic Insulation Infills
4) Extruded Aluminium Spacer Bar system
5) 0.7mm x D46 Galvanised Steel decking sheets
6) Warmfast Vapour Control Barrier
7) 150mm thick & 85mm thick Rockwool Hardrock Insulation
8) VM Breather Membrane Underlay
9) 0.7mm thick VM Zinc coils
10) Zinc standing seam sundry items

How the Work will be Carried Out:

Pre-Start Check:	Prior to works commencing the following checks will take place • Consents to be in place as identified in the *"Permits"* section • All personnel inducted and to have the Skills, Knowledge, Experience and training required for their role • All monitoring of the River wall to be setup and in place before works commence • Peel and Liverpool County Council to have accepted the methodology • All stakeholders to be informed that the works are to commence
Plant & Equipment Details:	All plant and equipment used on site shall be tested at regular intervals (as identified in current legislation relevant to the equipment) and labelled or stamped accordingly. Any associated documentary evidence or certification shall be retained on file. Only operatives trained in the use of items of plant and equipment will be authorised to use them and as such will report any defects to their supervisor. Any fuel tanks (bowsers) whilst on site will be locked at all times; also a double bunded system will be adopted to ensure protection against potential leaks and spills, a spill kit will be available. Where required, Sub-Contractor Supervisors and McLH Supervisors will complete and sign weekly plant list charting the condition of all plant and equipment used on this project. All daily and weekly plant inspection sheets will be stored on file by McLH. Details of plant and equipment required at each work front is outlined below, refer to the 'Summary of Plant' document for further information. **Suspended Deck:** Land Based Piling: • Rotary piling rig – Liebherr LB28 or Bauer BG40 • Crawler crane with lifting tackle – Kobelco CKE800G or Liebherr LR 1160 • 20t excavator • 50kVA generator • 2nr mobile tower lights • 2nr welding plants • 2nr power washers • MEWPs Marine Piling: • Jackup barge - approx. 60m long x 20m beam, 400-600t • 1000hp standby Tug for jackup barge • Rotary piling rig – Liebherr LB28 or Bauer BG40 • Crawler crane with lifting tackle – Kobelco CKE800G or Liebherr LR 1160 • Service Barge (approx. 30m x 20m) • 1000hp Tug to accompany service barge • 60-100kVA generator • 2nr mobile tower lights • Welfare & Accommodation – Canteen, Drying Room, Office, Toilet Block • 2nr welding plants • 2nr power washers • MEWPs Precast Installation & Insitu Concrete Deck: • 200t crawler crane – LR1200 • 130t crawler crane – LR1130 • Jackup barge - approx. 60m long x 20m beam, 400-600t • 1000hp standby Tug for jackup barge • Crawler crane with lifting tackle – Kobelco CKE800G or Liebherr LR 1160 • Service Barge (approx. 30m x 20m) • 1000hp Tug to accompany service barge • 60-100kVA generator

	• 2nr mobile tower lights • Welfare & Accommodation – Canteen, Drying Room, Office, Toilet Block • 2nr welding plants • 2nr power washers • 2nr MEWPs **Terminal Building Steel Erection:** • 100t Mobile crane • Telescopic forklift truck – telehandler • Various MEWPs • Various hand tools, 110v portable electrical equipment, extension leads, battery operated drills, tech guns • Tool chests and 2nr. 20ft storage containers **Terminal Building Roof & Cladding Works:** • 100t Mobile crane • Telescopic forklift truck – telehandler • Standing seam profile machine • Various MEWPs • Various hand tools, 110v portable electrical equipment, extension leads, battery operated drills, tech guns • Tool chests and 2nr. 20ft storage containers
Materials, Including Weights:	Material Weights to be confirmed following the completion of the RIBA Stage 4 Design.
Deliveries and Site Access:	Delivery schedules will be coordinated and communicated by the Site Management Team. All significant deliveries to site must be pre-arranged with 24 hours' notice given to McLH Site Staff by the relevant contractor/supplier. The site specific Traffic Management Plan must be strictly adhered to. Upon arrival to the site satellite compound all delivery drivers must report to the McLH Site Supervisor. They will then be directed to the relevant work area. There are clear signs along the delivery route to indicate where deliveries are to be made. These routes MUST be strictly adhered to. All access to the site will be via the Mersey for the marine piling works such as supply of piles and the transport of pile arisings off site. Deliveries of concrete, precast concrete units, structural steel and all other materials will be by road, this will be via Princes Parade. It has been proposed to divert Princes Parade to the rear of the works to create a working space and lay down area. This will need to be agreed with the relevant stakeholders, including Peel Ports, Peel Land and Property and Liverpool City Council in association with Wates Construction who will be working to the landside constructing the new hotel for Liverpool City Council, immediately adjacent the site. Through the liaison noted above a full and comprehensive site delivery protocol will be developed and agreed. Where possible deliveries will be planned to avoid peak times and unnecessary nuisance. This may mean that a satellite storage site may be required and deliveries then taken to site from there. All deliveries personnel will wear the site specific PPE at all times when on site.
Duration of Work:	Planned programme of works is as detailed below – note, this is subject to change based on HRO receipt. • Suspended Deck: April 2019 to June 2020 • Terminal Building Structural Steel: March 2020 to August 2020 • Terminal Building Roof & Cladding: June 2020 to January 2021
Resources:	
Personnel and Copies of Certificates:	Will be provided prior to the works commencing
Training and Competence:	Will be provided prior to the works commencing
Other Site Operations/Third Parties:	Will be provided prior to the works commencing

Location of Work

Site Address and Precise Location on Site Where Work is to be Carried Out:

The works will occur on the river Mersey in front of Princes Parade. The land address is;

Princes Parade
Liverpool
L3 1BF

Image 7, below, shows the location of the works and the extent of the demolition. The Blue section represents the location of the new Jetty.

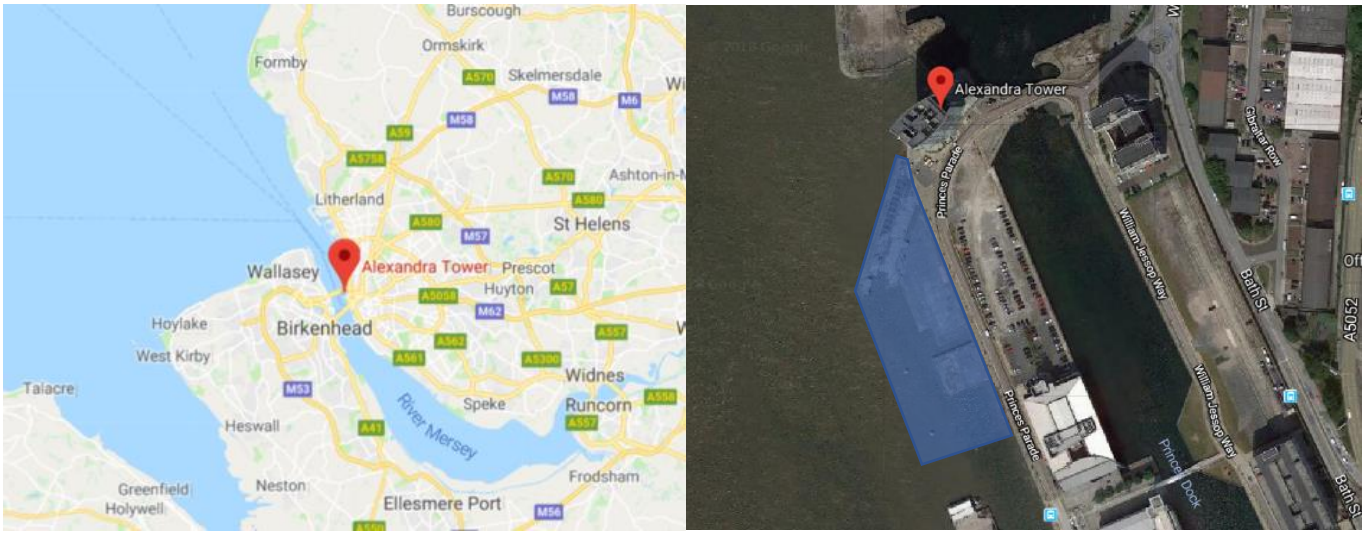


Image 7 – Location of the works

Site Specific Hazards:

Site Specific Hazards are briefed to the workforce as part of their daily briefings and inductions. Signage and control measures are put in place to highlight any known hazards on site when appropriate.

- Interface with the public
- Proximity to other works sites
- Proximity to residential property and businesses
- Interface with River traffic, cruise liners and the pilot operations
- Interface with the River Wall
- The presence of UXOs
- Tidal factors – current and rise and fall
- Noise and creating a nuisance
- Exposed site – wind and weather conditions
- Working at Height and over water
- Working adjacent to a live road

Access and Egress:

Access will be created via Princes Parade, ideally during the initial phase of Princes Parade will be closed or diverted behind the works, to reduce the interface with the public. Further to this there is a hotel development planned for Plot 11, where planned diversion route would intersect. It is envisaged that McL&H will be afforded a section of the Plot 11 site for welfare facilities and offices, as shown in the *image 10.* This will be for the site personnel only with management residing in an office let from Peel in building 12. Due to the limited space it is envisaged that a satellite compound will be required elsewhere with operatives bused from there to site. These details are to be negotiated and confirmed between now and the start of construction.

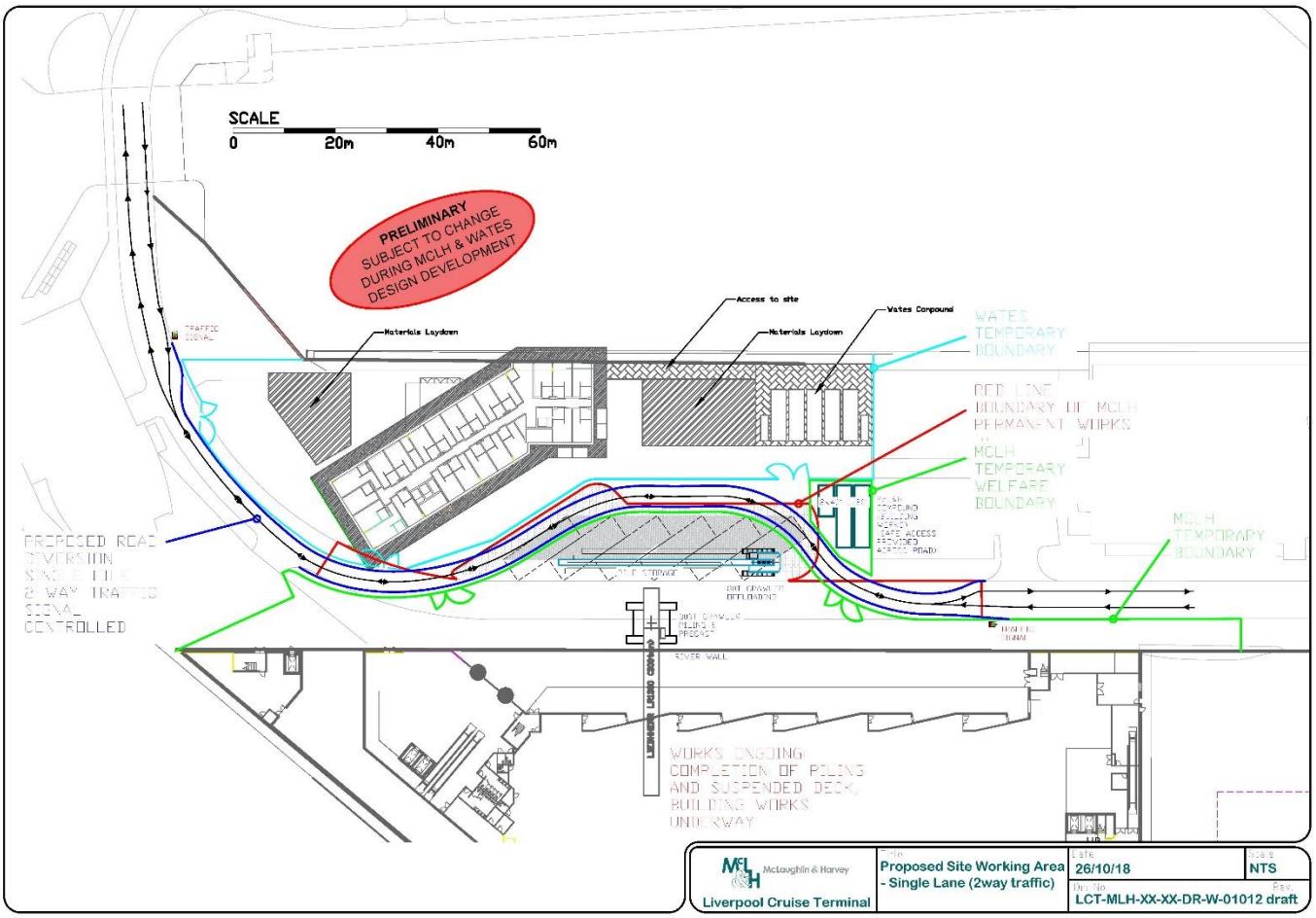


Image 10 – TMP and site setup

Proposed site compound, parking, offices, welfare and works area are outlined in the figures below.

Space is limited at the works area and proposed site office / welfare facilities; therefore, staff will park at the proposed site compound located approximately 0.5 miles north of the site (postcode L3 0BS). McLH will provide a minibus/shuttle bus to transport workers between the car park and the site.

Entry on to the site will be via site Biometric turnstiles provided at entrances to the works area, welfare and compound for security. This turnstile ensures that only individuals who have undergone induction can gain entry on to site. The turnstile will also act as a site attendance register in the event of an emergency.

Details of any other Locations in the Proximity of the Works which may affect the Safety of the Work or be affected by the Work and what measures will be used to control these risks e.g. Segregation, Warning Notices, Fencing:

- Full Segregation fencing will be erected along the rear of the works
- Signage will be erected to warn of the dangers
- The Landing Stage is the river side infrastructure which has the most potential to be impacted by the works. Regular liaison meetings will be conducted between McL&H, Liverpool Cruise, Peel Land and Property and Peel Ports to coordinate these activities.
- Traffic Management to Chapter 8 standard will be in place during any traffic diversions and will be approved by the relevant Authority.

Health, Safety, Quality & Environmental Management and Control Measures

Risk Assessments:	The Risk Assessments listed below have been carried out for each activity associated with this work and are appended to this Method Statement: • *A full list of RAs will be prepared once the detailed Method Statements have been finalised.* Operatives are required to read each Risk Assessment.
Site Rules:	Site Rules are briefed to the workforce as part of their daily briefings, inductions and are displayed on the site notice board.
Permits:	Permits required for this task, as identified in the relevant standard work instructions are listed below: • Access Permit – Peel Land and Property • Access Permit – Peel Ports • River Wall Permit – Peel Ports • Planning Permission – Liverpool City Council • Harbour Revision Order (HRO) – Parliament • Notice to Mariners – Harbour Master (Peel Ports) • Heritage Conditions – Heritage England • Listed Building Application – Liverpool City Council • Marine Licence – Marine Management Organisation (MMO) Other Stakeholders to be consulted; • Environment Agency • Duchy of Lancaster • Mersey Tunnels • MEAS • Liverpool Cruise • Isle of Man Steam Packet • World Heritage • Places Matter • CEFAS
Plant & Equipment (Including Scaffolding):	Plant and Equipment required for this work is listed below: Details of plant and equipment required at each work front is outlined below, refer to the 'Summary of Plant' document for further information.

Suspended Deck:

Land Based Piling:

- Rotary piling rig – Liebherr LB28 or Bauer BG40
- Crawler crane with lifting tackle – Kobelco CKE800G or Liebherr LR 1160
- 20t excavator
- 50kVA generator
- 2nr mobile tower lights
- 2nr welding plants
- 2nr power washers
- MEWPs

Marine Piling:

- Jackup barge - approx. 60m long x 20m beam, 400-600t
- 1000hp standby Tug for jackup barge
- Rotary piling rig – Liebherr LB28 or Bauer BG40
- Crawler crane with lifting tackle – Kobelco CKE800G or Liebherr LR 1160
- Service Barge (approx. 30m x 20m)
- 1000hp Tug to accompany service barge
- 60-100kVA generator
- 2nr mobile tower lights
- Welfare & Accommodation – Canteen, Drying Room, Office, Toilet Block
- 2nr welding plants
- 2nr power washers
- MEWPs

Precast Installation & Insitu Concrete Deck:

- 200t crawler crane – LR1200
- 130t crawler crane – LR1130
- Jackup barge - approx. 60m long x 20m beam, 400-600t
- 1000hp standby Tug for jackup barge
- Crawler crane with lifting tackle – Kobelco CKE800G or Liebherr LR 1160
- Service Barge (approx. 30m x 20m)
- 1000hp Tug to accompany service barge
- 60-100kVA generator
- 2nr mobile tower lights
- Welfare & Accommodation – Canteen, Drying Room, Office, Toilet Block
- 2nr welding plants
- 2nr power washers
- 2nr MEWPs

Terminal Building Steel Erection:

- 100t Mobile crane
- Telescopic forklift truck – telehandler
- Various MEWPs
- Various hand tools, 110v portable electrical equipment, extension leads, battery operated drills, tech guns
- Tool chests and 2nr. 20ft storage containers

Terminal Building Roof & Cladding Works:

- 100t Mobile crane
- Telescopic forklift truck – telehandler
- Standing seam profile machine
- Various MEWPs
- Various hand tools, 110v portable electrical equipment, extension leads, battery operated drills, tech guns
- Tool chests and 2nr. 20ft storage containers

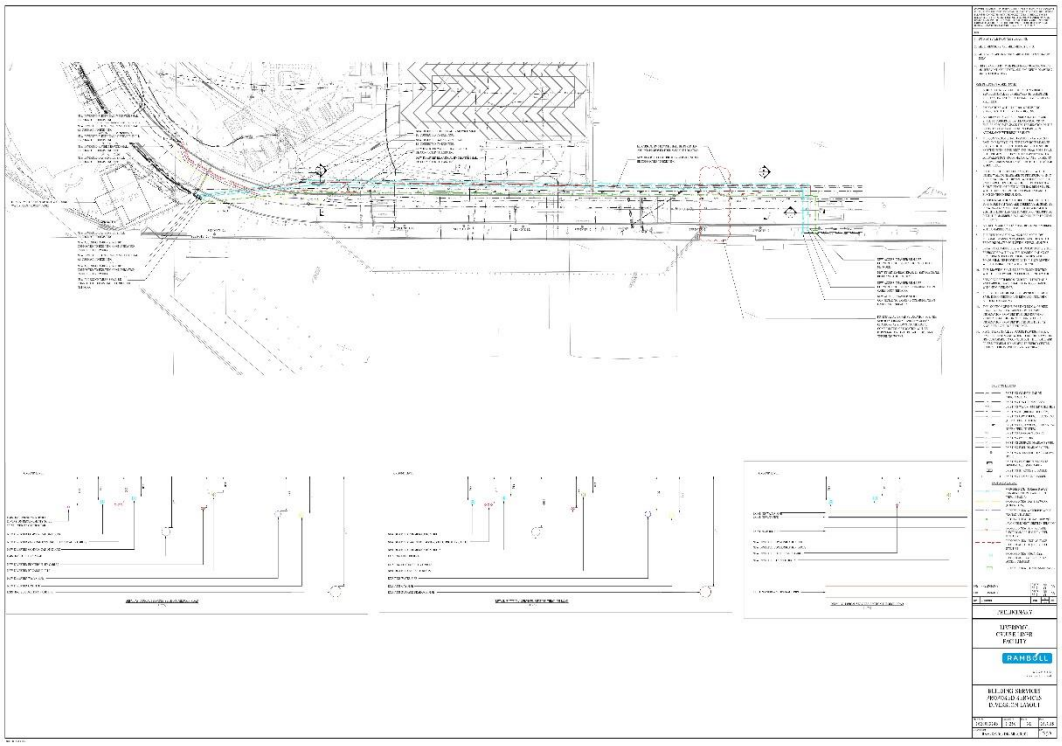
Plant and Operator Certification must be inspected by **William-John Cunningham (Project Manager)** prior to them being used. Non-Certified Plant must not be used. Operators who do not possess the appropriate skills and certification must not use that item of plant.

Inspections:	The following safety inspections must be carried out for this work task: • Inspection and Approval of Subcontractor RAMS • Daily Plant Checks • All certification of all plant and equipment - All power tools will be PAT tested and suitably tagged, electrically power tools will be visually inspected prior to use to ensure both the data test label is present and the equipment and cable is undamaged or worn prior to work commencing. • Training and competency checks on all operatives and supervisors
Supervision:	The person responsible for the onsite supervision of this work task is **William-John Cunningham (Project Manager)**, who will be the point of contact for any queries arising from carrying out the work task.
Hazardous Substances:	This work task necessitates the use of the undernoted hazardous substances: • Concrete (cementitious material) • Diesel • Petrol • Hydraulic Oil • Grease • Concrete Curing agent • Paint • Mould Oil A COSHH assessment will be completed for any substance considered hazardous to health and made available to operatives. Operatives will be taken through the control measures required. Any materials delivered to site must be accompanied by the safety data sheet.

Hold Points:	Hold points relating to this work task, as identified in the relevant work instructions, are listed below:
	
	• No works can commence until the following is in place;
	  • All Consents and permits approved
	  • Health and Safety Checks completed
	  • Plant and equipment must not be loaded onto or advanced forward to a new section of Temporary Works Deck until the setup has been signed off by the Temporary Works supervisor
	
	Work must not proceed beyond any hold point until authorised by **William-John Cunningham (Project Manager)** to do so.

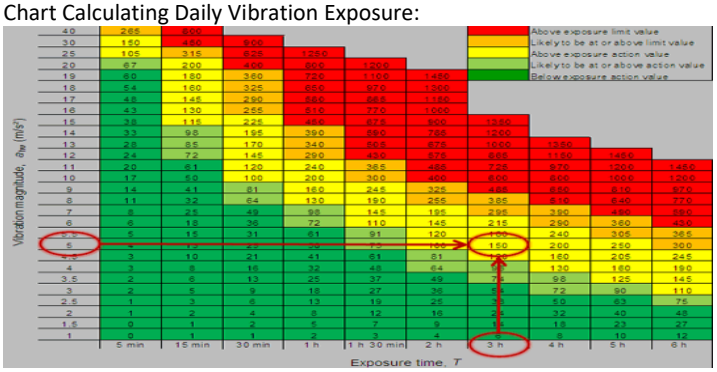
Personal Protective Equipment (PPE):	In addition to the minimum PPE requirements for the project, Operatives must wear the PPE identified in the relevant Risk/COSHH Assessment as listed below: • Hi Visibility Vest • Hard Hat – BS EN 397 • Gloves – Cut Factor 5, BS EN 388 • Safety Footwear – BS EN 347 • Safety Glasses – BS EN 166 Task specific PPE: • 150N Lifejacket – for Marine works only or working on the new deck structure • Harness – for terminal building construction when working at height • Hearing protection – task specific • RPE – Face fit testing to be conducted for staff operating tools causing dust – certification to be issued Operatives must use this equipment in accordance with any training and instruction provided.

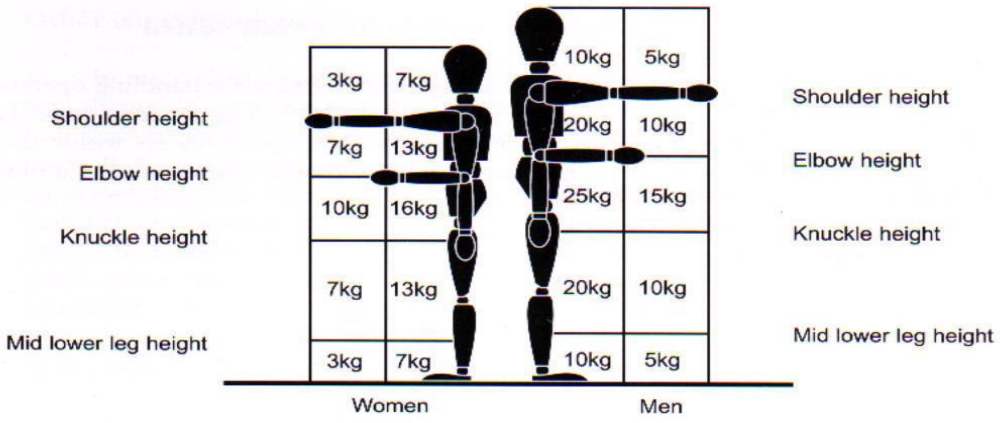
Third Parties:	Third Parties who may be exposed to risk as a consequence of this work task are identified in the relevant risk assessment and are listed below, together with the control measures required for each category: • Members of public – fence and warning signs to prevent access • Visitors to the café and tenants in Alexandra Tower – fence and warning signs to prevent access • Worker in properties along Princes Parade – fence and warning signs to prevent access • Wates – Working on the hotel site adjacent the works • Other Contractors working locally on the Liverpool Waters projects • Peel Ports • Peel Land & Property • Liverpool City Council (LCC) • ABP • Existing Cruise Liner Terminal Management at LCC
Services:	The undernoted services have been identified and are located in the vicinity of this work task. Control Measures are noted with each listed service: There are significant services within Princes Parade, as listed below; • LEEP • BT • HV and LV Electricity • Surface water • Virgin telecoms • Existing Watermains • Refer to existing services drawing reference RAM-XX-00-DR-ME-00001  All services will be diverted in advance of the works (refer to drawing reference RAM-XX-00-DR-ME-00002) with provision made for connection to the new buildings – Cruise Terminal and Hotel.

	
Welfare Facilities:	The following welfare facilities have been made available to the workforce: • Separate Canteen, drying room, toilets and office facilities will be made available on shore. Location TBC but likely to be with Plot 11.
Records and Certifications:	Records and Certifications required for this task, as identified in the relevant standard work instructions, are listed below: • Pile mill and fabrication certificates • Piling Records – driving and potentially drilling • Precast Concrete QA • Concrete QA records – pre- pour checks and cube results etc • Temporary works sign off
SHEQ Emergency Arrangements:	The measures to be taken in the event of an emergency have been prepared and are displayed on the site notice board. Refer to SHEQ Plan for further details of: • First Aid provision • Emergency Services • Man-in-Water procedure • Emergency Spill Response procedure
Specifications:	The specification relevant to this task is: • ***To be confirmed during the Design Phase***
Materials Management - Quality Control Inspections:	All goods and/or materials delivered to site for this work task will be inspected by **William-John Cunningham (Project Manager)** for compliance with the specification, damage and dimensional accuracy. Goods and materials found to be out with specification shall be returned on the delivery vehicle or alternatively clearly marked do not use and be placed in a designated area.

Materials Management - Handling and Storage:	Goods and materials to be incorporated into the permanent or temporary works shall be handled and stored in accordance with any specification requirements and the manufacturer's recommendations in a designated storage area. Materials specific to this work task are listed below: • Piles • Precast concrete • Bracing members (steel) • Reinforcement • Bolts • Ducting • Bollards • Structural Steel • Cladding • Flooring • Cabling • Internal finishes materials • M&E Plant • Paint With limited space in the site works area, logistics will operate a Just in Time delivery scheduling between the satellite compound location and the works area.

Nuisance Control Measures:	The measures to be taken to control nuisance are listed below:
	
	• Noise and Vibration monitoring will be conducted before the works to gather background information and then throughout the works. Noise and Vibration monitoring equipment will be set up as outlined in 'Proposed Monitoring Locations' layout LCT-MLH-XX-XX-DR-W-01100.
	• An investigation is ongoing to determine the expected vibration levels will be during the works. This will determine the measures that need to be put in place.
	• It is anticipated that vibration limit will be 9mm/s,
	• Airborne noise and underwater noise and will be monitored prior to construction, to establish baseline levels, and throughout construction works to ensure works do not exceed limits. Monitoring equipment will operate a red, amber and green system with live SMS and email notifications/alerts sent to the McLH Site Management Team when levels approach set limits. This will enable the Site Team to address site operations before exceedance of limit.
	• A noise evaluation assessment will be carried out to predict the likely noise expected to be developed as a result of demolition and construction works. This will be based on the proposed construction plant.
	• Noise Monitoring Equipment:
	  ○ Airborne noise shall be monitored using a sound level meter at locations noted below for the duration of the piling works.
	  ○ Underwater noise shall be monitored using a hydrophone at the location noted below for the duration of the piling works.
	• Potential use of acoustic barriers on piling barge to mitigate noise from piling operations at source.
	• Deliveries of tubular piles and precast concrete units will be by river where possible.
	• Road deliveries will be planned and coordinated.
	• Parking facilities will be available at the welfare setup, however, should these be insufficient for the numbers of operatives required to construct the terminal then a satellite compound will be established and works transported to and from the site by bus. It is highly likely that this will be required. Refer to 'Access and Egress' section above.
	• Dust release will be minimised as part of the standard procedures. Concrete cutting etc will be carried out using water suppression and damping and sweeping will be carried out routinely top prevent nuisance dusts. Any tools causing dust will have dust extraction devices fitted. Any dust that requires brushing operatives must use a hoover to prevent dust being spread.
	• Street Cleaning will be a requirement during the work, especially during the landside piling works and when ground works are occurring. Due to the other works occurring nearby, it would be worth organising this through liaison with the other contractors to prevent repeated sweeping the possible traffic consequences of this.

	• To ensure services are unaffected or disrupted by the works they will diverted into a safe location in advance. During the diversion works provision will also be made for the connection of the new buildings to the networks. • Lighting will be required especially during the winter months. When lighting is required, it will be as un-intrusive as possible with walkways having minor lighting and brighter task lighting setup where required. Due care and attention will be given to residents in this instance. Furthermore, care will be taken to ensure that task lighting will not interfere with navigation on the Mersey and all RAMS will be discussed with Peel before the works commence. • Lighting will be required during marine related and barge works throughout the night.
Health, Safety & Welfare – Noise & Vibration	Under the Control of Noise at Work Regulations 2005 where equipment emits sounds in excess of the relevant actions levels, this equipment will be assessed prior to being used on site and adequate hearing protection will be supplied, where equipment has the possibility to effect the operator a full risk assessment will be carried out and control measures put in place. • Always use the right tool for each job (to do the job more quickly and expose you to less hand-arm vibration). • Check tools before using them to make sure they have been properly maintained and repaired to avoid increased vibration caused by faults or general wear. • Make sure cutting tools are kept sharp so that they remain efficient. • Reduce the amount of time you use a tool in one go, by doing other jobs in between. • Avoid gripping or forcing a tool or workpiece more than you have to. • Store tools so that they do not have very cold handles when next used. • Limit the time that employees are exposed to vibration. • Plan work to avoid individuals being exposed to vibration for long, continuous periods – several shorter periods are preferable. • Where tools require continual or frequent use, introduce employee rotas to limit exposure times (avoid employees being exposed for periods which are long enough to put them in the high risk group). • A standard hammer drill creates a vibration magnitude of between 5 m/s² - 10 m/s². Operatives should note the chart below which indicates the exposure time that should not be exceeded. The points noted above should be implemented to eliminate potential risk of hand/arm vibration Encourage good blood circulation by: • Keeping warm and dry (when necessary, wear gloves, a hat, waterproofs and use heating pads if available); • Giving up or cutting down on smoking because smoking reduces blood flow; and • Massaging and exercising your fingers during work breaks. Chart Calculating Daily Vibration Exposure: 
Health, Safety & Welfare – Manual Handling	McLH shall, so far as is reasonably practicable, avoid the need for employees to undertake any manual handling operations at work, which involve a risk of personal injury. Where manual handling is unavoidable McLH shall take appropriate steps to reduce the risk of injury to the lowest practicable level. McLH Project Manager will conduct a manual handling assessment and will communicate with all operatives involved.

	 *Guideline Weights: These weights are guidelines only and are not absolute values.*
Pollution Control Measures:	The measures to be taken to control pollution are listed below: • Spill Kits will be available retain oil lost through burst hoses etc • Biodegradable Oil will be used where possible • All waste arising from the works will be taken ashore and disposed or recycled • Packaging will be reduced where possible • Concrete runoff will be prevented into the Mersey
Waste Control Measures:	• Timber arising from the demolition works will be recycled for reuse either as a timber product or processed in some form • Items which can be recycled such as pile offcuts will be segregated and sent to be reprocessed • Reduce packaging requirements where possible through discussions with suppliers • Waste to be segregated into skips for recycling and/or disposal • Concrete should be measured accurately before and as pours progress to prevent waste

Amendments and Additional Information

Amendments to the Method Statement:

Should any part of this Method Statement and its supporting documentation require amendment or alteration, this must be notified for agreement to all relevant parties prior to it being enforced.

This Method Statement will be reviewed and amended as and when necessary by **William-John Cunningham (Project Manager)**

Communications of Method Statement:

This Method Statement shall be communicated to all relevant parties (via toolbox talk) and signed by all personnel below to confirm that the briefing has taken place.

Method Statement Declaration Record

I, the undersigned, confirm that I have read and understood this Method Statement and its supporting documentation contained therein, and agree to work in accordance with their provisions.

I will notify **William-John Cunningham (Project Manager)** of any non-compliant/unsafe work practices or defective plant and equipment.

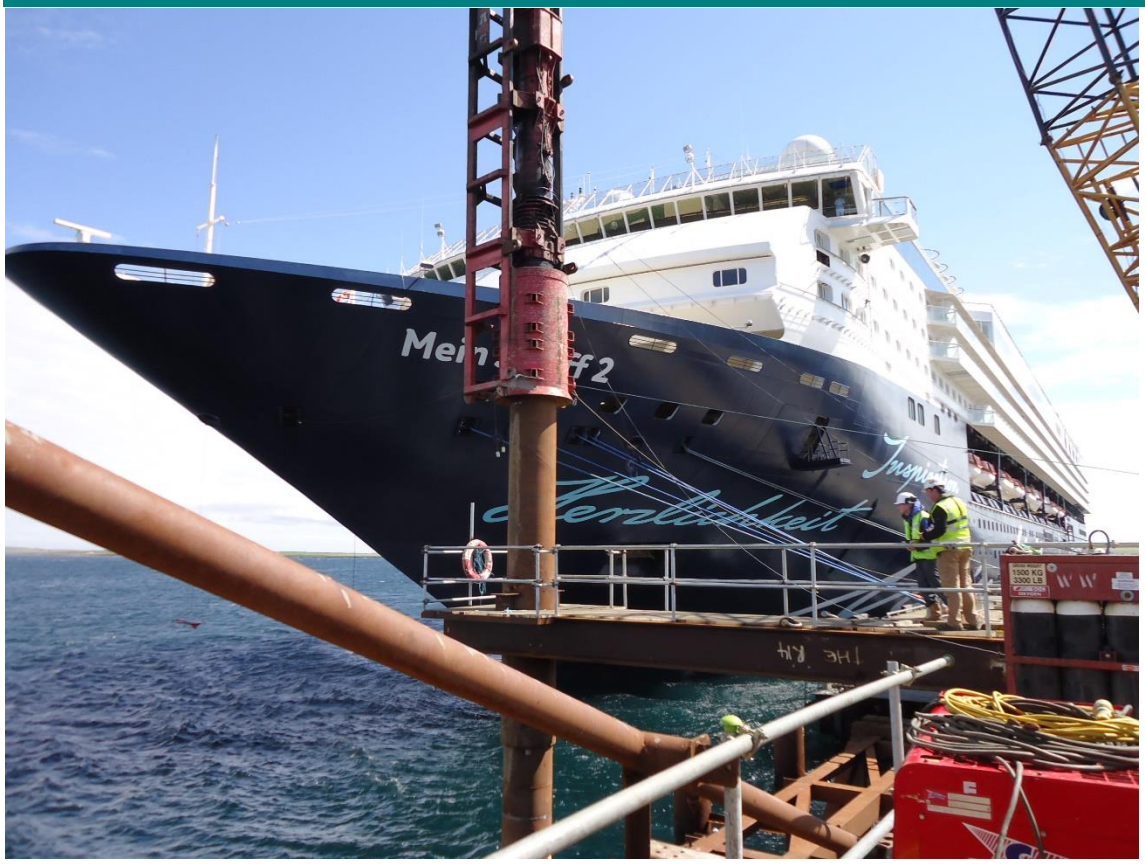
Name (PRINT):	Company:	Signature:	Date:

McLaughlin & Harvey

RAMBOLL

Liverpool City Council

Liverpool Cruise Terminal

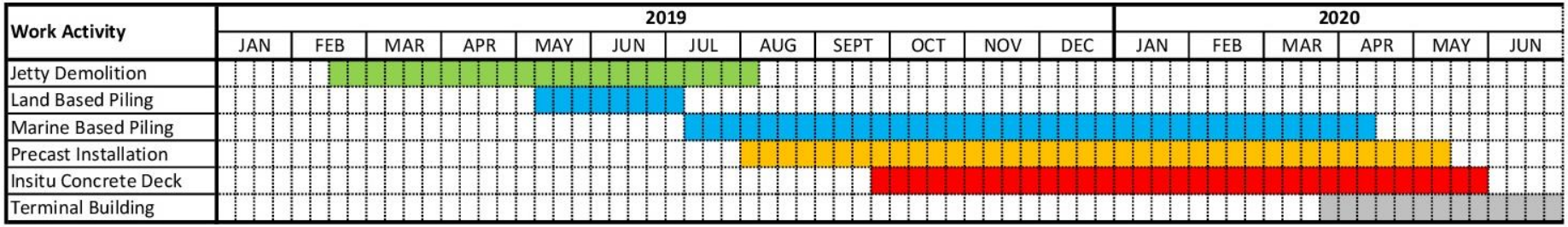


Review of Plant Requirements

Contents

Outline Programme of Works

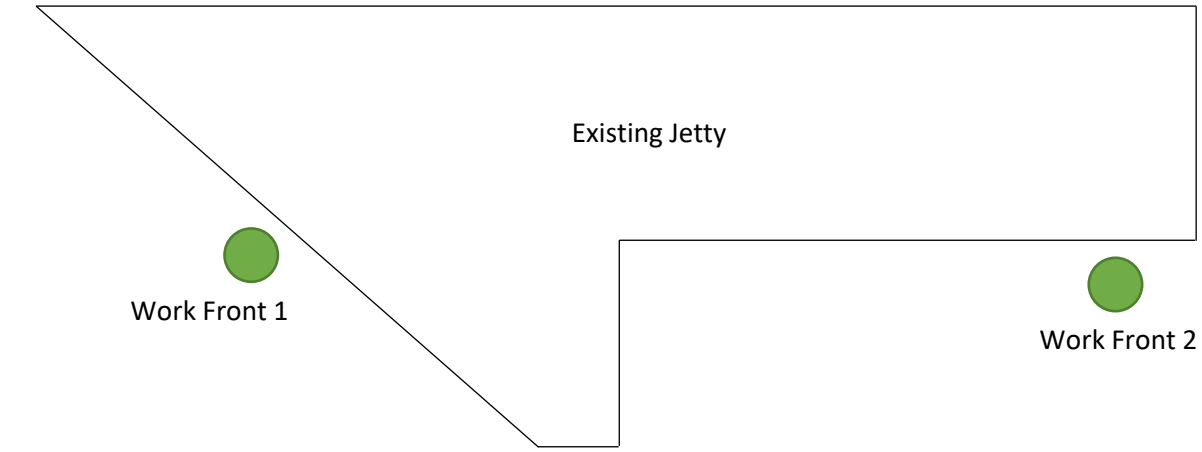
(Note – Programme is subject to change)



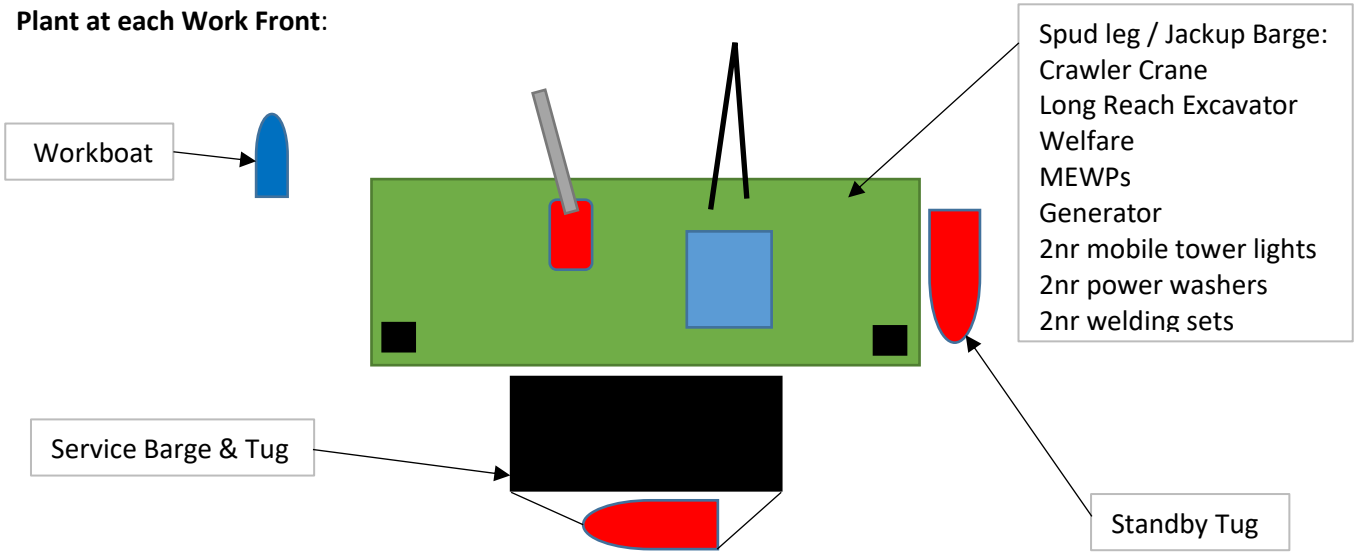
Demolition Works

Plant / Equipment at each Work Front		
Description	**No.**	**Typical Spec. (exact plant cannot be confirmed at present)**
Barge - Spud Leg / Jackup (TBC)	1	60m x 20m approx.
Long Reach Excavator	1	75t approx. – CAT 345C With grab, rock breaker & saw attachments
Crawler Crane	1	Kobelco CKE800G / Liebherr LR 1160 Lifting tackle & Vibro hammer
Standby Tug (for spud leg/jackup barges)	1	1000hp tug
Service Barge with Tug	1	30m x 20m approx. 1000hp Tug
Workboat / Safety Vessel	1	Approx. 300hp workboat
Generator	1	Approx. 60-100kVA
Mobile tower lights	2	
Welding Plants	2	
Welfare & Accommodation	1	Canteen, Drying room, Office, Toilet Block
Power washers	2	
MEWPs	1	

High-level Plan of Works Area:



Plant at each Work Front:

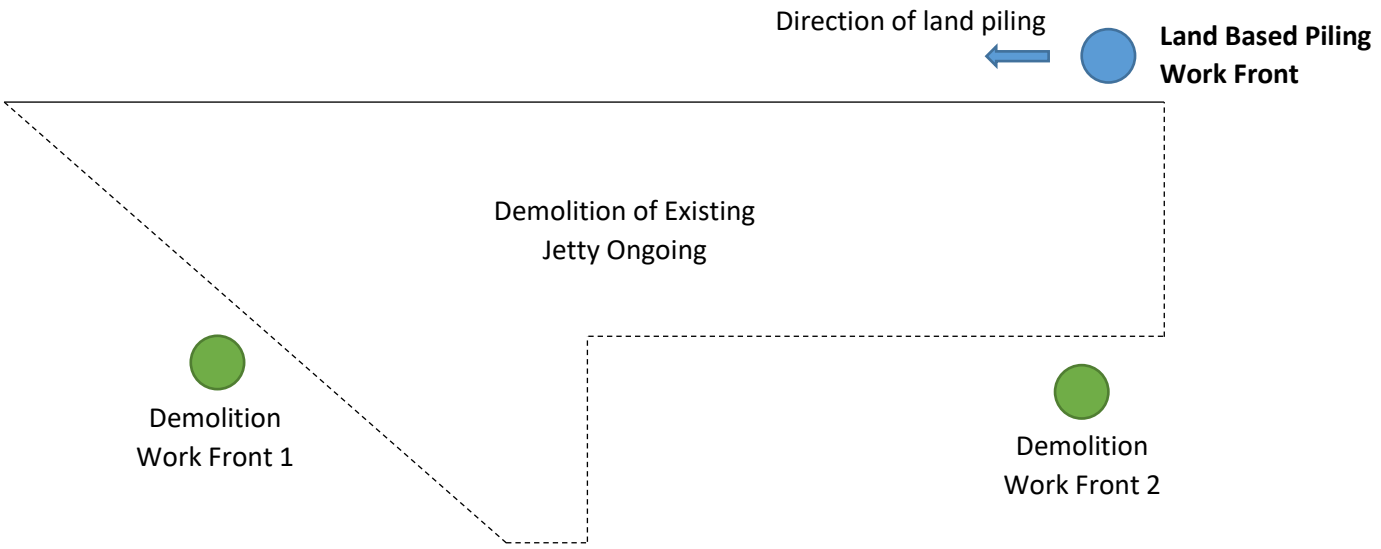


Land Based Piling

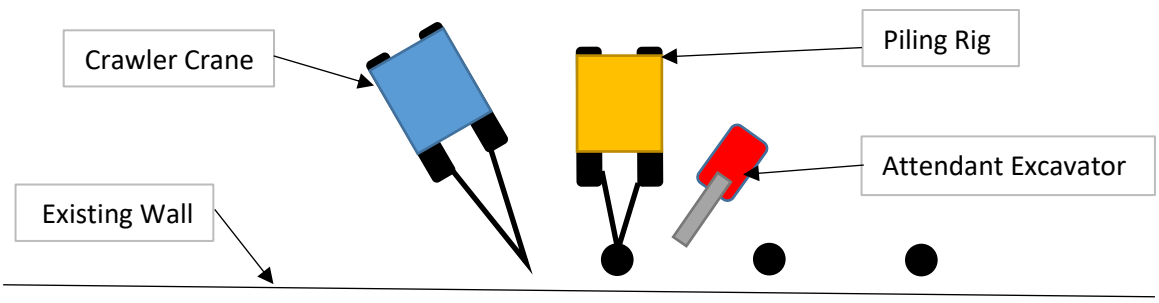
Plant / Equipment at each Work Front		
Description	**No.**	**Typical Spec. (exact plant cannot be confirmed at present)**
Rotary piling rig	1	Liebherr LB28 / Bauer BG40
Crawler Crane	1	Kobelco CKE800G / Liebherr LR 1160 With lifting tackle
20t excavator	1	
Generator	1	Approx. 50kVA
Mobile tower lights	2	
Welding Plants	2	
Power washers	2	
MEWPs	1	

High-level Plan of Works Area:

As indicated in the Outline Programme of Works, land based piling will commence during demolition of the existing jetty. Refer to Demolition Works section for details of plant required at demolition work fronts.



Plant at Land Based Piling Work Front:

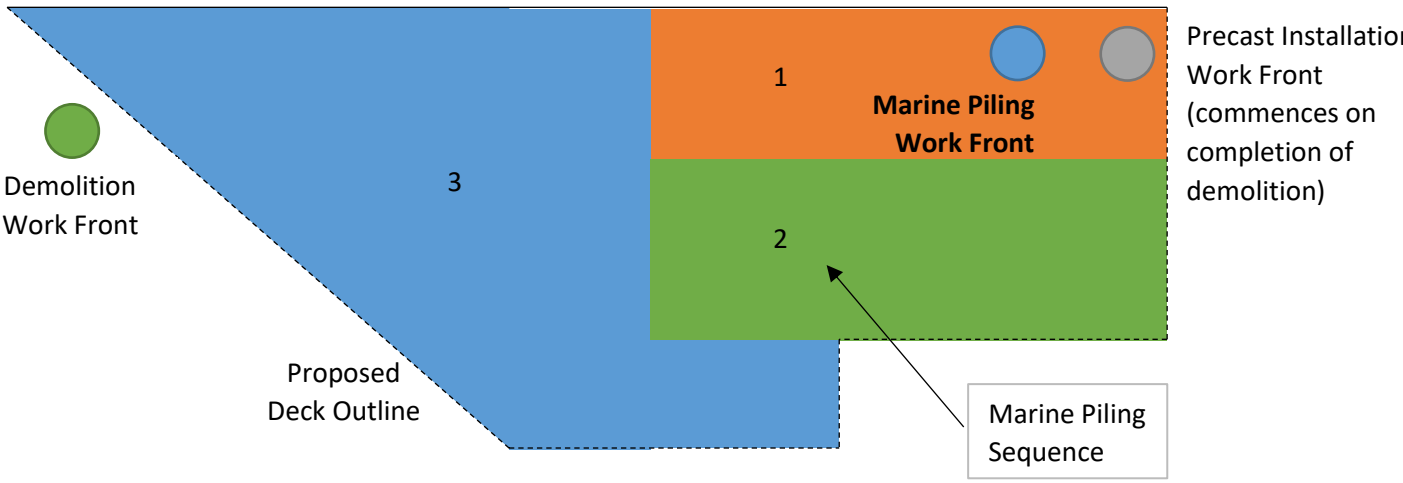


Marine Piling

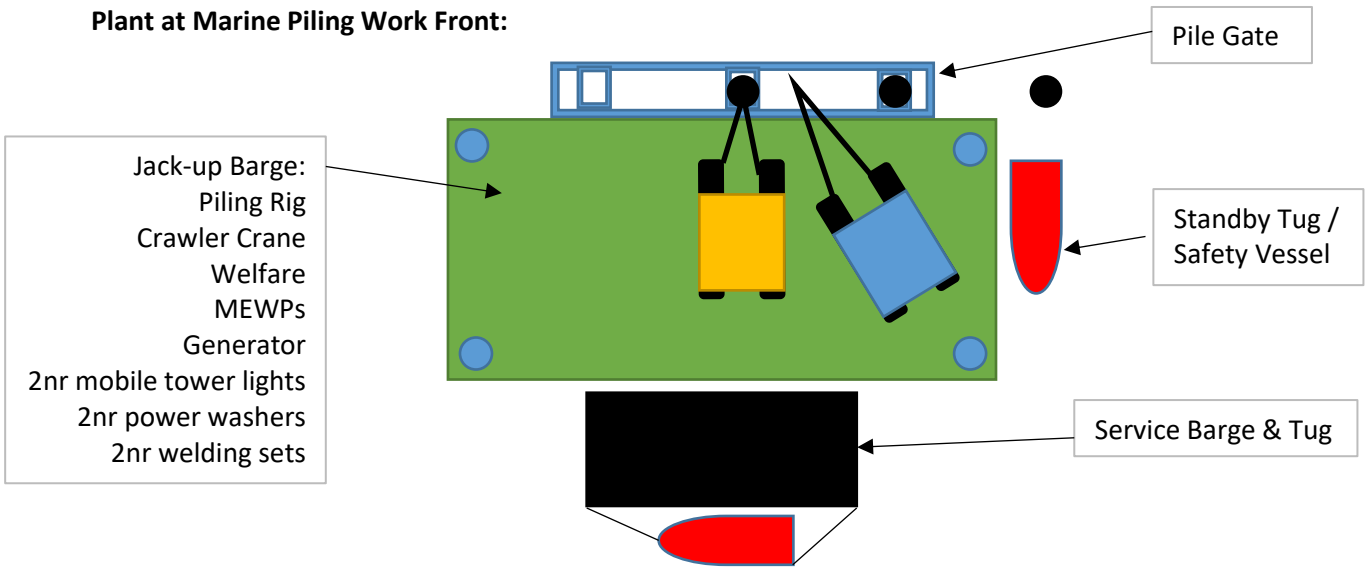
Plant / Equipment at each Work Front		
Description	**No.**	**Typical Spec. (exact plant cannot be confirmed at present)**
Jack-up barge	1	Size TBC – 30m x 20m Jackup, 400-600t approx.
Standby Tug	1	1000hp tug – on standby for jackup barge / safety vessel
Rotary piling rig	1	Liebherr LB28 / Bauer BG40
Crawler Crane	1	Kobelco CKE800G / Liebherr LR 1160 - With lifting tackle
Service Barge with Tug	2	30m x 20m approx. & 1000hp Tug
Generator	1	Approx. 60-100kVA
Mobile tower lights	2	
Welding Plants	2	
Welfare & Accommodation	1	Canteen, Drying room, Office, Toilet Block
Power washers	2	
MEWPs	1	

High-level Plan of Works Area:

As indicated in the Outline Programme of Works, land based piling will commence following completion of land based piling. Demolition works will be completed on one remaining work front after which precast installation will commence. Refer to Demolition Works and Precast Installation sections for details of plant required at the relevant work front.



Plant at Marine Piling Work Front:

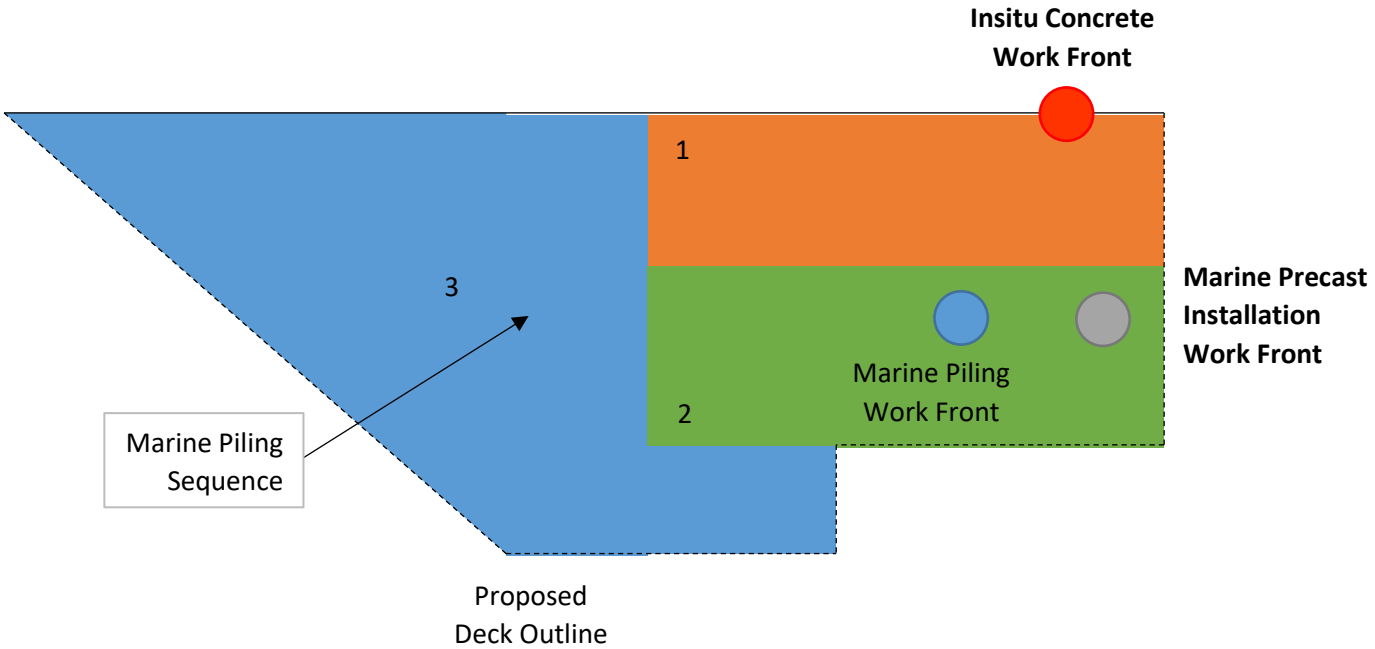


Precast Installation & Insitu Concrete Deck

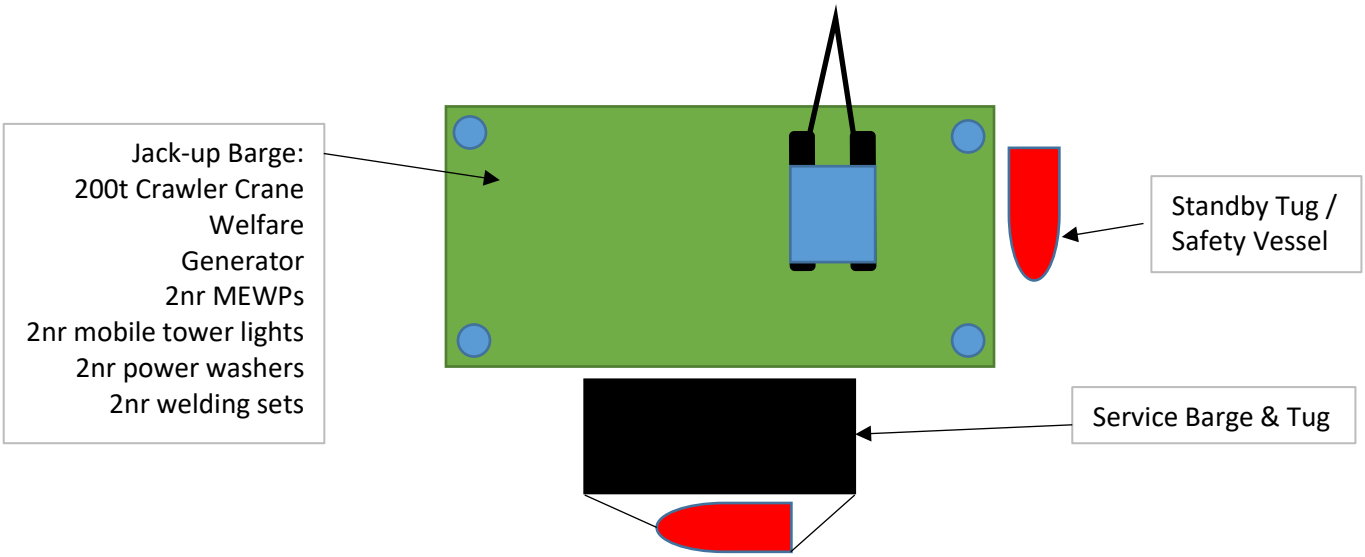
Plant / Equipment at Precast Installation & Insitu Concrete Work Fronts		
Description	**No.**	**Typical Spec. (exact plant cannot be confirmed at present)**
200T Crawler Crane	1	LR 1200 - TBC
130T Crawler Crane	1	LR 1130 – TBC
Jack-up barge (TBC)	1	Size TBC – 30m x 20m Jackup, 400-600t approx.
Standby Tug	1	1000hp tug – on standby for jackup barge / safety vessel
Crawler Crane	1	Kobelco CKE800G / Liebherr LR 1160 - With lifting tackle
Service Barge with Tug	2	30m x 20m approx. & 1000hp Tug
Generator	1	Approx. 60-100kVA
Mobile tower lights	2	
Welding Plants	2	
Welfare & Accommodation	1	Canteen, Drying room, Office, Toilet Block
Power washers	2	
MEWPs	2	

High-level Plan of Works Area:

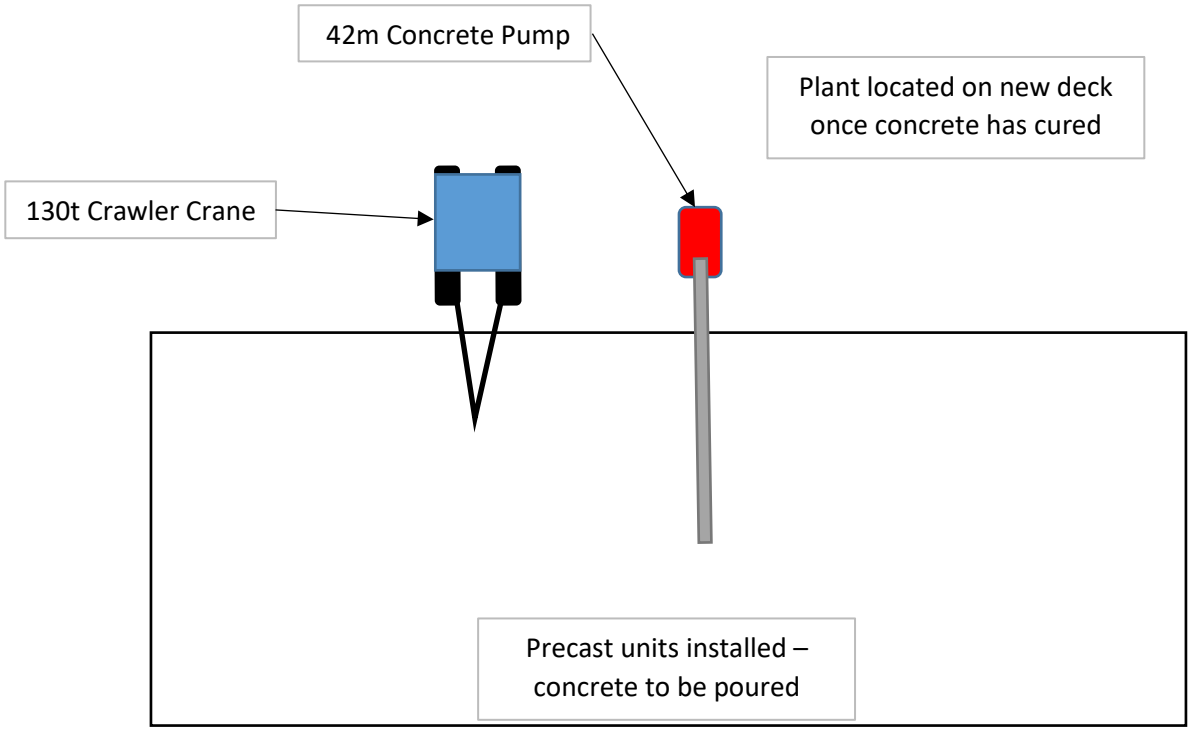
As indicated in the Outline Programme of Works, precast installation will commence on completion of demolition works, and will also take place following behind the marine piling. Insitu concrete works will also commence during precast installation. Details of plant required for the Precast Installation and Insitu Concrete work front are identified in the figures below. In addition, refer to the Marine Piling section for details of plant required at its work front.



Plant at Marine Precast Installation Work Front:



Plant at Insitu Concrete Deck Work Front (based on land and new deck structure):



Appendix 6.2a: Framework CEMP

Liverpool Cruise Terminal

Framework Construction Environmental Management Plan (CEMP)

October 2019

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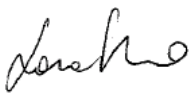
Client Name:	Liverpool City Council
Document Reference:	WIE12464-100-R-13-2-4-CEMP
Project Number:	WIE12464

Quality Assurance – Approval Status

This document has been prepared and checked in accordance with
Waterman Group's IMS (BS EN ISO 9001: 2015, BS EN ISO 14001: 2015 and BS OHSAS 18001:2007)

Issue	Date	Prepared by	Checked by	Approved by
First	November 2018	Lara Russo Consultant	Suzanne Craig Principal Consultant	Gavin Spowage Associate Director
Second	December 2018	Lara Russo Consultant	Suzanne Craig Principal Consultant	Gavin Spowage Associate Director
Comments				
Third	February 2019	Lara Russo Consultant	Gavin Spowage Associate Director	Gavin Spowage Associate Director
Comments		Incorporating JLL comments.		
Fourth	February 2019	Lara Russo Consultant	Gavin Spowage Associate Director	Gavin Spowage Associate Director
Comments		Incorporating Peel comments		
Fifth	March 2019	Lara Russo Consultant	Gavin Spowage Associate Director	Gavin Spowage Associate Director
Comments		Accounting for Issue of Updated NPPF, February 2019		

Sixth	June 2019	Lara Russo Consultant	Gavin Spowage Associate Director	Gavin Spowage Associate Director
				
Comments		Addressing NE and MEAS comments		
Seventh	July 2019	Lara Russo Consultant	Gavin Spowage Associate Director	Gavin Spowage Associate Director
				
Comments		Updated cormorant mitigation measures; updated dust mitigation measures		
Eighth	July 2019	Lara Russo Consultant	Gavin Spowage Associate Director	Gavin Spowage Associate Director
				
Comments		Addressing further MEAS comments as part of the RM		
NInth	August 2019	Lara Russo Consultant	Gavin Spowage Associate Director	Gavin Spowage Associate Director
				
Comments		Updated Cormorant mitigation		
Tenth	October 2019	Lara Russo Consultant	Gavin Spowage Associate Director	Gavin Spowage Associate Director
				
Comments		Addressing all consutation responses received to-date		

Disclaimer

This report has been prepared by Waterman Infrastructure & Environment Limited, with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporation of our General Terms and Condition of Business and taking account of the resources devoted to us by agreement with the client.

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This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at its own risk.

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1. Introduction

1.1 General Overview

This framework Construction and Environmental Management Plan (CEMP) has been prepared by Waterman Infrastructure & Environment Limited (hereafter referred to as 'Waterman'), on behalf of Liverpool City Council to support the construction of the new Liverpool Cruise Terminal and associated infrastructure including the demolition phase (hereafter referred to as the 'Development') on land at Princes Parade, Liverpool (the 'Site'). The general location of the Site is shown in **Figure 1** included within **Appendix A.**

The new Liverpool Cruise Terminal was granted planning permission on 3rd April 2018 (planning reference 17O/3230) and a number of planning conditions were attached. In particular, Planning Condition 8 of the Decision Notice states that:

"No development within any phase shall commence until a Construction Environmental Management Plan (CEMP) and Ecological Conservation Management Plan (ECMP) has been submitted to and approved in writing by the Local Planning Authority, in liaison with Merseyside Environmental Advisory Service and Natural England. The CEMP and ECMP must describe how construction will be managed to avoid, minimise and mitigate any adverse construction effects on the environment and provide the following details in accordance with the provisions set the Environmental Statement and HRA Screening Report Addendum - version 10-3-3:

I. measures to control and prevent dust, debris, emissions and water run-off from entering the River Mersey during construction;

II. how certain activities will be limited in time, location or noise level to minimise the risk of disturbance to SPA birds and to minimise impacts to supporting habitat;

III. measures to provide resting/roosting opportunities for cormorant;

IV. measures for reducing impact of lighting;

V. details for the waste minimisation, recycling and disposal of waste resulting from demolition and construction works;

VI. details of provisions to utilise renewable energy in the cruise terminal building.

The Plan shall be implemented in accordance with the agreed provisions over the course of construction of the development"

This framework CEMP was therefore prepared to provide the appointed Contractor with an outline of the relevant measures to be implemented during the construction of the Development to avoid, minimise or mitigate effects on the local environment and community surrounding Site. The CEMP is designed to ensure compliance within the requirements of relevant environmental legislation and Planning Condition 8. This framework CEMP is therefore aimed to guide the Contractor with the production of an operational CEMP (which is a 'live' document that is reviewed and updated by the Contractor at regular intervals throughout the project life cycle). The Contractor will have overall responsibility for the CEMP and the construction works at the Site.

The Cormorant Ecological Conservation Management Plan forms part of the CEMP and is included as a Technical Note in **Appendix B.**

1.2 Environmental Statement and ES Addendum

An Environmental Impact Assessment (EIA) was undertaken by Waterman in 2017 to support the Planning Application. The assessments were summarised within the following documents:

- Environmental Statement (ES) (Ref: WIE12464-100-R-1-1-1ES, dated October 2017), hereafter referred to as '2017 ES';
- ES Addendum (Ref: WIE12464-103-R-ES Addendum 12-3-8, dated June 2018), which was subsequently compiled in 2018 to address the additional requirements set out in the Marine Works (Environmental Impact Assessment) Regulations 2007, as amended, (to apply for a Marine Works Licence) and Schedule 3 of the Harbours Act 1964 (to apply for a Harbour Revision Order);
- ES Addendum (Ref: WIE12464-103-R-ES-Addendum-12-6-1, dated January 2019), which superseded the June 2018 ES Addendum and took account of, amongst other things, subsequent changes to the proposed construction methodology for the proposed Development;
- ES Addendum (Ref: WIE12464-103-R-ES-Addendum-12-7-2, March 2019), which superseded the January 2019 ES Addendum and was compiled to address subsequent additional comments received from the MMO; and
- ES Addendum (Ref: WIE12464-103-R-ES-Addendum-12-8-1, October 2019) – the 'fourth issue', which superseded the March 2019 ES Addendum and addresses subsequent comments received from MMO and other regulatory bodies including Natural England.

The baseline information, the relevant outcome of the assessment of the impacts and the mitigation measures identified within the 2017 ES and associated ES Addendum have been used to inform this framework CEMP. Therefore, reference to these documents and associated supporting studies will be made within the relevant section of the document.

1.3 Site Description

The Site falls within the administrative boundary of LCC and is centred at easting and northing coordinates 333670, 390670. The site and occupies an area of approximately 5.77 hectares (ha) (refer to **Figures 1 and 2**) and is bound by the Mersey Estuary to the west, the residential Alexandra Tower and the Princes Half Tide Dock to the north, Princes Dock and office buildings to the east and the Royal Liver Building and Water Street to the south. The current temporary 'Upper' Cruise Terminal is located adjacent to the south-east of the Site.

The northern part of the Site currently includes the derelict Princes Jetty and an area of surface car parking known as Plot 11. The Jetty and Plot 11 are separated by Princes Parade which connects to Waterloo Road in the north and St Nicholas Place in the south. A series of floating pontoons (Pontoons A to D) are located in the west and south-west of the Site. The existing 'Lower' Cruise Terminal building is located on Pontoon A (refer to **Figure 3**). The southern part of the Site contains the Isle of Man ferry terminal and a marshalling area associated with the cruise ship and ferry terminals. The Titanic Memorial is excluded from the Site boundary.

A detailed description of the key area of Site is provided within the sections below.

1.3.1 Plot 11

For information Plot 11 is as defined in the Outline Planning Application and includes Development Parcels 1g and 1h as identified on Parameter Plan 004 and Plots A-07 and A-08 of the Neighbourhood Masterplan and within Parameter Plan 005. The Plot 11 site is located in the north of the proposed Cruise Terminal Site (as defined by the redline planning boundary) and comprises a hard-standing surface car

park, currently used for short term parking. The hard-standing comprises a mixture of tarmac and cobbles with some gravel areas. A disused railway line runs through this part of the Site.

1.3.2 Princes Jetty

The derelict Princes Jetty and an area of open water occupy the north-west corner of the Site. Princes Jetty is formed of a concrete deck supported by approximately 140 timber uprights and is surrounded by security fencing and, as such, is not publicly accessible.

Two mooring dolphins are located within the open water area to the south of the jetty.

1.3.3 Pontoons

A series of four floating pontoons are located in the south-west of the Site, forming the current Liverpool Landing Stage that facilitates the berthing and servicing of cruise ships. There are a number of buildings and structures on the pontoons including a small building, located at the north end of Pontoon D, currently utilised as a Pilot launch facility.

The lower Cruise Terminal Building is located on the southern pontoon (Pontoon A). These pontoons are connected to Princes Parade in Princes Dock by number of link bridges to provide pedestrian and vehicular access.

1.3.4 Southern Area

The south part of the Site contains a marshalling area and the Isle of Man ferry terminal along with a small surface car park. An area of soft landscaping and the Grade II Listed Titanic Memorial is in this area but is specifically excluded from the Site boundary. A subterranean section of the Liverpool Canal Link runs beneath the car park.

1.3.5 Access Roads

Access to the site is provided from St Nicholas Place in the south-east. St Nicholas Place runs westwards through the south of the Site before turning north to become Princes Parade. Princes Parade forms the eastern boundary of the Site as it runs northwards before it bisects Princes Jetty and Plot 11. It then turns to the east in the north of the Site, eventually linking with Bath Street at the north-east corner of the Site.

Link bridges provide vehicular access from Princes Parade to the pontoons for service vehicles to access the cruise ships.

1.4 Development Proposal

1.4.1 Description of the Development

The Applicant has been granted with the construct a new cruise ship terminal facility and supporting infrastructure to replace the existing temporary cruise ship terminal. The main elements of the proposed Development comprise:

- Demolition of buildings and structures, including the controlled removal of Princes Jetty;
- Construction of a cruise liner terminal building;
- Construction of a new landing stage and suspended concrete deck;
- Removal of existing mooring dolphins and construction of two new mooring dolphins;

- Modification of the existing cruise liner terminal building to accommodate cruise related ancillary uses, including staff facilities and storage, on completion of the new cruise liner terminal; and
- Erection of a vehicular and pedestrian linkspan bridge (linking the new terminal building and the existing pontoons).

The physical characteristics of the proposed Development are set out in a series of Parameter Plans which set out, amongst other things, the location and maximum buildable envelope of the proposed built elements within the Site. The details of the proposed Development's appearance, including fixed building heights and footprints, will be established in due course, during the detailed design stage. The detailed design will need to accord with the relevant Parameter Plans.

Figure 3 shows the Proposed Site Layout; whilst **Figure 4 and 5** the Development elevations and sections respectively.

The primary use of the proposed Development would be the berthing of cruise ships, generally from March through to November, to accommodate the predicted growth in passenger numbers in this sector. Additionally, at appropriate times throughout the year and particularly during the off-season, it is proposed to use the new terminal building as conferencing and exhibition space.

1.4.2 Demolition of buildings and structures

The buildings and structures to be demolished comprise:

- Princes Jetty: To facilitate the construction of the new terminal building, the existing Princes Jetty
- structure must be removed. The jetty is currently in a state of disrepair and is unsuitable for safe
- berthing of vessels;
- The pilot launch buildings on Pontoon D; and
- The two mooring dolphins between Princes Jetty and Pontoon D.

The indicative location of building and structures to be demolished is illustrated on **Figure 6**. Further details drawings would be developed at detailed planning stage and should be taken into account for the production of the CEMP.

1.4.3 Cruise Liner Terminal Building

The Cruise Liner Terminal Building would be built on a new suspended deck. It would be a two-storey building comprising:

- Baggage x-ray area;
- Baggage hall;
- Customs area;
- Ground floor entrance atrium and departure lounge; and
- Café at 1st floor level.

No renewable energy systems are proposed as part of the Cruise Liner Terminal Building.

1.4.4 Vehicle Linkspans and Pedestrian Walkways

A vehicular link bridge (a 'linkspan') would connect the new suspended deck with the retained floating pontoons to the south. The linkspan would float to adjust for tidal variations and would be supported by a

dedicated support pontoon at the southern end. The northern end of the vehicular linkspan would be supported from the new suspended deck.

To segregate pedestrians from the vehicle access area and ensure a smooth transition of passengers to the varying deck levels of the cruise ships, a pedestrian walkway would be provided as part of the vehicular linkspan.

A hinged walkway bridge would connect the cruise terminal building to a fixed walkway which would provide access to the cruise ships. The high-level walkway would have a minimum headroom clearance of 5.3m above pontoon deck level to allow safe passage of vehicles beneath.

At this stage, it is anticipated that the form of construction for the link-bridge and walkways would be structural steel warren trusses with glassed side walls on each side and a solid roof.

1.4.5 Mooring and Berthing Infrastructure

Following the removal of the two existing mooring piles between the existing timber jetty and Pontoon D, it is considered likely that there would be one replacement mooring pile, and the potential for two additional berthing piles. These piles would be located in the same approximate location as the two existing mooring piles.

1.4.6 Existing Terminal Building

Once the new terminal building is in operation, the existing 'lower' terminal building on Pontoon A would be modified for cruise-related ancillary uses including storage and operational staff facilities.

1.4.7 Parking Provisions

On-site parking provisions would include coach bays as chevron bays along the frontage of the terminal building on Princes Parade and within the passenger pickup/drop-off area. This area would also include spaces for drop-off and pick-ups by private vehicles and for taxis. There would also be bays for shuttle buses linking with the off-site long-term designated car park(s).

1.4.8 Landscape, Open Space and Public Realm

The proposed Development would be at approximately the same level as existing (typically 7.55m AOD). The public realm would be designed in order to provide street level access from the passenger pick-up / drop-off area. The design principles of the landscape, open space and public realm would accord with the Princes Dock Neighbourhood Masterplan as approved in May 2018, reusing materials currently existing on-site, particularly those with a historical link to the dock, and having natural stone as the dominant surface material (granite and sandstone), simply and neatly detailed, incorporating discrete drainage and other street furniture.

1.4.9 Drainage Infrastructure

Surface Water

It is anticipated that surface water from the all areas other than highways areas would be discharged directly to the River Mersey, via interceptors and pollution abatement controls as appropriate. The most sustainable way to drain surface water runoff is through the use of Sustainable Drainage Systems (SuDS). Due to the nature of the proposed jetty deck structure, there is limited space and depth for many of the SuDS devices potentially available. Treatment could be achieved through the incorporation of

permeable asphalt used in conjunction with a shallow permavoid system fitted with a biomat filtration system (or similar treatment device).

The various options are discussed in more detail in the standalone Flood Risk Assessment report submitted in support of the planning application. The final strategy would be confirmed at the detailed design stage.

Foul Water

It is expected that foul water drainage would be connected to the existing private foul network which runs adjacent to the Site in Princes Parade. It is not anticipated that foul water from vessels would be discharged in to the landward sewerage system.

1.5 Sensitive Receptors

A review of the land uses surrounding the Site has been undertaken to ensure that appropriate mitigation measures are implemented to minimise disruption to potentially sensitive receptors. **Figure7** illustrates the surrounding land uses, whilst **Table 1** below provides a summary of the identified potential sensitive receptors around the Site. A definitive list of the schemes which have been reviewed was included within the Environmental Statement which accompanied the original outline application, these can be found in Table 16.1 of Chapter 15.

Table 1: Potential Sensitive Receptors

Category	Sensitive Receptor	Description
Residential and Commercial	Existing Residents	A number of residential properties are located in the local area, such as the Alexandra Tower adjacent to the north and the residential 1 Princes Dock ('City Lofts') adjacent to the north-east. Residential buildings on William Jessop Row are currently under construction and are expected to be complete and occupied prior to the Development coming into operation.
	Existing Businesses	A number of commercial activities are located in the proximity of the Site and include the Malmaison hotel approximately 125m to the east and the commercial Princes Dock Offices at 12 Princes Parade adjacent to the east.
Leisure / Amenity	Existing Users	Users of the 'Liverpool Canal Link'
Heritage Assets	Built Heritage	The southern section of the Site is located within the 'Liverpool Maritime Mercantile City' World Heritage Site (WHS) and the rest of the Site is within the WHS's buffer zone. The southern portion of the Site, along part of Princes Parade and St Nicholas Place, is located within the Castle Street Conservation Area. The north-east portion of the Site is adjacent to the Stanley Dock Conservation Area. The Memorial to Heroes of the Marine Engine Room (Grade II* Listed) is located within the southern section of the Site, but is excluded from the Site boundary. The derelict Princes Jetty is located within the Site boundary. This feature is a non-designated heritage asset, however, consultation with LCC in March 2018 with regards to the Development, confirmed that the jetty is considered a listed structure due to its

Category	Sensitive Receptor	Description
		physical connection to the Grade II listed Entrance to Princes Dock to the north. The 'Prince's Half Tide Dock' (Grade II Listed) is located immediately to the north, beyond Prince Parade, and includes the retaining walls of the dock. The Site falls within the setting of a group of nationally significant listed buildings, collectively known as the Three Graces: • The Royal Liver Building (Grade I Listed), approximately 50m south of the Site; • The Cunard Building (Grade II* listed), approximately 125m south; and • The Port of Liverpool Building (Grade II* Listed), approximately 200m south. A group of listed monumental statues are located to the west of the Three Graces, including: • Monument to Sir Alfred Lewis Jones (Grade II Listed); • Monument of Edward VII (Grade II Listed); • War Memorial in front of Cunard Building (Grade II Listed); and • Merchant Navy War Memorial (Grade II Listed).
	Archaeology	The Site has the potential to contain palaeo-environmental and riverine deposits from Prehistoric to the present day. The extant structure of the Princes Jetty is the only surviving element of the original Liverpool Landing Stage, where many people embarked for emigration to North America.
Ground Conditions and Contamination	Construction workers, Site users and off-site receptors.	The Site is immediately underlain by Made Ground, which is present in all areas except in the west extent of the Site. Superficial deposits include Tidal Flat Deposits (clay, silty, sandy) and Glacial Till (Stiff brown Clay with lenses of sand) which overlay the Chester Pebble Beds Formation (sandstone, pebbly, gravelly). Historically, the Site has been in use as docks from at least the 1850s where historical mapping indicates substantial modification to the banks of the Mersey Estuary that the Site is located on. Historical uses of the Site are primarily associated with the docks and include warehouses and a railway. Two dock basins, located in the southern section of the Site, appear to have been infilled in the 1890s. By the 1990s all building on Site had been demolished. The historical uses of the Site represent potential sources of contamination the underlying soils and groundwater. An assessment of UXO has been prepared previously by BAE Systems for the Liverpool Waters Masterplan area (within which the Site is located) with the assessment stating that *"the probability of encountering UXO during the project is relatively high… however…the probability of initiating the device and causing an explosion is substantially lower"*.
Ecology	Designated Sites	The Site is located within the Liverpool Bay Special Protection Area (SPA), which was fully classified as an SPA on 31 October 2017, with an extension in area and with additional interest features to the original SPA. Its bird interest features are red-throated diver (non breeding, winter), little gull (passage/non breeding), common tern (breeding), little tern (breeding) and common scoter (non

Category	Sensitive Receptor	Description
		breeding/winter). It is also recognised for its internationally important assemblage of birds, which are made up mostly of the same non breeding/winter/passage species above plus an additional two species: red-breasted merganser *Mergus serrator* and great cormorant *Phalacrocorax carbo*. Other designated ecological sites within 10km of the Site include: • The Mersey Narrows SSSI, approximately 800m to the west of the Site; • The New Ferry SSSI, approximately 3.3km to the south; • The Mersey Estuary Ramsar Site and SPA approximately 3.3km to the south and the Mersey Estuary SSSI approximately 4.3km to the south-east; • The North Wirral Foreshore SSSI, approximately 4.2km to the northwest; • The Dee Estuary Special Area for Conservation (SAC), approximately 4.2km north-west; • The Sefton Coast SAC and SSSI, approximately 6.3km north; and • The Ribble and Alt Estuaries Ramsar site and SPA, approximately 6.4km north.
	Terrestrial Habitats	On-site terrestrial habitats are considered to be of generally low ecological value. The Site offers very few opportunities for terrestrial bird species with regards to nesting sites or suitable food resources for foraging. With the exception of great cormorant, none of the mobile species (e.g. foraging common tern, little gull) relevant to European sites occur on the Development site, although they may forage along the adjacent River Mersey.
	Marine Habitats	There is a very small section of intertidal sediment (approx. 3000m^2) at the mouth of Prince's Half Tide Dock, immediately to the north of the Site red line boundary. There are also intertidal habitats within the Site on man-made structures including the existing jetty and dock walls. The subtidal sampling within the Site indicated that the sediments were quite heterogenous. However, the subtidal assemblage was relatively impoverished. The subtidal macroinvertebrate assemblage was dominated by juvenile blue mussel *M. edulis* and the cryptogenic acorn barnacle *A. improvisus*. Several non-native species were recorded. Three individuals of the starlet sea anemone *N. vectensis* were recorded at stations north of the Site red line boundary. There are at least 46 fish species within the Mersey Estuary of which eleven are species of conservation importance. These include the migratory (diadromous) species: Atlantic salmon; river lamprey; sea lamprey; and European eel which are protected under Annex II of the Habitats Directive as well as seven species that are protected under Section 41 of the NERC Act: sea trout (also a migratory species); sea trout, European smelt; Atlantic cod; herring; plaice; common sole; and whiting. Several species of fish use the Mersey Estuary as a spawning or nursery area. The number of marine mammals recorded within the Estuary is low; however, there are occasional sightings of harbour porpoise and bottlenose dolphin, and the pinnipeds grey and harbour seal.

Category	Sensitive Receptor	Description
Controlled Waters	Groundwater	The Site is underlain by Unproductive Strata associated with the Tidal Flat Deposits and a Principal Aquifer associated with Chester Pebble Beds Formation. The aquifer represents a potentially sensitive receptor. However, it is noted the Site is not located within a Groundwater Source Protection Zone.
	Sensitive Surface Water Features	The nearest surface water feature is the River Mersey, located directly to the west the and Princes Dock directly to the east. The Liverpool Canal Link also runs under the southern carpark area. The Princes Half-Tide Dock is located immediately to the north, beyond Princes parade. The River Mersey is considered has a heavily modified transitional water and EA water quality data indicates the river has an overall 'Moderate' status under the Water Framework Directive Classification Scheme.
Transport	Pedestrians, Cyclists, Vehicle Users	Existing vehicle, pedestrians, cyclists and other road users surrounding the Site.
	Transport Infrastructure	Nearby transport infrastructure includes Princes Parade, which forms the eastern boundary of the Site as it runs northwards, providing connection with Bath Street at the north-east corner of the Site.
Air Quality	Existing Local Residents	The Site is located within the LCC Air Quality Management Area.
Noise	Existing Local Residents	Existing residents surrounding the Site.

1.6 Applicable Codes and Standards

1.6.1 Considerate Constructors Scheme

The Contractor will work under the guidelines of the Considerate Constructors Scheme (CCS). The aim of the CCS is to improve the image of construction by encouraging good communications with site neighbours and the general public, improved welfare facilities and greater environmental awareness. The Contractor is required to achieve a CCS Code of Considerate Practice overall score of at least 40 points with a score of no less than seven in each of the five sections in the final CCS visit.

1.6.2 Contractor Management System

The Contractor shall have an Environmental Management System in place that is accredited to ISO 14001, Eco-Management and Audit Scheme (EMAS), or the International equivalent standard for such systems. Once appointed, the Contractor's own policies, procedures, targets and objectives shall be considered, and the Contractor's CEMP may need to be updated accordingly. The Contractor will also comply with all relevant legislation.

2. Works Activities and Responsibilities

2.1 Key Activities

The proposed construction works would take place from April 2019 until February 2021 and would have a programme duration of 100 weeks. Works would include a number of activities summarised in **Table 2**.

Table 2: Construction Activities

Activity	Action
Pre-commencement Surveys	• Building and structure recording surveys of Princes Jetty and Princes Dock prior to commencement of intrusive site works • Structural surveys • Detailed utilities and services survey including penetrating radar, where required
Service Diversions	• Termination/isolation of existing redundant services entering the Site, where necessary • Diversion of existing utilities and other services, where necessary
Enabling Works	• Engagement with all stakeholders to discuss the detailed sequence of Works, prior to setup of the Site • Installation of a perimeter hoarding and of the temporary Site office and compounds • Establishment of wheel wash facilities
Demolition and Dismantling	• Deconstruction and removal of the existing concrete-decked Princes Jetty. Due to the condition of the existing structure it is anticipated that these works would predominantly take place from within the Mersey Estuary using barges. Once the Jetty has been removed it is anticipated that the existing timber piles shall be removed from the river bed (where practicable). • Demolition of the exiting Pilot Launch Building on Pontoon D • Removal of the two mooring dolphins between Princes Jetty and Pontoon D
Pilling and New Jetty Construction	Works would include the construction of a new suspended deck, which would comprise reinforced concrete slabs supported on a grid of precast reinforced concrete beams that would in-turn be supported on steel tubular piles. Therefore, the main operations would include: - Piling works - Installation of precast beams and slabs - Casting of the in-situ concrete deck • Piling Works - Landside Piling: Works would commence with the installation of the landside piles to the rear of the river wall. This would be conducted using a Casagrande B300 rotary bored piling rig (or similar) and an attending crawler crane. The piling ring rig would install the casing first, then the pile rebar and finally the concrete. The rig would work sequentially starting at the southern end of the site working towards the north as shown on **Figure 8a**. - Marine Piling (new deck piles): Works would commence once Landward piles have progressed far enough ahead. These works would be carried out using marine plant consisting of a jack up barge with 180t crawler crane and Casagrande B300 rotary bored piling rig (or similar). The works would commence at the southern end of the site and work towards the northern end, as shown of **Figure 8b.** The marine piling would be undertaken with the aid of a jack up rig and the gate would be set-up for 3 No. piles. Prefabricated piles would be delivered to the jackup by a service barge and lifted by the crane. The piles would then be screwed into the seabed and penetrate the rock head

Activity	Action
	by the piling rig. Following the setup of 3 No. piles, the sockets would be drilled. The material arising from this operation would be placed into a skip, which would be located on a service barge to be taken away for disposal. Once the sockets have been drilled, then the pile cages will be installed and placement of concrete would be undertaken. The jetty piles are expected to be specified as 965mm diameter open ended steel tubes concreted into an augered rock socket; and - Marine Piling (mooring piles): these are also 965mm diameter open-ended steel tubular piles driven into the rock. • Installation of precast beams and slabs for the new deck would commence once the piles have progressed far enough and would be done using land-based plant consisting of a 350t crawler crane. • Casting of the insitu concrete deck would commence once the precast concrete members have been progressed to the first 3 bents of the structure**. Figure 8c** and **8d** show the different phases of the deck construction.
Building and Structures	• Construction of the building would commence, on the insitu concrete works have progressed far enough • The new terminal building is likely to be constructed as a two-storey steel framed building with a full height atrium at the northern end. • The terminal building steel frame would be constructed in a phased manner, progressing from south to north. • The first floor would be concrete possibly constructed as a composite floor with in-situ concrete on profiled steel decking. Steel decking would be installed to the first floor and possibly to areas of the roof. This would provide safe access until the in-situ concrete is poured on top of the decking to construct the floor slabs. • It is currently envisaged that the roof would generally be constructed from lightweight insulated panels. The roof cladding would be installed followed by the wall cladding and glazing to provide a watertight building to enable the fit out of the building to proceed.
External Works	• Construction of hard and soft landscaping
Water Discharges During Demolition and Construction	• Surface water from the landward areas would be treated before draining to Peel Ports' private sewer • Surface water from the new jetty would be treated and drained to the river

2.2 Key Responsibilities

To ensure that environmental standards are maintained, it is necessary that every person working on the Site is aware of their responsibilities. Responsibilities have been set out in Table 2 below but, in general, the Contractor will have overall responsibility for implementation of the CEMP. The Contractor will also detail roles and responsibilities in Method Statements & Risk Assessments (RAMS) and Plans of Work for each activity. It should be noted that individuals or companies can be responsible for more than one role.

Table 3: Key Responsibilities

Person / Organisation	Responsibility
The Employer and / or developer for each phase	• The developer is LCC, who would undertake formal communication with neighbours and relevant Regulators in relation to key stages of the works

Person / Organisation	Responsibility
Project Manager	• Key person involved in the management of the project on behalf of the Employer and / or developer, issuing instructions to the Contractor as necessary • Policing non-conformances reported during independent verification audits • It is understood that the Project Manager is [……]
Principal Contractor (Contractor)	• Develop a CEMP that would adhere to the requirements of this draft CEMP at all times • Liaising with the LCC and local residents where necessary • Attend meetings at the request of the LCC with representatives of local residents' groups where necessary and addressing complaints / queries as soon as practicable • Ensuring that all Site staff and subcontractors undertake their activities in accordance with best practice outlined within this draft CEMP and subsequent operational CEMP • Ensuring that the appropriate monitoring is being undertaken by the nominated Environmental Monitoring Consultant / Co-ordinator • Ensuring that the Site activities do not create unacceptable levels of environmental pollution or nuisance (including fuel spillages, odour, noise, dust or vibration). This includes ensuring that: - Statutory environmental requirements are met; - Environmental best practice and control is used; - Relevant procedures are followed; - Resources (personnel and financial) are available to meet the environmental management requirements; - Corrective actions are implemented; and - Records and other relevant documentation are maintained
Transport Co-ordinator (nominated by, and reporting to, the Contractor)	• Production of a Construction Traffic Management Plan (including a Site Delivery Plan) • Co-ordinating deliveries and controlling vehicles accessing and leaving the Site, along routes to be agreed with the LCC
Environmental Consultant / Co-ordinator (nominated by, and reporting to, the Contractor)	• Monitoring air, noise, vibration on and immediately adjacent to the Site and ensuring that complaints regarding air, noise or vibration are appropriately investigated and responded to • Monitoring of any water discharges, in order to assess compliance with temporary water discharge consents • Monitor the quality of imported and site-won material in line with the site reuse criteria
Liaison Manager (nominated by, and reporting to, the Contractor)	• Liaison with neighbours and the LCC regarding site-specific issues • Producing a regular newsletter to inform stakeholders of progress, issues and upcoming work • Keeping the site notice board(s) up to date, including with appropriate contact information

Person / Organisation	Responsibility
Subcontractor Site Managers	• Ensuring that all staff adhere to the rules detailed in the Site induction • Ensuring that statutory adhere to the environmental requirements and the CEMP • Ensuring that resources (personnel and financial) are available to meet the environmental management requirements. • Reporting incidents to the Contractor • Ensuring that corrective actions are implemented. • Ensuring that records and other relevant documentation are maintained and reported to the Contractor, including energy use and water consumption
Site personnel	• All Site staff are responsible for adhering to the requirements of the procedures outlined in the CEMP, ensuring that legislative requirements and good environmental practice are met within their job function • As part of the Site induction, all Site staff will be made aware of the importance of maintaining good relations with the local community and neighbours

2.3 Relevant Permits

A number of permit and/or licences will be required to undertake the construction works and will include, but not limited to:

- Access Permit – Peel Land and Property;
- Access Permit – Peel Ports;
- River Wall Permit – Peel Ports;
- Planning Permission – Liverpool City Council;
- Harbour Revision Order (HRO) – Parliament;
- Notice to Mariners – Harbour Master (Peel Ports);
- Heritage Conditions – English Heritage;
- Listed Building Application – Liverpool City Council;
- Marine Licence – Marine Management Organisation (MMO);
- Discharge Permits - Peel Ports / Environment Agency.

If not already in place, the Contractor should apply for all relevant permits and licences. A copy of all Licences, Environmental Permits etc. will be held on Site in a designated file(s).

3. General Site Management

3.1 Introduction

This procedure addresses the general Site management practices that should be employed to ensure the safe and compliant operation of the Site. In addition, it provides control to reduce the impacts for general operations on receptors in the surrounding.

3.2 Procedure

3.2.1 Site Working Hours

It is anticipated that general hours of work would be between 07:00 and 19:00, for 7 days per week, with some tidal works occurring outside these hours.

It is also anticipated that low noise works would be required outside these hours, in preparation for piling works, precast and in-situ works to be undertaken on the following day; although the Contractor will endeavour to minimise the frequency and duration these works. Such activities may include:

- Moving of barge to required location and jack-up;
- Setup of temporary pile gates;
- Placement of reinforcement cages; and
- Moving of service barges for disposal of arisings and material supply.

The above mentioned working hours would be agreed with LCC and the Marine Management Organization (MMO), as relevant, prior to commencements of the works.

3.2.2 Site Security

During working hours, access to the Site will be kept closed except when vehicles are entering or leaving. The Site access / egress points will operate a security pass system, and access to the Site will only be granted after a site induction has been undertaken. The Site will be clearly marked with fixed warning signs at the entrance / exit and around work perimeters detailing the potential hazards of the area.

All staff will be required to sign in and out of the Site.

Out of working hours, the Contractor should ensure that Site access points are securely locked and appropriate security provisions set in motion to prevent unauthorised access. Any security events will be logged and the logs will be kept on-site and made available to Council officers on request.

Construction hoarding will be provided in accordance with HSE standards and the Conditions of Licence issued by LCC, and will be maintained by the Contractor during the works. Hoardings will be fitted with bulkhead lights and will be well lit during hours of darkness. In addition, the Contractor will ensure that all hoardings are painted. Pedestrians will be redirected safely to alternative pedestrian routes.

3.2.3 Site Facilities

It is envisaged that the Principal Contractor would be afforded a section of the application site for welfare facilities and offices, as shown on **Figure 9**. This would be for the site personnel only with management residing in an office let from Peel in Building 12. Due to the limited space it is envisaged that a satellite compound would be required elsewhere with operatives bused from there to site. These details would be negotiated and confirmed before the construction.

On-site changing and canteen facilities for Site employees will be provided by the Contractor. A Site office will be installed for the Contractor Site Manager who will hold the all documentation required.

Employees should not congregate on the pavement outside the Site boundary, unless required to do so as part of their work. A Site dress code will be specified in the induction and details of inappropriate behaviour, including the use of radios, will be highlighted during the Site induction. The Site shall run a staggered break system to prevent large groups of site employees visiting local shops together.

Food waste will be disposed of regularly, to minimise the potential for vermin. Adequate waste and rubbish disposal facilities will be provided to minimise littering.

Designated smoking areas will be provided at the Site, with no smoking allowed to occur outside this area.

All site facilities will be contained within the designated welfare area.

3.2.4 Site Floodlighting

Floodlighting in areas adjacent to sensitive receptors shall generally be limited to the working hours identified in **Section 3.2.1**, and when seasonal changes in natural daylight require it. Where light glare may cause a nuisance, light shielding will be considered. Site lighting will be kept to a minimum, whenever possible, taking into account the needs for site Health and Safety and security. Hoarding will be lit during the hours of darkness.

Where required, lighting shall be sensitively placed, taking due account of nearby residential properties and ecologically sensitive areas. Where possible, lighting shall be directed away from the residential properties to the west of the site.

No site floodlighting will be undertaken out of hours without prior agreement with LCC and the Marine Management Organization (MMO), as relevant.

4. Neighbour and Local Community Liaison and Management of Complaints

4.1 Introduction

This procedure addresses neighbour and community liaison during the works including liaison with commercial and charter fishing operations which use the River Mersey close to the Site. The Contractor is responsible for ensuring compliance with the procedure. In addition, all staff are responsible for adhering to its requirements.

4.2 Relevant Legislation

- Clean Neighbourhoods and Environment Act 2005;
- Environmental Protection Act 1990, Part III: Statutory Nuisance; and
- Control of Pollution Act 1974.

4.3 Procedure

4.3.1 Liaison

Prior to each phase of the construction, all neighbouring occupiers will be contacted in writing by the Contractor to explain:

- The activities to be undertaken;
- The duration of the works; and
- The working hours.

Telephone numbers for key contacts, email addresses and helpline details will also be provided by the Main Contractor. The Contractor will maintain a full-time Site contact for the public and LCC in order for them to be able to obtain information, register a complaint or request action.

The Contractor will provide a Fisheries Liaison Officer (FLO) during the construction works to keep fishermen informed. The FLO would be responsible for timely communication of construction plans in order to help skippers plan fishing locations etc during the construction works.

The Contractor will also liaise with LCC (and the MMO, where relevant), to discuss working methods and measures to be used to minimise disruption.

During the works, communication with the neighbours will be maintained via a dedicated phone line for complaints, notice boards on hoardings (displaying contact details for key Site personnel) and a regular newsletter with updates on the progress of the Development and details of key upcoming activities and changes to any previously disseminated information. Neighbours will also be specifically informed about any abnormal work or road closures proposed.

All relevant licenses issued must be displayed prominently on hoardings, scaffolds, gantries or fences.

As part of the stakeholder engagement, a meeting will be arranged with the Harbour Master to advise Peel Ports of the extent of the works and to present and agree the relevant Method Statement. Following this meeting information will then be disseminated to the relevant stakeholders on the Mersey and the wider Maritime community via a Notice to Mariners.

4.3.2 Complaints

In the event of a complaint from a neighbour, a member of the public or other interested party in relation to any site activities, it will be recorded in a designated logbook, stating the nature of the complaint, the cause and, where appropriate, the remedial action taken. Sub-contractors will immediately notify the Main Contractor should they receive any complaints.

Should complaints be received, they will be addressed directly by the Contractor to enable the situation at the time of the complaint to be reviewed, and where appropriate immediate actions employed to rectify the problem. The FLO would be responsible for dealing with any complaints from fishing vessels.

All complainants will be contacted by the Contractor or their representative for further discussion and to identify a mutually acceptable resolution if the problem persists. Where a valid grievance is raised, measures will be put in place where practicable to avoid recurrence of the complaint.

The Contractor will provide regular updates to the Project Manager with regard to complaints received and subsequent resolutions.

4.4 Documentation

All complaints will be recorded in a complaints log with details of remedial action taken. The log will be available for inspection at any time during working hours.

5. Waste Minimisation and Management

5.1 Introduction

This procedure applies to the minimisation, storage and disposal of all waste generated during the construction works. It is also concerned with the establishment of procedures for complying with statutory and good practice requirements for waste management. The Contractor is responsible for ensuring that the relevant documentation is completed and held on Site. In addition, all staff are responsible for adhering to the requirements of the procedure.

The anticipated waste generated during the demolition and construction works is expected to comprise demolition waste (largely concrete timber and metals), typical construction waste (e.g. plastics, concrete, scrap metal, tarmac) and general waste generated by site workers.

This section represents an outline Waste Management Strategy (WMS). Whilst not a legal requirement, a detailed Site Waste Management Plan (SWMP) will be prepared by the Contractor before work before construction begins.

5.2 Potential Effects

The improper management of construction waste may result in potential health risks to the public and adverse environmental effects such as air, water and land pollution as well as in deterioration of the historic heritage and visual impacts of the local area.

5.3 Relevant Legislation and Guidance

- Environmental Protection Act 1990, Part II;
- Waste (England and Wales) Regulations 2011 (as amended);
- List of Wastes (England) Regulations 2005;
- Hazardous Waste (England and Wales) Regulations 2005, as amended;
- Landfill (England and Wales) Regulations 2002, as amended;
- Guidance on Applying the Waste Hierarchy (DEFRA, 2011);
- Environmental Permitting (England and Wales) Regulations 2016;
- Guidance on the classification and assessment of waste - Technical Guidance WM3, 2015;
- British Standard BS EN 14899:2005 - Characterisation of Waste, 2005;
- Clean Neighbourhoods and Environment Act 2005;
- Waste Management: The Duty of Care, A Code of Practice (HMSO, 2016);
- Definition of Waste: Development Industry Code of Practice (CLAIRE, 2008);
- Control of Asbestos Regulations 2012; and
- Asbestos: The Survey Guide (HSE, 2012).

To assist in achieving best practice, the Principal Contractor will consider the following initiatives:

- Waste Change, an online notice board where local recyclers advertise the availability of various types of waste and companies can search for required materials; and
- Building Research Establishment (BRE) and Construction Industry Research and Information Association (CIRIA) current initiatives and publications relating to construction; and

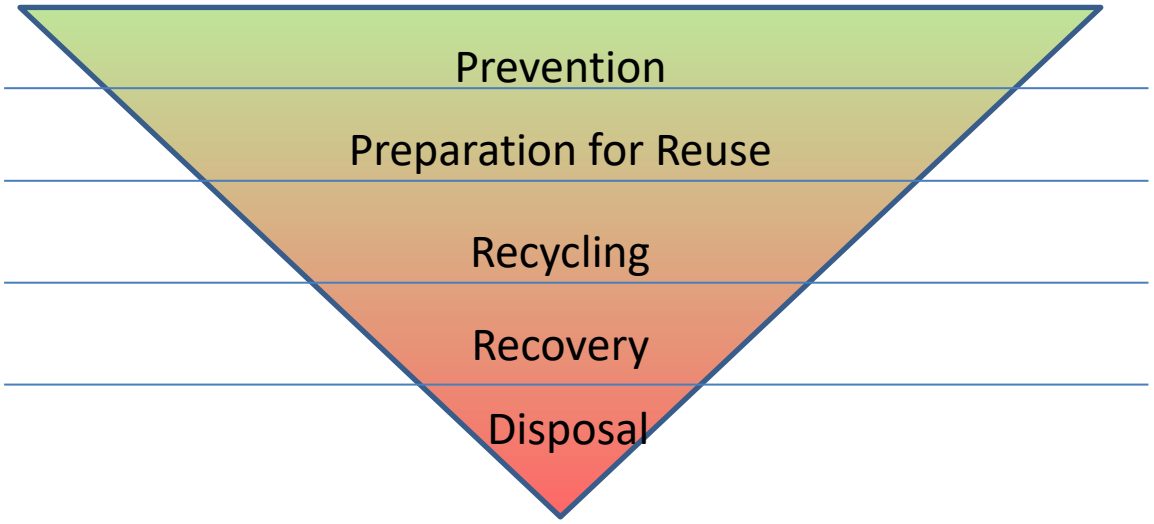
- National Industrial Symbiosis Programme.

5.4 Procedure

In line with the Waste (England and Wales) Regulations 2011, the Contractor has the duty to take all such measures available, as are reasonable in the circumstances, to apply the waste hierarchy.

In To this aim, the Contractor should rank waste management options according giving top priority to preventing waste in the first place. When waste is created, priority should be given to preparing it for re-use, recycling, recovery and finally disposal (e.g. landfill). In particular:

- Prevention includes all the measures to minimise the quantity and the quality of the waste generated, such as measures aimed at using less material in design and manufacture, keeping products for longer, using less hazardous materials;
- Preparation for reuse involves checking, cleaning, repairing, refurbishing, whole items or spare parts, in order to make the material suitable for reuse;
- Recycling is aimed at turning waste into a new substance or product. Includes composting if it meets quality protocols;
- Recovery includes treatment options such as anaerobic digestion, incineration with energy recovery, gasification and pyrolysis which produce energy (fuels, heat and power) and materials from waste; some backfilling; and
- Disposal, represents the ultimate options, and includes landfill and incineration (without energy recovery).



The procedures to be implemented in order to achieve an effective management of the materials and a reduction the waste generated during the construction of the works will be described in the SWMP. This document will detail how the re-use and recycling of materials will be maximised and will provide an estimate of the qualities of each type of waste likely to be produced, along with the proportion of waste that will be re-used or recycled on site, or removed from the site for off-site re-use, recycling, recovery or disposal.

5.4.1 Waste Prevention

The Contractor shall implement measures to minimise the production of waste during the construction phase. Measures should include, and not be limited to:

- Use standard sizes and quantities of materials, and plan ahead to reduce off cuts;
- Avoid over-ordering;
- Buying materials in bulk bags rather than loose, where possible to reduce wastage;
- Arrange deliveries to match work stages;
- Avoid materials being stored on site longer than necessary and under poor conditions; and
- Minimise rework from errors and poor workmanship.

Site induction and regular toolbox talks should be undertaken to raise awareness of good waste management. The Constructor may consider the use of computer software to estimate required quantities accurately.

5.4.2 Waste Classification

As part the waste duty of care, the Contractor must classify the waste:

- Before it is collected, disposed of or recovered;
- To identify the controls that apply to the movement of the waste;
- To identify the European Waste Catalogue code;
- To complete waste documents and records;
- To identify suitably authorised waste management options; and
- To prevent harm to people and the environment.

Waste classification should be undertaken based on the document 'Guidance on the classification and assessment of waste - Technical Guidance WM3 (1st edition 2015) and British Standard BS EN 14899:2005 'Characterisation of waste'. As a result of the classification, the Waste will be provided with a six figure European Waste Catalogue code as described by the List of Wastes Regulations (England) 2005 and would be classified as 'Hazardous' or 'Non-Hazardous', depending on if it displays or not hazardous properties.

The Contractor is responsible for commissioning the appropriate waste classification chemical testing, which will be undertaken by a NAMAS / UKAS accredited testing facility.

5.4.3 General Handling Procedures

Non-Hazardous Waste

Once the waste has been produced, the Contractor has the general duty to:

- Sort and store waste safely and securely;
- Check if the waste carrier is registered to dispose of waste;
- Complete a Waste Transfer Note for each load of waste that leaves the Site; and
- Retention of completed Waste Transfer Notes for 2 years.

Information on each waste carrier and waste treatment / disposal facility (e.g. environmental permit) should be included within the SWMP. Any anomaly with regards to the waste contractors' licenses should be reported to the Crimestoppers.

Hazardous Waste

Hazardous Waste requires additional handling, storage and disposal precautions, which include:

- Use of appropriate storage measures suitable for its hazardous properties;
- Use of businesses authorised to collect, recycle or dispose of hazardous waste;
- Preparation of EA Waste Consignment Notes; and
- Completion of Part E returns;
- Retention of completed Waste Consignment Notes for 3 years.

Hazardous waste must be clearly labelled and segregated before being treated (e.g contaminated soil) under an appropriate waste management licence or removed by a specialist, licensed waste contractor. As per the Non- Hazardous waste, information on waste contractors must be detailed within the SWMP.

Any asbestos would be removed by a licensed contractor in accordance with the Control of Asbestos Regulations 2012 and the appropriate HSE guidance in Asbestos: The Survey Guide.

In the event that potentially hazardous contaminated soils, the Works would cease in this area until the contamination has been investigated and an appropriate strategy implemented for its management.

In accordance with relevant health and safety legislation, all construction staff would be provided with appropriate Personal Protective Equipment (PPE). Welfare facilities would be provided on the Site for washing and changing. Toolbox talks should be undertaken to raise awareness about potential hazardous materials that may arise from Site and management procedures.

5.4.4 Waste Storage

The Contractor has the responsibility to provide adequate measures to store the waste before any re-use, recycling, recovery or disposal operations.

Waste material will be segregated into individual waste streams retained in clearly labelled stockpiles, skips or drums in designated areas. The detailed SWMP will include information on the types and volumes of wastes anticipated to be produced, details of any dedicated refuse / recycling enclosures, along with specific plans for how each waste stream will be stored and disposed of.

The Site will be left in a clean and tidy condition at the end of each day. Welfare facilities and skips will be clean and tidy, and food waste will be collected regularly to avoid attracting vermin to the Site.

All roads, pavements, construction equipment, temporary structures, materials and machines will be kept clean and tidy at all times with litter and rubbish removed promptly.

When leaving the Site, appropriate measures will be taken to prevent waste escaping onto the public highways, for example containers must be secured and open skips must be covered by sheeting.

Stockpiling of potentially contaminated material will be avoided. Where stockpiling is unavoidable, the material will be located on hardstanding and covered with sheeting. Stockpiles will be physically separated to avoid cross contamination and temporary road access provided for placement and loading. Any stockpiles will be positioned on impervious surfaces to collected drainage and prevent loss of entrained water and leachate to ground.

5.4.5 On-Site Reuse

In line with the Informative 9 of the Planning Decision, including the Environment Agency Model Procedures and good practice advice for applicant, the CLAIRE Definition of Waste: Code of Practice (CoP), will be considered for the reuse of site-won materials (e.g. excavations operations and/or removal of existing sub-structures).

The CLAIRE CoP is a voluntary tool based on a 'suitable for use' and 'risk based approach' which provides operators with a framework for determining whether or not excavated material arising from site during remediation and /or land development works are waste or have ceased to be waste.

The CLAIRE CoP applies to both uncontaminated and contaminated material from anthropogenic and natural sources, including:

- Soil, both top soil and sub-soil, parent material and underlying geology;
- Soil and mineral based dredgings;
- Ground based infrastructure that is capable of reuse within earthworks projects, e.g. road base, concrete floors;
- Made ground;
- Source segregated aggregate material arising from construction activities, such as crushed brick and concrete, to be reused on the site of production within earthworks projects or as sub-base or drainage materials; and
- Stockpiled excavated materials that include the above.

In order to comply with the CoP and demonstrate that the material reused has ceased to be a waste, a Materials Management Plan (MMP) will be prepared by the Environmental Management Coordinator / Consultant. The MMP will be reviewed by a CLAIRE CoP Qualified Person who will provide a Declaration to the EA prior to the use of materials.

The MMP will provide detailed procedures covering the treatment of the waste and the reuse of materials. The document would be based specific reuse criteria in order to ensure reuse of the materials would not cause harm to human health or pollution of the environment. Site reuse criteria will be derived from a human health and controlled waters risk assessment and will also include geotechnical specifications.

The MMP will include procedures to characterise the materials and assess their compliance with the site reuse criteria. Should the waste require to be treated, in order to be suitable for use, the treatment of the would be undertaken under a valid Environmental Permit or a registered Waste Exemption.

The Contractor will ensure that all materials subject to excavation, disposal, treatment and/or reuse are tracked throughout, and evidence generated to provide an auditable trail.

All evidence will be included in the Verification Report, which will be produced following the completion of the works to provide an audit trail to show that materials and wastes have gone to the correct destination.

The contractor Developers should ensure that all contaminated materials are adequately characterised both chemically and physically and that the permitting status off any proposed operations are clear.

5.4.6 Recycling

Waste management priorities and practical actions that can be undertaken on Site should follow the principles of the waste hierarchy, as outlined below.

Prior to the construction works of a specific area of the Site, the Contractor shall undertake an audit of the Site to identify materials and opportunities for maximising salvage, reuse and recycling rates of building structures and materials prior to disposal. This will be guided by the BRE's SMARTwaste toolkit and the Waste and Resources Action Programme (WRAP) Facilities Management Procurement toolkit.

Opportunities to recycle in the local area will also be investigated before any materials are disposed. The Contractor will contact LCC to notify them of any materials requiring disposal or raise the presence of such materials at working groups. Contacting other developers in the area to collect such materials (thus reducing vehicle trips and mileage) will be encouraged.

5.4.7 Off Site Treatment/ Disposal

Waste requiring off-site recycling/recovery or disposal would be adequately sampled and characterised both chemically and physically in line with the Technical Guidance WM3 on the classification and assessment of waste, as detailed within Section 5.3.2.

Should the waste be addressed to landfill disposal, it will be also classified in accordance with the Landfill (England and Wales) (Amendment) Regulations 2005, the Hazardous Waste Regulations 2005.

The Contractor will carry out pre-treatment of the waste material to a methodology that is agreed with the receiving landfill operator and in accordance with Environment Agency guidance.

As waste producer, the Contractor is responsible for describing the waste in detail. To this aim, the Contractor will provide a 'Basic Characterisation' of the waste, which must include:

- Waste source and origin;
- The code applicable to the waste under the European Waste Catalogue (EWC);
- Determination if the waste has any hazardous properties;
- The process producing the waste (including a description of the process, its SIC code and characteristics of its raw materials and products which may affect its behaviour under landfill conditions);
- The waste treatment applied, or a statement of why treatment is not considered necessary;
- The appearance of the waste (including smell, colour, consistency and physical form);
- Confirmation that the waste is not prohibited from disposal to landfill (for example liquid waste and whole used tyres); and
- The class of landfill the waste can be disposed at.

Copies of all relevant licences for the waste disposal / treatment site will be provided prior to the waste being disposed off-site.

5.5 Documentation

The following documentation must be completed and held on Site by the Contractor:

- Details of any targets for waste minimisation and recycling;
- Details regarding the quantities of waste produced, reused, recycled and sent to landfill;
- Waste Transfer Notes (Controlled Waste);
- Hazardous Waste Consignment Notes;
- Waste carrier's registration licences; and
- Environmental Permits and licences for disposal sites.

Transfer notes for controlled waste and consignment notes for hazardous waste must include an accurate description of the type, quantity and containment of waste; the European Waste Catalogue Number; and details of the waste carrier, who must be licensed. Sufficient information must be provided to ensure that the waste disposal operator is aware of the potential hazards of the substance. All documentation must be retained for a minimum of two years for transfer notes and three years for consignment notes and be available for inspection.

It should be noted that from 1 April 2016, premises in England are no longer required to register as hazardous waste producers. In the place of the former six-digit premises code the first six letters of the organisation's name are to be included on consignment notes.

6. Transport Management

6.1 Introduction

This procedure applies to the management of vehicles accessing the Site during the works and vehicle circulation within the Site. The Contractor is responsible for managing traffic and ensuring that drivers adhere to both onsite and offsite transport protocols. All staff are responsible for complying with this procedure.

It is anticipated that access to site would be created via Princes Parade, and consideration has been given to divert a section of Princes Parade to the rear of the works to create a working space and lay down area. This would also allow better access to the landside of the River Wall. The proposed diversion route is illustrated on **Figure 10**, along with the proposed construction traffic management option.

A Construction Traffic Management Plan (CTMP) will be prepared by the Contractor to provide a framework for understanding and managing construction vehicle activity in and out of the Site in co-ordination with other requirements such as the Considerate Construction Codes of Practice and Site Waste Management Plans. Furthermore, the plan will identify a range of tools, actions and interventions aimed at reducing and retiming waste removals / deliveries, maximising the use of more sustainable modes and ensuring procurement activities also account for vehicle movement and emissions. In particular, a Site Delivery Plan will form part of the CTMP.

In addition, individual construction contracts will include appropriate safeguards to ensure that the Contractor's methods and plant are controlled on site.

It is recommended that the Contractor should consider registration with the Fleet Operator Recognition Scheme (FORS) to demonstrate the Development's commitment to safe working practices and should reasonably endeavour that all sub-contractors used throughout the works are also registered with FORS. This will be checked by the preferred construction contractor in the first instance.

6.2 Potential Impacts

The potential impacts as a result of construction traffic are:

- Congestion on the local road network resulting from vehicle routing and / or queuing to access the Site;
- Pollution as a result of queuing vehicles;
- Pedestrian and cyclist safety; and
- Dust, noise and vibration of vehicles visiting and operating on Site.

6.3 Relevant Legislation and Guidance

- The Highways Act 1980;
- Environmental Protection Act 1990;
- Road Vehicles (Construction and Use) Regulations 1986, as amended;
- The Non-Road Mobile Machinery (Type-Approval and Emission of Gaseous and Particulate Pollutants) Regulations 2018;
- Road Vehicles (Construction and Use) Regulations 1986;
- The Road Traffic (Vehicle Emissions) (Fixed Penalty) (England) Regulations 2002;
- EC Directive 98/69/EC;

- Traffic Management Act 2004;
- Sulphur Content of Liquid Fuels (England and Wales) Regulations 2007, as amended;
- LCC Unitary Development Plan (UDP) 2002; and
- Merseyside Local Transport Plan 3 (LTP3).

6.4 Procedure

6.4.1 Liaison with LCC

For all temporary closures of roads and footpaths surrounding the Site required as part of the construction works, the Contractor will carry out an initial consultation with LCC. No obstruction of the public footway or public carriageway should occur during construction without prior agreement in writing by LCC. Agreement with LCC will be required on the proposed commencement date of such works, the area of the carriageway or footway to be occupied and duration, and the proposed methods of construction in order to minimise inconvenience to the public. Agreement with LCC would also be required concerning the posting of notices informing local residents, businesses and organisations.

An up-to-date Construction Traffic Management Plan will be prepared ahead of the commencement of Site works. The plan will be agreed with LCC and implemented on commencement of such works.

6.4.2 Public Safety

CEMP should also include measures to address public safety issues. To this end, the construction site will be secured by the installation of a perimeter hoarding equipped with vehicle access gates for deliveries and workforce. On-site and security measures will be in place to prevent entrance by the public or unauthorised persons. These measures would be maintained and kept in good order for the full duration of the construction phase.

CEMP should also include measures to reduce the perception of severance during construction activities, as well as the sensible routing of HGVs to avoid sensitive areas. Measures may include taking steps to phase the arrival and departure of HGVs, in order to avoid large numbers of HGVs accessing the local road network at the same time. Consideration may also be given to using river transport for removal of material and deliveries if considered feasible by the appointed Contractor.

The CEMP should also encourage Contractors to use construction vehicles fitted with cycle specific safety equipment, including side-bars, blind spot mirrors and detection equipment to help reduce the risk of collisions on the local roads.

All HGV drivers will have attended HGV Cycle Awareness sessions to ensure they are aware of and understand (and look-out for) cyclists on the roads.

All access to and egress from the Site will be made in a forward direction.

Public safety measures may also include the need for short-term partial or full closure of footways close to the Site during construction. Where temporary full or partial road and/or footway closures are required these would be agreed with LCC, as discussed in Section 7.4.1.

6.4.3 Site Access

It is anticipated that general access to site would be created via Princes Parade, as shown on **Figure 9.** This would involve a partial closure of a section of Princes Parade, which would be diverted as indicated in **Figure 10**. Access to the site for the marine piling works will be via the River Mersey.

Road closures and construction traffic routes will be subject to formal agreement with LCC and safe alternative walkways would be provided.

6.4.4 Deliveries

It is anticipated that delivery of piling rigs, supply of piles and the transport of pile arisings off site during the marine piling works such will be via the River Mersey.

Deliveries of concrete, precast concrete units, structural steel and all other materials would be by road, this will be via Princes Parade. This would need to be agreed with the relevant stakeholders, including Peel Ports, Peel Land and Property and Liverpool City Council in association with Wates Construction who will be working to the landside constructing the new hotel for Liverpool City Council, immediately adjacent the site (subject to approval).

Through the liaison noted above a full and comprehensive site delivery protocol will be developed and agreed. This may mean that a satellite storage site may be required and deliveries then taken to site from there.

All deliveries will be limited to working hours, and where possible will be planned to avoid peak times and unnecessary nuisance. Deliveries will be phased and controlled on a 'just in time' basis to limit travel time around the Site, stockpiling of materials and any associated noise and dust impacts.

A vehicle booking and management system will be enacted in order to minimise peaks and increase opportunities for consolidated deliveries. As necessary, peak hour restrictions will be applied and enforced.

Banksmen will be present at all times to ensure the safe movement of any vehicles arriving at and leaving the Site and to ensure material and equipment are delivered and removed with as little disruption to local road users and traffic in the immediate vicinity of the Site.

Wheel washing and road cleaning facilities will be provided at a sufficient level to ensure the surrounding road network is kept clear of spoil and debris.

All the delivery operations would be detailed within a Site Delivery Plan, which would form part of the CTMP.

The hours that deliveries (i.e. construction materials arriving / leaving in articulated lorries) related to the works will be allowed to access the Site will be 07:00 and 19:00 Monday to Sunday (subject to approval).

6.4.5 Navigation Traffic

It is not expected that the works themselves will have an impact on the current navigation on the Mersey. With the works progressing using the top down methodology, then the impact on Mersey traffic will be minimised. However, should there be a requirement for any small vessels to access the works then this will be agreed in advance and managed in line with the Safety Guidance For Small Boat Passage Of The River Mersey (Version 3 April 2010), with the Mersey VTS to be contacted for all movements on VHF Channel 12.

6.4.6 Vehicle Maintenance and Emissions

All vehicles should be regularly maintained in accordance with the manufacturer's specifications and must meet the relevant European Emission Standards pursuant to EC Directive 98/69/EC (commonly known as Euro standards), depending on the year the vehicle has been manufactured.

Similarly, heavy duty vehicles must comply with emission standards set in EC directive 98/69/EC non-road mobile vehicles with compression ignition engines used within the Site must comply with emission standards set in EC directive 98/69/EC. Vehicles must meet Stage III limits from commencements of works.

Non-road mobile machinery (NRMM) of net power between 37KW and 560KW used on site are required to meet specific standards. This applies to NRMM engines for both Nitrogen Oxides (NOx) and Particulate Matter (PM) emissions. These standards are based upon engine emissions standards set in Regulation (EU) 2016/1628.

Exemptions to the standards set out above for road and non-road vehicles may be granted for specialist equipment with alternative emission reduction equipment or run on alternative fuels. Such exemptions shall be applied for in writing to Local Planning Authority in advance of use.

Vehicles or equipment not complying with these standards must not be used on the Site without prior written approval from the Local Planning Authority.

Any diesel-powered machines used on Site must be run on low sulphur diesel, which is a fuel meeting the specification within BS EN 90.

6.5 Documentation

- Copies of vehicle maintenance records;
- Construction Traffic Management Plan (CTMP);
- Travel Route and Contractor Welfare / Parking Location Plans;
- Employee Work Travel Plans; and
- A log of correspondence with LCC regarding non-conformance.

7. Control of Emissions to Air

7.1 Introduction

The major influences on air quality throughout the construction works are likely to be dust-generating activities and vehicle emissions from plant and vehicles both on and accessing the Site. Potentially, nuisance can be caused by the deposition of construction dust.

Typical emissions arising from plant operating during the construction works and from vehicles going to and from the Site would have the potential to contribute to local levels of air pollution, particularly Nitrogen Dioxide (NO_2), Carbon Dioxide (CO_2) and particulate measuring 10µm or less (PM_{10}). Dust nuisance occurs more readily during prolonged dry weather and especially in strong winds. Dust becomes more difficult to suppress once it is made airborne, consequently, good site management must include the ability to respond quickly to such conditions.

The whole of Liverpool City area has been designated as an air quality management area (AQMA) for exceedances of nitrogen dioxide (NO_2).

The nearest high sensitivity human receptors to air pollution are residential properties located within 20m of the Site boundary on Princes Parade to the north and William Jessop Way to the east. The nearest ecological receptor is the River Mersey, (included in the Liverpool Bay Special Protection Area (SPA) for foraging common tern *Sterna hirundo*), a high sensitivity receptor located within part of the Site.

An Air Quality assessment was prepared by Waterman as part of the 2017 ES submitted to LCC and the MMO in relation to the planning permission for the Development. The chapter presented an assessment of the likely significant effects of the proposed Development on local air quality, and particular consideration was given to the effects of potential emissions from site-wide construction activities.

The procedures outlined below apply to the management of emissions to the atmosphere during the works. All staff are responsible for complying with the requirements of the procedure.

7.2 Potential Impacts

The construction works in relation to the Development have the potential to effect local air quality conditions, as follows:

- Dust deposition onto surfaces such as clothes, cars or windows; and
- Impact on human health from dust inhalation and air emissions; and
- Impacts on ecological receptors due to dust deposition and air emissions.

Dust generation is usually associated with the demolition, earthworks, construction and trackout activities. The Air Quality assessment prepared by Waterman indicated that the sensitivity of the surrounding area to dust nuisance was high during all the relevant phases construction works in terms of dust soiling effects and human health inhalation and was low in terms of ecological effects. Based on the emissions magnitude and sensitivity of the area, the assessment indicates that the risk of having dust soiling and health effects on the is high during the earthwork and construction and medium for the demolition phase and trackout activities. Whilst the risk of having ecological effects was assessed as being generally low, with the exception of the demolition phase, where this was considered negligible. Therefore, Site specific mitigation measures would be required to ensure that there are no adverse effects from demolition and construction.

Plant operating on the Site and demolition and construction related vehicles entering and egressing the Site from / to the local road network would have the potential to increase local air pollutant concentrations, particularly in respect of NO_2 and particulate matter (both PM_{10} and $PM_{2.5}$). The likely effect of construction

vehicles entering and egressing the Site to air quality would, in the worst-case, give rise to a temporary, short-term, local effect of moderate adverse significance during the peak construction period.

7.3 Relevant Legislation and Guidance

- Environmental Protection Act 1990; Part III Statutory Nuisance;
- Control of Substances Hazardous to Health Regulations 2002;
- Control of Pollution Act 1974;
- Clean Air Act 1993;
- The Health and Safety at Work Act 1974;
- Clean Neighbourhoods and Environment Act 1995;
- Air Quality Regulations 2010;
- UK Air Quality Strategy 2007;
- Environmental Permitting (England and Wales) Regulations 2016, as amended;
- British Research Institute (BRE) "Controlling particles, vapour and noise pollution from construction sites" 2003;
- Environmental Permitting (England and Wales) Regulations 2016, as amended;
- Institute of Air Quality Management: Guidance on the Assessment of Dust from Demolition and Construction 2014;
- Local Air Quality Management Technical Guidance LAQM. TG(16), Defra 2016;
- Environmental Protection UK & Institute of Air Quality Management Guidance; Land-Use Planning & Development Control: Planning for Air Quality, 2017; and
- LCC Air Quality Action Plan 2008; and
- Air Quality Annual Status Report for Liverpool City Council, LCC 2016.

7.4 Baseline Air Quality

LCC currently undertakes monitoring of NO_2 at one location in Liverpool City Centre. The urban roadside automatic monitor on Queens Drive, Walton is located, approximately 5km to the north-east of the Site (OS Grid Reference 336164, 394906). The urban background automatic monitor in Speke monitors NO_2 and PM_{10} and is located approximately 12km to the south-east of the Site (OS Grid Reference 343884, 383601). The most recent monitored concentrations at these monitors are presented in **Table 4** below from 2013 to 2016. The monitoring results in indicate that the NO_2 and PM_{10} objectives were met in each year measured.

NO_2 was also measured at locations using 73 diffusion tubes in Liverpool. However, the results for the ten NO_2 roadside diffusion tubes closest to the centre of the Site (presented in **Table 5)** indicate that the annual mean NO_2 objective of 40µg/m^3 was exceeded at all the 10 diffusion tubes in 2015 and at seven diffusion tubes in 2016.

Table 4: Annual Mean Monitored Concentrations at the LCC automatic monitors (µg/m^3)

Monitor	Pollutant	Averaging Period	AQS Objective	2013	2014	2015	2016
Queens Drive, Walton	NO_2	Annual Mean (µg/m^3)	40µg/m^3	34.0	34.6	34.3	-
		1-Hour Mean (No. of Hours)	200µg/m^3 not to be exceeded more than 18 times a year	0	0	0	-
Speke	NO_2	Annual Mean (µg/m^3)	40µg/m^3	23.0	24.7	22.4	23
		1-Hour Mean (No. of Hours)	200µg/m^3 not to be exceeded more than 18 times a year	0	0	0	0
	PM_{10}	Annual Mean (µg/m^3)	40µg/m^3	14.0	14.0	13.9	15
		24-Hour Mean (No. of Days)	50µg/m^3 not to be exceeded more than 35 times a year	6	2	1	0
	PM2.5	Annual Mean (µg/m^3)	25µg/m^3	11.6	10.8	9.2	10.0

Notes: Data obtained from 2016 Air Quality Annual Status Report for Liverpool City Council and www.airqualityengland.co.uk

Table 5: Annual Mean Monitored Concentrations at the LCC automatic monitors (µg/m^3)

Site ID	Location	Distance to Site centre (km)	2015	2016
T29	Leeds Street/Pall Mall Road Sign	0.8	**43**	39
T30	Leeds Street/Pall Mall Road Sign	0.8	**41**	40
T31	Leeds Street/Pall Mall Road Sign	0.8	**43**	38
T38	Covent Garden/Dale Street Lamp Post	0.3	**48**	**44**
T39	Strand Street/Water Street Junction – Road sign L2	0.5	**67**	**67**
T40	Strand Street/Water Street Junction Road sign L2	0.5	**64**	**60**
T41	Strand Street/Water Street Junction Road sign L2	0.5	**67**	**63**
T32	Crosshall Street Downpipe 2nd Along from Dale St.	0.8	**70**	**63**
T33	Crosshall Street Downpipe 2nd Along from Dale St.	0.9	**73**	**65**
T34	Crosshall Street Downpipe 2nd Along from Dale St.	0.9	**80**	**66**

7.5 Procedures

7.5.1 Liaison with LCC

Prior to the commencement of construction works, the Contractor will liaise with LCC to confirm:

- PM_{10} Action Levels;
- Monitoring regime, sampling locations and frequency; and
- Proposed mitigation measures.

7.5.2 General Mitigation Measures

Guidance from the BRE states that the most effective mitigation technique for dust control is to prevent dust from becoming airborne, since it is difficult to suppress after this stage. As such, good site management would include the ability to respond quickly to such conditions.

The following mitigation measures will be adopted by the Contractor to reduce and manage dust and other emissions from Site activities and minimise disruption or nuisance to neighbouring occupiers.

- A) Pre-project planning
  - Method statements including the demolition method statement required as a condition of planning will include processes for controlling dust;
  - Where applicable hold regular liaison meetings with other construction sites within 500m of the Site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised;
  - Setting of speed limits; and
  - Discussions with LCC to determine what monitoring is required to meet local and national aims
- B) Site works
  - Visual assessment of dust levels will be undertaken by all Site personnel at all times to identify where excess dust levels are being generated;
  - Erection of appropriate hoarding and / or fencing to reduce dust dispersion and restrict public access;
  - Damping down of areas subject to ground breaking / excavation activities and any demolished materials;
  - Damping down of materials during the site infilling operations;
  - Setting an onsite speed limit of 10mph; and
  - Keeping fencing, barriers, scaffolding and screening clean and in good repair with any damage repaired by the Contractor without delay.
- C) Haulage routes, vehicles and plant
  - Unnecessary vehicle movements and manoeuvring will be avoided;
  - Locate plant and vehicles away from sensitive areas, or housed in closed environments where possible;
  - Use of vehicles and plant with low emission levels;
  - Restriction of drop heights onto lorries;
  - Regular maintenance of engines, plant, maintenance of pumps and bowser jets;
  - Use of wheel-washes at site egress points to ensure vehicles are clear of mud and similar debris prior to leaving the Site boundary;
  - Use of enclosed and sheeted vehicles;
  - Prevention of unnecessary engine idling;
  - Provide regular road sweeping activities;
  - Avoid heating with open flame burners;
  - Using water sprays, sand or Hessian to reduce vapour emissions; and
  - Use of particle control measures on all machinery which can generate dust.
- B) Materials handling, storage, stockpiles, spillage and disposal
  - Provision of screening during dust generating activities near to residential properties adjoining the Site;
  - Keeping handling areas clean and free of dust;

- Employ best available dust suppression techniques to control particle emissions;
- Damping down with water when loading materials onto vehicles, onto conveyors and skips;
- Storage of fine dry materials in enclosures or given adequate protection from wind, by sheeting;
- Ensure that skips are securely covered;
- Ensure methods and equipment are in place for immediate clean-up of accidental spillages of dusty or potentially dusty materials, using wet handling methods where appropriate; and
- No burning of waste wood or other materials on Site.

A specific Construction Traffic Management Plan (CTMP) will be prepared by the Contractor and will identify the route management strategy for HGVs. During construction, the Contractor should aim to establish and maintain an area for turning vehicles on-site so that all vehicles can enter and leave in a forward gear for as much of the construction programme as possible. An area for site workers to park at the Site would be established, although use of public transport to access the Site would be encouraged.

The Contractor must ensure that all plant and vehicles are in good state of repair and conform to the manufacturers' specification or legislative / British Standard Emission Standards. Plant maintenance and defect reports shall be held on Site in a designated file. Wherever possible, plant shall not be left running for long periods when not directly in use. Where appropriate, electrically-powered plants shall be used in place of petrol or diesel.

Care should be taken that damping down and wheel washing activities do not create excess mud that could cause excessive run-off into water courses and drainage.

Close liaison with surrounding sensitive properties should be undertaken during periods that may generate dust because of the combination of activities or particular wind conditions (speed and direction).

In addition, recording of any exceptional incidents that cause dust and air quality pollutant emissions, either on or off-Site, and appropriate action taken to resolve the situation.

7.5.3 Monitoring

Monitoring shall be the responsibility of the Contractor. Final details of dust monitoring are to be agreed with LCC. The Contractor will determine the prevailing wind direction across the Site using data from a nearby weather station and identify which sensitive location(s) need to be monitored. Details of the monitoring programme (parameters, equipment, frequency) as well as monitoring locations need to be agreed with LCC. In line with IAQM guidance (*Guidance on Monitoring in the Vicinity of Demolition and Construction Sites, October 2018 (version 1.1)*, a minimum of two monitoring locations will be established, ideally one upwind and one downwind.

Action Levels will be agreed with LCC. The recommended action level for PM_{10} / dust concentrations is 190µg/m^3 averaged over a 1-hour period.

It is recommended that an alarm level, lower than the Action Level, is identified by the Contractor's system, to allow issues surrounding elevated dust levels to be dealt with prior to the Action Level being reached.

Where the results of monitoring exercises indicate that the Action Levels have been exceeded, work should stop immediately, and the following steps will be undertaken by the Contractor:

- Identify the activity or activities causing the Action Level to be exceeded;
- Investigate whether the activities could be easily changed or other simple actions taken to substantially reduce dust levels;

- If simple and effective remedial measures are not identified, adopt alternative techniques and / or additional mitigation measures, until the problem is rectified;
- In all cases where Action Levels are likely to be exceeded, undertake liaison with neighbours and LCC to the degree that is appropriate for the levels likely to be reached and their estimated duration; and
- Log the incidents of exceedances along with the identified source and the action taken to mitigate the issue. This log should be available for review by LCC at all times.

The local community will be informed in writing of proposed Site operations and potentially disturbing operations will be programmed for times that would minimise any impacts.

On-going visual inspection of the Site will be undertaken at all times by the Contractor. If dust clouds are observed, action should be taken immediately, notwithstanding dust monitoring measurements.

Daily on and off-Site inspections, with particular regard to the dust deposition, should be undertaken.

The above measures will be set out in a Dust Management Plan to be provided by the Contractor in due course.

7.6 Documentation

The following documentation must be held on file onsite:

- A Dust Management Plan, including dust monitoring sheets;
- Records of targets and progress against these targets for onsite energy use;
- A log of exceedances / complaints with source and details of corrective action taken;
- Method Statements;
- Risk Assessments;
- Plant maintenance and defect reports; and
- Complaints procedure.

8. Terrestrial Noise and Vibration

8.1 Introduction

This procedure applies to the management of noise and vibration during the construction works. All staff are responsible for complying with the requirements of the procedure.

A Noise and Vibration assessment was prepared by Waterman as part of the Environmental Statement submitted to LCC in relation to the planning permission for the Development. The chapter presented an assessment of the likely effects of the proposed Development on the surrounding area in terms of noise and vibration, both during the construction phase and operational phase of the Development. It also outlined the relevant baseline acoustic conditions on the Site and immediate surrounding area.

An updated assessment of demolition and construction noise was completed in November 2018 which took account of updated proposed construction methodology, particularly in relation to the use of less noisy and vibration-inducing piling techniques.

The area surrounding the Site is urban in nature, being a combination of residential and business / commercial use. The closest sensitive receptors (SRs) for noise and vibrations during demolition and construction would be as follows:

- Alexandra Tower (Residential);
- Liverpool City Lofts (Residential); and
- Malmaison Hotel (Residential).
- Baseline noise surveys were undertaken by Waterman in March 2017.

Ambient noise levels around the Site ranged between $L_{Aeq,T}$ 51dB and 64dB dependent on location, time of day and time of week. The dominant noise source at all locations was noted to be road traffic noise. Noise levels during the night-time period were typically lower than those experienced during the day and evening time as a result of reduced traffic flows and human activity during this period.

Generally, the noise climate around the Site were reportedly dominated by constant distant vehicular traffic on the New Quay (A5052) and influenced by intermittent vehicular traffic on the access road running through Princes Dock; however at Alexandra Tower and Number 12 Princes Dock Offices high tidal noise from the waves hitting the banks of the river were discernible, during the night, when road traffic was at a lull.

8.2 Potential Impacts

The highest noise and vibration noise levels during the Works tend to be generally associated with piling, excavation, and construction of the substructure and superstructure. During the fit-out, construction noise would be generally lower.

At both Alexandra Tower and No.12 Princes Dock Offices major, short-term, temporary, local adverse effects are predicted for all phases when works are undertaken at the closest distance to identified receptors during both the day and evening (including Sunday daytime) periods. At night-time during ‘low noise’ works negligible effects are predicted to occur at both Liverpool City Lofts and Malmaison due to distance attenuation. At Alexandra Tower local, short-term temporary effects of major adverse significance are predicted when works are undertaken within 20m, reducing to moderate adverse at 50m from receptors.

It should be noted that, in reality, construction works would be transient in nature, with works for the most part taking place at locations significantly removed from the SRs. Nonetheless, given that some major adverse effects have been predicted, mitigation measures would be required to reduce noise levels from the all the construction phases of the proposed Development.

The construction of the Development, namely the suspended deck, would necessitate the use of rotary bored piling into the river bed. Given the distance at which perceptible vibration may occur, there is the potential for temporary, short-term, local minor to moderate adverse effects at Alexandra Tower and No. 12 Princes Parade Dock Office depending on the proximity and method of piling works to these properties. With regard to all other receptors, negligible effects are anticipated due to the distance separation from the works. Piling and construction activities more than 50m from Alexandra Tower are predicted to result in negligible noise effects.

Vibration arising from activities other than piling are not anticipated to give rise to perceptible vibration at the SRs due to the type of activities and distance separation.

Without mitigation, there is the potential for temporary, short-term, localised minor adverse effects at the SRs adjacent to the construction traffic route.

8.3 Relevant Legislation and Guidance

- Environmental Protection Act 1990 Part III Statutory Nuisance;
- Control of Pollution Act 1974 Part IV (Sections 60 and 61);
- The Control of Noise (Codes of Practice for Construction and Open Sites) (England) Order 2002 as amended;
- Noise Emission in the Environment by Equipment for Use Outdoors Regulations 2001;
- The Noise and Statutory Nuisance Act 1993;
- The Noise Act 1996, as amended;
- Control of Noise at Work Regulations 2005, as amended;
- Environmental Noise (England) Regulations 2006;
- The Environmental Noise (Identification of Noise Sources) (England) Regulations 2007, as amended;
- BS 5228: 2009+A1:2014 Control of Noise on Construction and Open Sites, Parts 1 and 2;
- BS 7385: Part 2 Guide to Damage Levels from Ground Borne Vibration;
- BS 6472: Guide to Evaluation of Human Exposure to Vibration in Buildings;
- BS EN 61672-1:2013: Electroacoustics, Sound level meters, Specifications December 2013; and
- BRE “Controlling particles, vapour and noise pollution from construction sites” 2003.

8.4 Procedures

8.4.1 Liaison with LCC

Discussions will take place with LCC prior to and / or (as the case may require) during works on relevant areas of the Site regarding the following:

- Noise & Vibration monitoring locations;
- Noise & Vibration Action Levels;
- Noise & Vibration monitoring regime; and

- Proposed mitigation measures.

Discussion shall relate to the specific works and operations on such relevant plots or parts of the Site and the relevant context in which such works and operations shall be carried out.

In this regard, it should be noted that Condition 23 of the Liverpool Cruise Terminal Decision Notice (planning reference: 17O/3230) states that:

23. Noise levels at any occupied residential property due to construction or demolition or Site Engineering and Preparation Works shall not exceed 75dB LA eq (10 hour) measured at 1m from the façade of the nearest occupied property, between the hours of 08.00 to 18.00, Monday to Friday, and 75dB LA eq (5 hour) during the hours of 08.00 to 13.00 on Saturday, as controlled through the CEMP, unless such works have the prior approval of the Local Authority, under S61 of the Control of Pollution Act 1974.

In addition, the Local Planning Authority Advice for Applicant No.11 indicates that *During the site works the contractor shall pay full regard to the best practicable means available in respect of the control of noise and dust from the site. In addition, no operations which are audible at the site boundary shall be carried out: (i) outside the hours of 0800 to 1800 weekdays; (ii) outside the hours of 0800 to 1300 Saturdays, and (iii) at any time on Sundays or Bank Holidays.*

However, it is understood that works are tide dependent and therefore works outside those specified in Condition 45 are being sought; namely 0700-1900 Monday to Saturday but also with the flexibility to include Sunday.

Based on current planning and programming, there is the potential for 'low noise' works to be undertaken outside the requested operational hours of 0700-1900 7-days a week. This is to allow preparation for piling works, precast and in-situ works that would be undertaken the following day. Such activities may include:

- Moving of barge to required location and jack-up
- Setup of temporary pile gates
- Placement of reinforcement cages
- Moving of service barges for disposal of arisings and material supply.

As stated in BS 5228-2, and as generally accepted, the threshold of vibration perception for humans in residential environments is typically in the PPV range 0.15 to 0.3 mm/s at frequencies between 8 Hertz (Hz) and 80Hz with complaints likely at 1 mm/s. With regard to potential damage to utilities and listed buildings/structures, provided vibration is ≤7.5mm/s (derived from BS5228-2 advice) the potential effect is likely to be insignificant. For all other buildings, a vibration level of ≤10mm/s is likely to be insignificant with regard to building damage.

8.4.2 General Mitigation Measures

Noise and vibration shall be managed according to best practicable means. The following mitigation measures should be implemented by contractors at all times to minimise noise and vibration generated from construction activities and disruption to any sensitive receptors. Particular attention will be paid to implementing the measures outlined below when operations are undertaken in close proximity to occupied properties.

Mitigation measures should include but not limited to:

- Use of hoarding to the required height and density appropriate to the noise sensitivity of the along boundaries with sensitive receptors;

- Any damage to the hoarding surrounding the Site to be immediately repaired by the Contractor;
- Use of modern, quiet and well-maintained machinery such as electric powered plant, where possible and hoists should use the Variable Frequency Converter drive system;
- Use of screens around static plant, and other temporary acoustic barriers where appropriate;
- Switching off plant which is not in use;
- Vehicles and mechanical plant used for the Works to be fitted with exhaust silencers;
- Plant should be operated in such a manner as to minimise noise emissions in accordance with the relevant EU / UK noise limits applicable to that equipment;
- Plant should be properly maintained and operated in accordance with manufacturers' recommendations. Electrically powered plant would be preferred, where practicable, to mechanically powered alternatives;
- Establish noise and vibration target levels (a Section 61 agreement under the Control of Pollution Act 1974(COPA)) to reduce noise and vibration to a minimum in accordance with best practicable means, as defined in Section 72 of COPA;
- Where high levels of noise and vibration are predicted, monitoring of noise and vibration levels;
- Changing, where possible, methods and processes to keep noise and vibration levels low;
- Positioning plant as far away from residential property as physically possible and switching off when not in use;
- Works would be limited to restricted working hours, as detailed in **Section 3.2.1**;
- Where possible, adopt low vibration working methods or alternative working methods, use of cut off trenches, reduction of energy input per blow and reducing resistance to penetration e.g. pre-boring for driven piles; and
- Regular communications held between contractors, Local Authority officers and neighbours;
- Occupants of adjacent properties most likely to be affected by noise or vibration from activities on the Site should be informed of the nature of the works, proposed hours of work and anticipated duration prior to the commencement of activities.
- Adopting quiet periods during the day to enable the occupants of surrounding commercial premises to carry out their work normally;
- Where noise Trigger Levels are exceeded, appropriate action should be taken to prevent exceedance of threshold levels (see Section 8.4.3); and
- Reviewing techniques, especially in response to exceedances of the Action Level and / or complaints.

The Construction Traffic Management Plan (CTMP) prepared by the Contactor will assist in the control of traffic during construction of the site. The CTMP will ensure the construction vehicle movements would be adequately scheduled to avoid concentration of movements during sensitive hours. The CTMP will also include a construction traffic routing plan, which would further contribute to minimise the temporary and intermittent adverse impacts associated to the construction traffic. Consideration should also be given to the avoidance (or limited use) of roads during peak hours, where practicable. The CTMP will be agreed between LCC, the Contractor and the Applicant.

The implementation of mitigation measures set out above should be based on the attenuation levels set out within the Table B1 'Methods of reducing noise levels from construction plant' of BS5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites' and, as such should provide a 10dB(A) reduction.

For additional noise mitigation to address the impact of noise on birds, please refer to **Section 13.4**.

8.4.3 Noise and Vibration Monitoring

Monitoring shall be the responsibility of the Contractor. The requirement for noise and vibration monitoring, and the monitoring locations and frequency, will be agreed with LCC. This will be determined by the nature of the construction works being undertaken at the Site at a particular time. During phases that have the potential to generate excessive noise and / or vibration, continuous monitoring is likely to be required. Monitoring frequency and locations will be defined following liaison with LCC.

Noise and vibration monitoring record sheets, as presented in **Appendix C (**or similar), will be completed as necessary.

The results of monitoring will be recorded and retained on Site. Should monitoring identify any exceedance of the noise or vibration Action Levels or should any complaints regarding noise and vibration be received, additional sample noise and vibration monitoring should be undertaken by the Environmental Monitoring Co-ordinator nominated by the Contractor.

Where the results of the monitoring exercises indicate that the Action Levels have been exceeded, the following actions should be undertaken:

- The activity or activities causing an exceedance of the Action Levels will be identified through discussions with the Environmental Monitoring Co-ordinator;
- Investigations will be made to determine whether the activities could be easily changed, or other simple actions taken to substantially reduce noise or vibration levels;
- If simple and effective remedial measures are not identified, consideration will be given to the implementation of alternative techniques and/or additional mitigation measures;
- Log the incidents of exceedances along with the identified source and the action taken to mitigate the issue. This log shall be available for review by LCC at all times; and
- In all cases where Action Levels are likely to be exceeded, neighbours shall be advised in writing to the degree that is appropriate for the levels likely to be reached and their estimated duration.

8.4.4 Equipment

Noise monitors will comply with BS EN 61672-1:2013 and conform to a Class 1 integrating sound level meter that simultaneously records L_{Aeq}, L_{MAX}, L_{90} and L_{10} noise levels. The vibration monitors must continuously sample the vibration levels and record the maximum vertical Peak Particle Velocity (PPV) every second for sample vibration monitoring and every 15-minute period for continuous vibration monitoring. The vibration monitors will be capable of measuring 3-dimensional levels of vibration. Data recorded by the monitors will be downloaded on a weekly basis and reported to the relevant members of the project team.

8.5 Documentation

The following documentation must be held on file onsite:

- Noise and vibration monitoring data;
- Details of all complaints received;
- Details of corrective action taken if complaints are received or excessive noise is identified; and
- Information regarding maintenance of monitors and Site plant / vehicles.

9. Townscape and Visual Effects

9.1 Introduction

This procedure applies to the management of the townscape and visual effect during the site enabling and construction. All staff shall be responsible for complying with the requirements of the procedure.

As mentioned in Section 1.2, the southern part of the Site is within the WHS. The location of the proposed cruise terminal building is within the WHS Buffer Zone. Castle Street Conservation Area forms part of the WHS and also overlaps the southern part of the Site.

9.2 Potential Impacts

General anticipated potential effects associated with demolition and construction would include:

- The visual impact of HGV movement, barges and general construction works;
- The visual impact of site lighting around construction areas;
- The visual and landscape impacts of remodelling ground levels/cut and fill operations;
- The landscape impacts of incorporating services and utilities;
- The landscape and visual impacts of temporary parking, on-site accommodation and work areas;
- The visual impacts of temporary screening measure and protective fencing;
- The landscape and visual impact of material stockpiles.

As is commonplace with major building works, the scale of the activities involved in the construction of the planned Cruise Liner Terminal and its associated infrastructure, including local demolitions, dock wall reconstruction and jetty construction, would potentially be visible from many locations including the opposite side of the Mersey. These would have the potential to give rise to a range of visual effects that cannot practicably be mitigated that would vary over the construction period depending on the scale and intensity of the Works. However, the effects would be predominantly visual and it is not anticipated that there would be any significant townscape effects during demolition and construction.

9.3 Relevant Legislation and Guidance

- National Planning Policy Framework (NPPF), 2019;
- Planning (Listed Buildings and Conservation Areas) Act 1990;
- Town and Country Planning Act 1990;
- Unitary Development Plan (UDP), LCC, 2002;
- Regional Spatial Strategy, LCC 2008; and
- Liverpool World Heritage Site Management Plan, 2017.

9.4 Procedure

In order to mitigate against potential adverse visual effects, the dedicated measures shall be incorporated in the CEMP, ensuring that temporary deterioration to landscape resources, character and visual amenity would be kept to a practicable minimum.

Minimum measures to be included are as follows:

- Establish and enact good site management, maintenance and housekeeping;
- Use of hoardings where appropriate to screen works from surrounding visual receptors;

- Security fencing during construction being of a type and colour chosen to be sympathetic to the surroundings;
- Consideration of the location, type, height and colour of site compounds buildings / portacabins;
- Use of directional lighting and limiting hours of operation to minimise effects on receptors; and
- Limiting height of stockpiles on site (e.g. to height of surrounding hoarding / fencing).

10. Built Heritage

10.1 Introduction

This procedure applies to the management of built heritage assets during the Site construction works. All staff shall be responsible for complying with the requirements of the procedure.

The following existing reports and information on built heritage are available:

- International Council on Monuments and Sites (ICOMOS) Statement prepared by Waterman in October 2017; and
- Built Heritage assessment prepared by Waterman, which formed one of the chapters of the 2017ES submitted to LCC in relation to the planning permission for the Development.

The Liverpool Maritime Mercantile City World Heritage Site was inscribed by UNESCO in July 2004 under the 1972 World Heritage Convention. The southern section of the site falls respectively within the Liverpool Maritime Mercantile World Heritage Site (WHS) and its Buffer Zone (BZ). Part of the proposed site lies within the Castle Street Conservation Area. The site surrounds the Titanic Memorial (Grade II Listed Building), although this is excluded from the scheme and outside planning application site boundary. The Site also lies within the wider setting of, and is visible from, the Grade II Listed Waterloo Warehouse and the various Grade I and II* Listed Buildings at the Pier Head. For these reasons the site is considered a sensitive location in heritage terms.

The derelict Princes Jetty is located within the Site boundary. As per the Informative 12 provided as part of the Planning Decision Notice, the jetty is considered a listed structure due to its physical connection to the Grade II Listed Entrance to Princes Dock to the north.

As detailed in **Section 1.5**, the Site within the setting of a group of nationally significant listed buildings, collectively known as the Three Graces and a group of listed monumental statues are located to the west of these buildings.

10.2 Potential Effects

Potential effects on the built heritage asset associated with the construction works can be classed as ‘direct’ and ‘indirect’. Direct effects are expected to include the material alteration to the built heritage asset, such as its extension, alteration to fabric or design or its demolition. Indirect effects are related to the potential for noise, dust and additional traffic vibration to have a detrimental effect on the heritage assets identified.

The 2017 ES Built Heritage assessment indicated that during the construction phase:

- There would be no such primary direct effect to any heritage assets of high heritage significance, namely the listed buildings which fall outside of the Site boundary; and
- Indirect Effects are expected to be temporary adverse upon both the heritage assets located within the Site and located within the surrounding of the Site.

It was subsequently confirmed that since Princes Jetty is connected to the listed Entrance to Princes Half Tide Dock, listed building consent is required to demolish Princes Jetty. The Applicant has applied for listed building consent.

[Note: To be updated as and when consent granted]

10.3 Relevant Legislation and Guidance

- Planning (Listed Buildings and Conservation Areas) Act 1990;
- Town and Country Planning Act 1990 (as amended);
- National Planning Policy Framework (NPPF) 'Conserving and Enhancing the Historic Environment' (Section 16);
- English Heritage (2008) Conservation Principles, Policies and Guidance;
- Liverpool Unitary Development Plan (2002); and
- Liverpool Maritime Mercantile City World Heritage Site Supplementary Planning Document (2009).

10.4 Procedure

Any mitigation measures to be Included within the CEMP on matters related to heritage should be discussed with Historic England and LCC prior to during works on relevant areas of the Site.

The following mitigation measures shall be incorporated within the CEMP in order to limit the adverse effects on the built heritage during the enabling works and construction programme:

- As per Condition 8 of the Planning Decision Notice, demolition shall not be implemented until the Listed Building Consent has been granted; In particular, as per Informative 12 of the Planning Decision Notice " *…listed building consent will be required for the demolition that part of the Princes Jetty which is fixed to the listed dock and for the construction of any part of the proposed Cruise Terminal Structure that is fixed to the listed dock wall".*
- Care should be taken during the demolition and construction works to limit the extent of vibration and dust, reducing the significance of adverse effects upon the following heritage assets:
  - Liverpool Maritime Mercantile City WHS;
  - Memorial to Heroes of the Marine Engine Room;
  - Royal Liver Building;
  - Cunard Building;
  - Port of Liverpool Building:
  - Tower Building;
  - Church of Our Lady and St Nicholas;
  - Dock Wall and Dock Wall Gates;
  - Listed Statues in and Around Pier Head;
  - Princes Half Tide Dock, Entrance to Princes Half Tide Dock and Waterloo Warehouse;
  - Castle Street Conservation Area;
  - Stanley Dock Conservation Area; and
  - West Africa House and Wellington Buildings.
- Monitor listed structures for movement or damage if activities are being undertaken in proximity to the structures (none currently proposed); and
- Any artefacts including signage, plaques, date stones, objects associated with historic uses, and written or illustrative materials, if discovered during demolition shall be stored for inspection by the Heritage Consultant prior to its destruction or onward salvage. Potentially sensitive material shall be handled through appropriate channels.

11. Archaeology

11.1 Introduction

This procedure applies to control of potential adverse effect on the Archaeology, associated with the Site construction activities. All staff are responsible for adhering with the requirements of the procedure.

The following existing reports and information on archaeology are available for consultation:

- Archaeology assessment prepared by Waterman, included as Chapter 11 within the 2017 ES submitted to LCC in relation to the planning permission for the Development; and
- International Council on Monuments and Sites (ICOMOS) Statement prepared by Waterman in October 2017.

All but a small portion of the Site falls within the buffer zone of the adjacent World Heritage Site (WHS) and the very southern-most part of the Site falls within the WHS, but no development is proposed in this area. The rest of the Site has been specifically excluded from the WHS itself.

The Site has the potential to contain palaeo-environmental and riverine deposits from Prehistoric to the present day. These would be of value in a regional context and would be of medium significance.

The extant structure of the Princes Jetty is the only surviving element of the original Liverpool Landing Stage, where many people embarked and disembarked for emigration to North America.

In addition, several sets of railway tracks were observed, along with the footprints of previous buildings and stone block surfaces, both within and outside the Site. Both tracks and buildings are marked on historic OS maps. The tracks are part of the early twentieth century Riverside Railway. The railway and the buildings were part of the infrastructure of the Liverpool Docks, and therefore part of a major international port. These features are likely to be more relevant to the construction of the proposed Liverpool Cruise Liner Hotel, adjacent to the Liverpool Cruise Terminal but within the wider Liverpool Cruise Terminal Site.

11.2 Potential Effects

An archaeological assessment was prepared by Waterman as part of the 2017 ES submitted to LCC in relation to the planning permission for the Development, in order to identify likely effects resulting from the Development, including demolition and construction works.

The assessment indicated that the likely impact from the Development would result from activities such as: demolition of Princes Jetty; piling; new services and utilities, or diversion of existing ones; and hard and soft landscaping.

In particular, the Development would entail the demolition of Princes Jetty, giving rise to a substantial magnitude of change. Also, the proposed resurfacing of the Dock and the direct physical impact to the structure of the Dock, to form a connection with the new jetty, would represent a substantial magnitude of change. In addition, demolition and construction activities could, locally, potentially truncate (or further truncate) palaeo-environmental and riverine deposits.

11.3 Relevant Policy and Guidance

- National Plan Policy Framework Section 12: Conserving and enhancing the historic environment 2012;
- English Heritage: Conservation Principles, Policies and Guidance for the sustainable management of the historic environment, April 2008;

- Historic England (formerly English Heritage): The Battersea Channel Project, Nine Elms: exploration of the buried prehistoric landscape 2014;
- Liverpool Unitary Development Plan, 2002; and
- Liverpool's World Heritage Site - Supplementary Planning Document, 2009.

11.4 Procedure

The any mitigation measures to be included within the CEMP on matters related to heritage and archaeology should be discussed with Historic England and LCC prior to and during works on relevant areas of the Site.

In order to limit the adverse effects on the archaeology and in line with Condition 24 of the Planning Decision Notice, the following mitigation measures shall be incorporated within the CEMP:

- A written scheme of archaeological investigation, including provisions for recording of the existing jetty structure and associated infrastructure to Level 3 as set out in Historic England's Understanding Historic Buildings A Guide to Good Recording Practice (2016), and details for an archaeological watching brief to be submitted to and approved by LCC before commencement of the works; and
- A scheme of investigation to be implemented and reported in accordance with the approved programme.

12. Management of Soil Contamination

12.1 Introduction

This section identifies procedures to control the potential issues associated with the management of contaminated soils that may arise during the construction works. All staff are responsible for complying with the requirements of the procedure.

The following existing reports and information on ground conditions are available:

- Preliminary Environmental Risk Assessment (PERA) prepared by Waterman in October 2017; and
- Ground conditions and contamination assessment prepared by Waterman, which formed one of the chapters of the 2017 ES (as amended by the March 2019 ES Addendum) submitted to LCC in relation to the planning permission for the Development.

On-site potentially contaminative land uses were identified on site and associated with the use of the southern section of the Site as a car park. In addition, potentially contaminative historical land uses were recorded on-site and comprised significant infilling / reclamation and various dockyard activities, including railways and associated infrastructure and warehousing. Therefore, there is a potential that these land uses could have impacted upon the surrounding soils and Controlled Waters receptors. The recorded infilling also represents a potentially significant source of ground gas.

Potentially contaminative off-site land uses include former landfill sites, significant areas of infilling /reclamation, warehouses, railways and associated infrastructure, sawmills, tobacco works, lead works, coal yard, bus station and a grave yard. Therefore, potential for on-site migration of contamination and ground gas from these sources cannot be discounted.

Liverpool was subject to significant bomb damage during World War 2 and Unexploded Ordnance (UXO) is considered to be a high risk at the Site.

12.2 Potential Effects

Due to the potential for contamination within the underlying soils and/or groundwater, a number of potential effects have been identified during the demolition and construction works, and include:

- Effects on Human Health from Ground Contamination and Ground Gas;
- Effects on Human Health from Unexploded Ordnance;
- Effects on Soils and Controlled Waters;
- Effects on Ecological receptors; and
- Disposal of Excavated Material.

12.2.1 Effects on Human Health from Ground Contamination and Ground Gas

Construction and demolition activities, particularly the breaking up of existing hardstanding surfacing, piling, earthworks associated with the construction of new structures, roads and parking facilities and the excavation of drainage routes has the potential to disturb and expose future construction workers and Site visitors to any contamination (including asbestos) present within the underlying soils and groundwater which would have been previously contained and effectively isolated by hardstanding, building footprint and other structures. There is also a potential that construction workers could be exposed to asbestos containing materials (ACMs) (if present) within the existing Lower Cruise Terminal building which is proposed for modification and reconfiguration. In addition, ground gas associated with

the extensive infill, organic soils and off-site features (including former landfills) could potentially migrate via granular deposits into poorly ventilated spaces (such as excavations), thereby posing a potential risk to future construction workers.

12.2.2 Effects on Human Health from Unexploded Ordnance

Construction and demolition activities may give rise to the effect of temporary, local and of major adverse significance on human health in the event of encountering UXO at the Site.

12.2.3 Effects on Soils and Controlled Waters

During demolition and construction, areas of existing hardstanding would be broken out to accommodate the Development, allowing increased rainwater and surface run-off to infiltrate the subsurface. This could potentially mobilise previously contained residual contamination which could feasibly migrate into the underlying aquifers or the Mersey Estuary giving rise to adverse effects. In addition, to facilitate demolition and construction, it is anticipated that potentially polluting substances and activities would be introduced to the Site. These may include concrete pouring, storage of fuels and chemicals and leaks/ spills of fuel and oil from demolition and construction vehicles. In the event of an accidental pollution incident, and in the absence of mitigation, this can have potential adverse effect on Controlled Waters.

In addition, piling would have the potential to create new pathways for contamination into the underlying Principal bedrock aquifer.

12.2.4 Effects on Ecological Receptors

The demolition and construction of the proposed development would introduce potentially polluting substances and activities to the Site. Whilst unlikely, there is a potential that accidental released, leaks or spills could occur, leading to migration via surface water beyond the boundary of the demolition and construction area resulting in effects on animal and ecological receptors of the Mersey Narrows & North Wirral Foreshore which is a designated SSSI, SPA and Ramsar site.

Consequently, in the absence of mitigation, there may be potential effects on sensitive land uses in the surrounding area as a result of demolition and construction works.

12.2.5 Disposal of Excavated Material

Due to the potentially contaminative land use excavation works may result in the handling and managing of contaminated excavated materials.

12.3 Relevant Legislation and Guidance

- Environmental Protection Act 1990 Part IIA;
- Environmental Damage (Prevention and Remediation) Regulations 2009, as amended;
- Contaminated Land (England) Regulations 2006, as amended;
- Contaminated Land Statutory Guidance 2012;
- Building Regulations 2000;
- Environmental Permitting (England and Wales) Regulations 2016, as amended;
- Control of Substances Hazardous to Health Regulations 2002;
- Health and Safety Executive (HSE) Guidance Note EH40/2005 Workplace Exposure Limits, as amended;

- Health and Safety Executive (HSE), 'Protection of Workers and the General Public during the Development of Contaminated Land, 1991;
- CIRIA Report 132 'A Guide for Safe Working on Contaminated Sites, 1996;
- National Planning Policy Framework 2012;
- The Construction (Design and Management) Regulations 2015;
- The Control of Asbestos Regulations 2012;
- Environmental Permitting (England and Wales) Regulations 2016;
- Hazardous Waste (England and Wales) Regulations 2005; and
- Waste (England and Wales) Regulations 2011.

12.4 Procedure

A number of procedures will be set within the final CEMP, in order to avoid or minimise effects associated with the soil contamination during constructions works.

12.4.1 Human Health from Ground Contamination and Ground Gas

Contractor to adhere to COSHH Regulations 2002 the CDM Regulations 2015 and the Control of Asbestos Regulations 201, to ensure worker safety throughout the construction period.

Construction workers should be made aware of the possibility of encountering contaminated soils and asbestos in made ground through the Site Induction, Method Statements and Toolbox Talks. Vigilance should also be maintained throughout the works for any signs of unanticipated contamination.

All Site personnel and visitors will be required to use appropriate PPE commensurate with the contaminants present and the activities being undertaken, thereby minimising the risk of exposure to contaminated soils, dust and perched groundwater. Where appropriate, workers are required to wear respiratory protective equipment (RPE) commensurate with the activities being undertaken and the contaminants present. All personnel to be provided with asbestos awareness training.

The potential for exposure to ground gas would be monitored where construction workers enter confined spaces such as excavations. Safe procedures for entry into excavations would be developed in line with HSE and CIRIA guidance and, where necessary, adequate RPE and ventilation would be provided.

Adoption of dust suppression methods as required, such as water spraying, wheel washing facilities for vehicles leaving the Site and covering of stockpiled materials and materials being transported to and from the Site. In addition, regular cleaning of Site roads, access roads and the public highway will be implemented.

Further mitigation includes the use of good personal hygiene, washing and changing procedures.

12.4.2 Unexploded Ordnance

A specialist des- based assessment of unexploded ordnance risk (UXO) would also need to be undertaken ahead of any intrusive works to consider the risk of encountering UXO on the site.

Potential effects of inadvertent detonation of UXO during intrusive works (such as excavation, construction and piling) must be mitigated through adherence to the mandatory health and safety requirements and the Site-specific mitigation measures outlined in the 1st Line Defence Detailed UXO Risk Assessment report. These include:

- Site-Specific UXO awareness briefing to all personnel conducting intrusive works (all works);
- UXO specialist presence on Site to support shallow intrusive works (trial pits, excavations, shallow foundations, etc.); and
- Intrusive Magnetometer Survey of all boreholes and pile locations down to a maximum bomb penetrations depth (deep intrusive works).

12.4.3 Soils, Controlled Waters and Ecological Receptors

The Contractor should identify measures for the minimisation of potential contamination of underlying soils and Controlled Water receptors.

In line with Condition 15 of the Planning Decision Notice (Foundation/Piling Works Method Statement), piling or any other foundation designs using penetrative methods will not be undertaken other than with the express written consent of the local planning authority. The development will be carried out in accordance with the approved details.

In line with Conditions 16 and 17 of the Planning Decision Notice (Contamination),

No part or phase of the development hereby permitted shall commence until;

- An investigation and assessment methodology, including analysis suite and risk assessment methodologies will be developed and submitted to the Planning Authority prior to any site investigations;
- Any site investigation will be undertaken only following approval in writing from the Planning Authority;
- The site investigation and assessment will be undertaken by competent persons to determine the status of contamination including chemical, radiochemical, flammable or toxic gas, asbestos, biological and physical hazards at the site and submitted to the LPA.
- The investigations and assessments will be in accordance with current Government and Environment Agency recommendations and guidance and will identify the nature and extent of any contaminants present, whether or not they originate on the site, their potential for migration and risks associated with them.
- The assessment will take into account potential risks to: human health, controlled waters, property (existing or proposed) including buildings, crops, livestock, pets, woodland and service lines and pipes, adjoining land, ecological systems, and archaeological sites and ancient monuments.
- If required, a detailed remediation scheme (if required), will be submitted to and agreed in writing with the LPA;
- Following completion of the approved remediation scheme (if required) a verification report will be prepared and submitted to and approved in writing by the Planning Authority; similarly, this applies also to a phased approach; and
- Should any potentially contaminated (unusual/suspect) material or flammable/toxic gas not previously identified is discovered, this will be reported in writing to the Planning Authority and a further assessment and a revised remediation scheme will be required.

Additional mitigation measures will also include, but be limited to:

- Implementation of procedures for the safe management of fuels and other potentially hazardous materials, spillage clean-up, use of best practice construction methods and monitoring;
- The use of appropriate tanked and bunded areas for fuels, oils and other chemicals;

- Locating stockpiles of materials identified as containing leachable contaminants on hardstanding surfaces to prevent mobile contaminants infiltrating the underlying soils;
- Generation of stockpiles of excavated material to be minimised as far as reasonably practical;
- Testing of any ground proposed for re-use within the Site for contamination (including leachable contamination) to ensure that soils are not placed in areas where they will potentially present a risk to groundwater and surface water receptors;
- Provision of a clean capping layer comprising imported subsoil and topsoil as a growing medium, where ground investigation identifies phytotoxic contamination within proposed areas of soft landscaping. The thickness of the capping required would be informed through consultation with LCC and the landscape architect.
- Use of dust suppression techniques, including water spraying in dry weather, wheel washing facilities for vehicles leaving the Site and covering stockpiled material;
- Measures to avoid surface water ponding and collection and disposal of all on-Site run-off; and

Establishment of pollution incident control procedures, as per **Section 17.**

It is anticipated that the expected piling depths would extend into the bedrock which is designated by the EA as a Principal Aquifer, EA's 'Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention' describes various methods and scenarios for piling through contaminated land. This guidance recommends that a Foundation Works Risk Assessment be prepared to support the selection of appropriate piling methodology.

12.4.4 Off Site Treatment or Disposal of Excavated/ Stockpiled Material

All wastes requiring off-site management (Treatment or Disposal) needs to be transported to a licensed waste treatment facility of licensed landfill site in accordance with the Duty of Care Regulations 1991 and, as applicable, in accordance with the Environmental Permitting (England and Wales) Regulations 2016, the Hazardous Waste (England and Wales) Regulations 2005 and the Waste (England and Wales) Regulations 2011. Licensed waste carriers should be used for the haulage activities.

12.5 Documentation

The following documentation shall be held on the Site:

- A log of environmental incidents and remedial actions;
- Relevant approvals from LCC;
- Copies of waste transfer and consignment notes of any contaminated soil that is removed from the Site;
- Copy of relevant written consents from the regulatory austerity;
- Copy of the Foundation Works Risk Assessment; and
- Materials test records (chemical and geotechnical).

13. Minimisation of Disturbance to Ecology

13.1 Introduction

This section identifies procedures to control the potential adverse effects of the demolition and construction of the Development on Terrestrial Ecology, Ornithology and Marine Ecology.

All staff are responsible for complying with the requirements of the procedure.

The following existing reports and information are available on ecology:

- Marine Ecology, Ornithology and Terrestrial Ecology assessment prepared by APEM and Waterman, which formed one of the chapters of the 2017 ES and of the subsequent ES Addendum completed in March 2019;
- Information to inform a Habitat Regulations Assessment (HRA) Appropriate Assessment, completed by Waterman in (Ref: WIE12464-100-11-2-3-AA, January 2019);
- Cormorant Ecological Conservation Management Plan, prepared by Waterman and presented as a Technical Note in **Appendix B;** and
- An Adaptive Management Plan for the cormorant mitigation – refer to **Appendix E**.

13.1.1 Designated Sites

As mentioned in Section 1.5, the Site is located within the Liverpool Bay Special Protection Area (SPA), which was fully classified as a SPA on 31 October 2017, with an extension in area and with additional interest features to the original SPA. The birds interest features include red-throated diver, common scoter, little gull, common tern, little tern and a non-breeding waterbird assemblage including as its main components red-throated diver, common scoter, redbreasted merganser and cormorant.

Other designated ecological sites within 10km of the Site include:

- The Mersey Narrows and North Wirral Foreshore Ramsar site and SPA, approximately 800m to the west of the Site (on the opposite side of the Mersey);
- The Mersey Narrows SSSI, approximately 800m to the west of the Site;
- The New Ferry SSSI, approximately 3.3km to the south;
- The Mersey Estuary Ramsar Site and SPA approximately 3.3km to the south and the Mersey Estuary SSSI approximately 4.3km to the south-east;
- The North Wirral Foreshore SSSI, approximately 4.2km to the northwest;
- The Dee Estuary Special Area for Conservation (SAC), approximately 4.2km north-west;
- The Sefton Coast SAC and SSSI, approximately 6.3km north; and
- The Ribble and Alt Estuaries Ramsar site and SPA, approximately 6.4km north.

13.1.2 Terrestrial Ecology and Ornithology

The Site offers very few opportunities for terrestrial bird species with regards to nesting sites or suitable food resources for foraging and doesn't have opportunities for any of the bird species associated with the protected sites listed above. A small number of common bird species, such as blackbirds and robins, may occur on the Site but not in any significant numbers. In addition to common species, two protected bird species are known to have bred close to the Site; peregrine falcon and black redstart, which were included within the desk study to inform the baseline. Due to a lack of old warehouses and nesting ledges mean that the habitat is not preferable for black redstart for breeding, but as it is a species that is

notoriously difficult to locate unless singing, it could be frequenting the Site to forage. With the exception of great cormorant, none of the mobile species (e.g. foraging common tern, little gull) relevant to European sites occur on the Development site, although they may forage along the adjacent River Mersey.

13.1.3 Marine Ecology

Phytoplankton and zooplankton assemblages are present within the Site and are expected to be typical of the Mersey Estuary and Liverpool Bay area. It is anticipated that taxa present at the Site would be well adapted to the extremely turbid environment and fluctuating tide levels of the Mersey Estuary. A small section of intertidal sediment (approx. 3000m2) is located at the mouth of Prince's Half Tide Dock, immediately the north of the Site red line boundary. Intertidal habitats are also present within the Site on man-made structures including the existing jetty and dock walls. These structures were colonised by species including the non-native barnacle *Austrominius modestus*, macroalgae and small numbers of periwinkle.

The subtidal sampling within the Site indicated that the sediments were quite heterogenous. However, the subtidal assemblage was relatively impoverished. The subtidal macroinvertebrate assemblage was dominated by juvenile blue mussel M. edulis and the cryptogenic acorn barnacle *A. improvisus*. Several non-native species were recorded. Three individuals of the starlet sea anemone *N. vectensis* were recorded at stations north of the Site red line boundary.

There are at least 46 fish species within the Mersey Estuary of which eleven are species of conservation importance. These include the migratory (diadromous) species: Atlantic salmon; river lamprey; sea lamprey; and European eel which are protected under Annex II of the Habitats Directive as well as seven species that are protected under Section 41 of the NERC Act: sea trout (also a migratory species); sea trout, European smelt; Atlantic cod; herring; plaice; common sole; and whiting.

The number of marine mammals recorded within the Estuary is low; however, there are occasional sightings of harbour porpoise and bottlenose dolphin, and the pinnipeds grey and harbour seal.

During the construction phase of the proposed Development, it will be ensured that appropriate environmental controls are implemented to avoid the contravention of legislation.

13.2 Potential Impacts

The potential impacts from the construction activities to the ecological receptors are associated with:

- Loss of habitat;
- Physical disturbance and displacement (disturbance of bottom sediments);
- Physical disturbance and displacement (visual);
- Airborne noise and vibration;
- Underwater noise and vibration;
- Changes to water quality (suspended solids and release of contaminants from sediments);
- Pollution (direct e.g. oil);
- Collision risk due to vessel movements;
- Spread of non-native species; and
- Physical disturbance and displacement (indirect i.e. through the food chain).

The demolition and removal of the existing jetty will result in the loss of supporting habitats.

Visual disturbance could occur as a result of movements of vehicles and machinery at or within close proximity to the Site and construction workers walking on or close to the Site. Within the aquatic environment visual disturbance could be associated with the presence of barges during construction. There is also potential for visual disturbance due to any artificial light used during the construction works.

Source of noise and vibration during the construction activities are associated with enabling works; excavation; piling works; building and structures foundation and the movement and operation of plant vehicles, machinery and construction workers.

Changes to water quality may occur as a result of activities disturbing the estuary bed, such as piling works which could lead to an increase in turbidity and resuspension of bottom substrates could potentially result in the release of chemicals locked in the sediments to the water column

Pollution may result from the improper discharge of surface water, stockpiling of contaminated materials, improper handling of hazardous material.

Loss of Habitat

During demolition and removal of the existing jetty, intertidal habitats and species encrusting the existing wooden jetty structure and the supporting habitat would be permanently removed. The wooden pile habitat would be replaced via the installation of metal piles for the new Cruise Liner Terminal; however, it is noted that however, that the dominant encrusting organisms on the current structures which would be expected to colonise the new structures would include the non-native barnacle *Austrominius modestus*.

Removal of the jetty structures would also result in the loss of subtidal invertebrates and algae that have colonised them, but these species are widespread on other structures in the vicinity of the Works including the walls at the waterfront and these taxa would be expected to colonise new jetty structures introduced for the Development.

Some loss of habitat would also be experienced as a consequence of the installation of piles (which are currently planned to avoid the locations of the current pile footings). However, the area of the estuary bed due to the installation of new piles is small (footprint of approximately 102m^2) which also represents a small proportion of the available subtidal habitat within the Site.

It is expected that dismantling and construction would have effects on great cormorant *Phalacrocorax carbo*, a component species of the bird assemblage feature of Liverpool Bay SPA. This would classify as loss of habitat for this species and would determine a displacement of birds from resting/roosting locations due to loss of land under the footprint of the construction works.

No impacts are considered to affect great cormorants from the remaining listed indirect and direct effects, including changes to water quality from suspended solids and release of sediment chemicals: such changes would be temporary and localised and the magnitude of effect negligible given the extent of the River Mersey.

Black redstarts are not known to forage on the Site and the demolition plans do not involve the destruction or removal of any known nesting locations.

Physical Disturbance and Displacement (Disturbance of Bottom Sediments)

Disturbance of Bottom Sediments may result in potential mortality of individuals within the footprint of new piles as well as in a displacement of subtidal invertebrates or fish within areas immediately outside the pile footprints due to physical disturbance of sediment in the area. This could include the smothering of

individuals by sediment settling out of solution. However, predicted effects would be limited to approximately 1km from the existing jetty.

The area of subtidal sediment potentially affected by this disturbance would be larger than the area within the pile footprints but would still be very small in relation to the availability of similar habitats within the Site boundary and wider Estuary. Any disturbed/displaced benthic invertebrates would only be displaced a short distance and would be expected to survive such disturbance.

With specific regards to fish, it should be noted that they highly mobile species and any fish physically disturbed by the work due to sediment movement/changes in habitat would be able to avoid the area during periods of disturbance and return to the area if required once disturbance has ceased. It should be noted that the type of habitat potentially disturbed is widespread within the Site boundary and wider Estuary so fish would not have to move far to find similar habitat.

Physical Disturbance and Displacement (Visual)

Receptors potentially affected by this effect are fish, marine mammals and birds. Visual disturbance generally results in a temporary avoidance of the area due to the works.

With regards to birds, physical disturbance as a consequence of machinery, vehicles / vessels and workmen at the Site or travelling to and from it could potentially cause temporary or permanent displacement of bird species feeding and / or roosting within a preferred area.

Airborne Noise and Vibration

The sources of noise and vibration from the mobilisation activities associated with this Development include the movement and operation of plant vehicles, vessels and machinery on the Site and adjacent to it on the water. The biggest potential source of noise is from piling works.

It is anticipated that effects of airborne noise on receptors would be negligible or neutral. However, there may also be direct impact from noise and vibration causing displacement of great cormorant from resting/roosting locations.

Underwater Noise and Vibration

The deconstruction and removal of the existing Princes Jetty would generate some underwater noise due to the breaking and removal of wooden piers and other structures. Noise could be also generated by the barges and other boats utilised to remove the Princes Jetty structure. However, the biggest potential source of noise is from piling works for the new Cruise Liner Terminal.

The receptors potentially affected by this effect are fish and marine mammals.

Fish species have different sensitivity to underwater noise and effects may include:

- Behavioural effects (e.g. changes in swimming behaviour and orientation, communication between conspecifics and detection of predators/prey);
- Masking effects (i.e. the reduction in the detectability of a given sound as a result of the simultaneous occurrence of another sound);
- Temporary threshold shift in hearing (short- or long-term changes in hearing sensitivity that may or may not reduce fitness);
- Recoverable tissue injury (injuries, including hair cell damage, minor internal or external hematoma etc. None of these injuries are likely to result in mortality); and
- Mortality and potential mortal injury (immediate or delayed death).

Underwater noise can have physical and behavioural effects on marine mammals. Physical injury can include permanent threshold shift (i.e. permanent hearing damage caused by very intensive noise or by prolonged exposure to noise) or a temporary threshold shift, and behavioural effects can include avoidance of an area subject to noise disturbance. Overall, any effects are considered likely to be of minor adverse significance.

Changes to Water Quality and Pollution

Receptors potentially affected by this effect are plankton, intertidal and subtidal habitats and species, fish, marine mammals and birds.

Effects of minor adverse significance are anticipated on Intertidal and Subtidal Habitats and Species, Fish and mammals. However, it should be noted that many bird species being highly sensitive to oil pollution incidents, if individuals come into direct contact with pollutants.

Spread of Non-Native Species

Demolition and removal of the existing Princes Jetty would be conducted by barge. These barges are expected to remain within the Mersey Estuary for the entire demolition phase. Vessel movements (fouling of hulls and ballast water) have been identified as the highest potential risk routes for the introduction of non-native species. The main non-native species recorded during the site-specific benthic survey were the invasive barnacle *A. modestus*, the starlet sea anemone *N. vectensis* and the American piddock *P. pholadiformis*.

13.3 Relevant Legislation

Specific habitats and species of relevance to the Site receive legal protection in the UK under various European and domestic legislative provisions, including:

- Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) (the 'Habitats Directive');
- Birds Directive - Council Directive 2009/147/EC on the Conservation of Wild Birds;
- Water Framework Directive (WFD) (2000/60/EC);
- Marine Strategy Framework Directive (MSFD) (2008/56/EC);
- EU Alien Invasive Species Regulation (Regulation No 1143/2014);
- Convention for the Protection of the Marine Environment of the North-East Atlantic (the 'OSPAR Convention'), 1992;
- Ramsar Convention on Wetlands of International Importance (1972);
- Council Regulation (EC) No 1100/2007;
- Convention on Biological Diversity 1992;
- Marine and Coastal Access Act 2009;
- Wildlife and Countryside Act 1981, as amended;
- National Environment and Rural Communities (NERC) Act 2006;
- Eels (England and Wales) Regulations 2009;
- The Conservation of Habitats and Species Regulations 2017;
- Conservation of Seals Act 1970;
- UK Marine Policy Statement (MPS);

- National Planning Policy Framework;
- UK Post-2010 Biodiversity Framework;
- Marine Plans;
- Draft Liverpool Local Plan 2016;
- North Merseyside Biodiversity Action Plans;
- Mersey Estuary Management Plan 2007; and
- Mersey Waterfront Regional Park Strategic Framework 2007.

The Contractor is required to ensure that all relevant UK and EU legislation relating to the protection and enhancement of ecology has been complied with during the construction process.

13.4 Procedure

The following mitigation measures will be included in the CEMP:

- All works to be undertaken in line with the Cormorant Ecological Conservation Management Plan, following its submission and approval in writing by the Local Planning Authority, in liaison with Merseyside Environmental Advisory Service and Natural England;
- Installation of a permanent floating pontoon in Princes Half Tide Dock for the cormorants to rest/roost upon prior to the wooden jetty being dismantled, in order to mitigate against the displacement of cormorants due noise, vibration and visual disturbance associated with construction works (refer to **Appendix B**). The effectiveness of the pontoons would be established by adherence to an Adaptive Management Plan (AMP). The AMP is provided in **Appendix E**.
- Incorporation of horizontal suspended deck braces which would be suitable for great cormorant to rest/roost upon once the Development is operational and when vessels are not docked to these areas;
- A soft-start piling approach will be implemented in order to reduce potential adverse effects to fish and marine mammals. This involves gradually increasing the force of piling, thereby steadily increasing the sound power levels generated over a period of time. This would alert individuals within the area, without exposing them to more intense sound power levels, and provide an opportunity for them to move away from the noise source. This technique is recommended as best practice by the Joint Nature Conservation Committee for pile driving operations and is considered appropriate for the proposed development;
- Management of waste water, including surface water, should be undertaken in a manner which prevents sediment laden / contaminated run-off entering watercourses, using construction control measures given within Pollution Prevention Guidelines from the Environment Agency (withdrawn from use but still providing good guidance). This may also be subject to appropriate licensing by the EA;
- Construction of the drainage system to be designed and managed to comply with BS 6031:2009 ‘The British Standard Code of Practice for Earthworks’, which details methods that should be considered for the general control of drainage on construction sites. Discharge rates and volumes of water discharged would be agreed with the EA and/or local wastewater network provider. Where appropriate, cut-off drainage would be provided around the Site during demolition and construction when there is no on-site drainage network in place. Surface drainage system to be equipped with settlement and oil interception facilities, where required, and discharge to be agreed with the EA and/or local wastewater network provider and compliant with the discharge consent;

- Stockpiling of contaminated materials to be avoided, wherever possible. Stockpiles should be located on areas of hard standing or on plastic sheeting to prevent mobile contaminants infiltrating into the underlying ground;
- Potentially hazardous liquids on the Site such as fuels and chemicals to be managed and stored in accordance with best practice guidance, such as that published by the Environment Agency. Storage tank and container facilities to be appropriately bunded within designated areas and located away from surface water drains, docks and the Mersey Estuary;
- An Emergency Incident Plan to be in place to deal with any spillages and/or pollution incidents. This would include the provision of on-Site equipment for containing spillages, such as emergency booms and chemicals to soak up spillages. Any pollution incidents would be reported immediately and regulatory bodies such as the Environment Agency immediately informed;
- All marine works need to be undertaken in line with Marine Works Licence. In addition, the Contractor must ensure that the marine operations are carried out in line with the Navigation Risk Assessment (NRA);
- Works to be carried out in line with a project-specific Biosecurity Risk Assessment, which will outline numerous inherent mitigation design measures to limit the risk of introduction of invasive non-native species (INNS). The contractor should undertake works in line with the best practice guidelines and standard INNS protocol. Biosecurity assessments will be undertaken for all vessels measures and will take account of the following aspects: management of vehicles and vessels, Ports and Harbour protocols, conformity to the guidelines and best practice set out in the Natural England and Natural Resources Wales Biosecurity Planning guidance.
- In order to limit the potential effects of demolition and construction works on qualifying bird species, daily air temperature recording will be undertaken during site works. In the case of severe winter weather restrictions, a suitably qualified ecologist will visit the site in order to assess the requirements for further actions. Given the location next to the Mersey Estuary and close to open sea, any waterbirds affected by severe winter weather on the docks would relocate to the estuary/sea to feed. In the unlikely event that significant numbers of waterbirds remain on immediately adjacent docks during severe winter weather periods, consideration would be given to halting or reducing demolition/construction work to prevent undue disturbance. Any actions taken as a result of below freezing conditions will be agreed with LCC / MEAS.
- All high disturbance works (i.e. piling) will be temporarily suspended if local temperatures (as recorded by nearest Met Office data and/or available site specific measurements) are below zero degrees centigrade for a period of 7 consecutive days, and remain suspended until temperatures reach above zero degrees centigrade for a period of 3 consecutive days. Any works stoppage will be subject to a bird count visit by a suitably qualified ecologist, in order to check if any SPA species are present and affected. If this is not the case, works would proceed with the agreement of LCC / MEAS. Records of air temperatures and actions taken as a result of below freezing conditions would be submitted to LCC / MEAS.
- The Contractor shall ensure that all those working on the Site are aware of their obligations in relation to ecological legislation;
- The Contractor shall nominate a Biodiversity Champion to influence Site activities and ensure that detrimental impacts on Site biodiversity are minimised in line with the recommendations of the project ecologist;
- As part of the site induction process, all staff working on the marine elements of demolition and construction will be made aware, through toolbox talks by suitable qualified personnel, of the potential

presence of starlet sea anemone and that this species is protected under the Wildlife and Countryside Act;

- When drilling is conducted, a soft-start approach will be deployed whereby the drill string will be incrementally lowered from deck level until it lightly touches the silty seabed (mudline). The drill will then be started extremely slowly to dislodge/disperse any *N. vectensis* a short distance away from the immediate point at which drilling will occur (due to the robust nature of *N. vectensis* they would be expected to readily survive such movement across a short distance within any dislodged sediments). The speed of the drill will then increase very slowly until it reaches full capacity;
- As a good practice, during demolition and construction works artificial lighting will be angled towards the working areas and platform to limit spillage; and
- Should nesting birds be encountered, method statements for the establishment of appropriate exclusion zone(s) shall be drafted by a suitably qualified ecologist and kept on site.

13.5 Documentation

- A copy of the Marine Licence issued by the MMO;
- Relevant documentation such method statement(s) for exclusion zone(s) around any identified active breeding bird nests shall be kept on the Site;
- Cormorant Ecological Conservation Management Plan (refer to **Appendix B**);
- Adaptive Management Plan (AMP). Refer to the AMP in **Appendix E**.
- Emergency Incident Plan;
- An Environmental Incident Logbook for use in the event of a pollution incident (and to include also log of associated log remedial actions); and
- Relevant approvals from LCC.

14. Management of Costal Processes, Sediment Transport and Contamination

14.1 Introduction

This procedure applies to the operations that are likely to cause disturbance or alter the quality of the sediments during marine works (e.g. piling, walls works and water discharges) and aims to avoid and/or minimise potential adverse effects on the sensitive receptors. All staff are responsible for complying with the requirements of the procedure.

The following existing reports and information on sediments conditions are available:

- Coastal Processes, Sediment Transport and Sediment Contamination assessment prepared by Waterman, which formed one of the chapters of the 2017 ES and of the subsequent ES Addendum completed in June 2018;
- Marine Ecology Survey Report, prepared by APEM in October 2017;
- Hydrodynamic and Costal Processes Studies, prepared by HR Wallingford in October 2017; and
- Water Framework Directive Scoping Report, prepared by Waterman in October 2017.

A survey was undertaken in the Mersey Estuary by APEM in June 2017, to recover sediment samples for analysis. The analysis of the sediment samples provided information on the status of the baseline environment at the Site and in the Mersey Estuary. The sediment samples were analysed for physicochemical parameters. Based on the results of the above analysis, it is considered that the sediments across the Site can be classified into two categories:

- Group 1: This group comprises stations G02, G06, G09 and G10. These stations have low levels of fine (<63µm) material, (between 3.2 and 4.2%) and are predominantly composed of sand. The stations were located on the margins of the main estuary channel and are expected to be under the influence of tidal flows. The analytical results from these stations are indicative of a relatively uncontaminated environment. The variations in heavy metal and hydrocarbon concentrations at these sites could be considered indicative of natural variation in the sediment.
- Group 2: This group comprises stations G01, G03, G05, G07 and G08. The sediments at these stations presented a varying proportion of fine material, between 11.5% and 74.1%. The stations were all located in the immediate vicinity of either the structures and retaining walls at the side of the estuary that experience reduced tidal flow velocities (G01) or in a sheltered area outside of the area of main tidal flows (G05, G05, G07 and G08) with minimal tidal currents. The results of the sediment analysis from these stations showed that there were levels of heavy metals over the Cefas CAL1 thresholds, but below the Cefas CAL2 limits. The hydrocarbon concentrations in the sediment were typically above either the CCME TEL or OSPAR ERL levels, indicating that there is a potential risk to marine organisms. The levels of heavy metals and hydrocarbons in the sediments in the Group 2 stations are indicative of a low level of contamination. This is most likely due to a combination of the historical industrial activity along the banks of the estuary, and the limited flows within the Group 2 station locations allowing the accumulation of fine-grained sediment.

Under the Water Framework Directive, the Mersey Estuary is considered to be heavily modified for navigation, ports and harbours, as per the current Development. The estuary is currently failing to achieve Good Status with respect to ‘lead and its compounds’.

14.2 Potential Effects

Potential effects of demolition and construction works on costal processes, sediment transport and contamination would be as follows:

- Effects on Tidal Flow;
- Effect on the waves at the Site;
- Transport of Estuarine Sediments; and
- Disturbance of Potentially Contaminated Sediments

14.2.1 Tidal Flow

The Development has the potential to affect the Mersey Estuary with respect to either increasing or decreasing tidal flows in the vicinity of the Site as a result of the planned demolition of the existing jetty structure. This is due to the drag effect of the existing piled structure on the tidal flows being removed. Any effect on tidal flows would be limited to the duration of demolition and construction operations.

14.2.2 Wave Effects

The current jetty structure does not have a substantial effect on the baseline wave regime. Therefore, the removal of this structure is not expected to cause a substantial change in the wave regime.

14.2.3 Transport of Estuarine Sediments

The overall effect of removing the existing jetty reduces the potential for fine sediment accretion particularly in the area north of the structure, around the Princes Half Tide Dock approaches, with an estimated reduction in accretion of 0.3 to 0.4m of sediment. The reduction in accretion in these areas results in some areas experiencing a small increase in the potential for fine sediment accumulation as material which would have settled further towards the channel is now able to settle nearer the bank line

14.2.4 Disturbance of Potentially Contaminated Sediments

During demolition and construction activities at the Site a certain level of sediment disturbance is unavoidable. The rate of sediment release during the demolition and construction is anticipated to be insignificant compared to the ambient sediment flux in the Mersey Estuary. The movement of potentially contaminated sediment may lead to a localised deterioration in sediment (and water quality) around the Site and in the immediate vicinity. The level of potential contamination is relatively low; however it may provide a cumulative effect to the concentrations of potential contaminants in other areas of the estuary.

14.3 Relevant Legislation and Guidance

- National Planning Policy Framework (NPPF);
- The Water Framework Directive (WFD) 2000/60/EC;
- EU Bathing Water Directive (2006/7/EC);
- Countryside and Rights of Way Act 2000;
- Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora;
- WFD Guidance: Clearing the Waters for All (2016);
- CIRIA C744 - Coastal and marine environmental site guide. 2nd edition (2015);
- CIRIA C741 - Environmental good practice on site guide. 4th edition (2015);

- Canadian Council of Ministers of the Environment (CCME) Freshwater sediment quality guidelines (2001);
- Marine Licensing: sediment analysis and sample plans (CEFAS Action Levels) (2016); and
- OSPAR Levels and trends in marine contaminants and their biological effects – CEMP Assessment report (2012).

14.4 Procedures

Measures should be implemented to minimise impacts associated with the management of the dredged sediments as well as procedures to protect the quality of the undisturbed river bed. To this end:

- All marine works should be undertaken in accordance with the Licence for Marine Works issued by the MMO;
- All mitigation measures to control adverse effects associated with all marine works (including dredging) would need to be agreed with the MMO and other relevant authorities;
- Pollution preventions measures should be put in place to prevent release on contaminants the could compromise the quality of the undisturbed sediment.

14.5 Documentation

The following documents will be held on Site:

- A copy of the Marine Licence issued by the MMO;
- An Environmental Incident Logbook for use in the event of a pollution incident;
- A log of environmental incidents and remedial actions;
- Relevant approvals from LCC.

15. Water Management and Pollution Control

15.1 Introduction

This procedure applies to discharges of trade effluent and other waters from the Site, as well as the control of ground and surface water pollution during the on shore and marine works. All staff are responsible for complying with the requirements of the procedure.

The following documents are available for information:

- Water Framework Directive Scoping Assessment, prepared by Waterman in October 2017;
- Preliminary Environmental Risk Assessment (PERA) prepared by Waterman in October 2017; and
- Ground conditions and contamination assessment prepared by Waterman, which formed one of the chapters of the 2017 ES submitted to LCC in relation to the planning permission for the Development.

The Site is underlain by Unproductive Strata associated with the Tidal Flat Deposits and a Principal Aquifer associated with Chester Pebble Beds Formation. The Site is not located within a Groundwater Source Protection Zone.

The nearest watercourse to the Site is the adjacent River Mersey, which is tidal at this location and forms some of the western part of the Site. The Mersey Estuary is designated under the Water Framework Directive (WFD) as a heavily modified transitional water body and its overall status is classed as 'Moderate' (with Moderate Ecological status and 'Failing' Chemical Status).

According to the EA's indicative flooding data, the Site is located in an area of fluvial or tidal flooding. However, flood defences are recorded in the area. The EA's indicative flooding data also indicates that parts of the Site located in an area at high and medium risk of surface water flooding.

There are nine recorded groundwater abstractions within a 1km radius of the Site, the closest of which is located 220m east of the Site at Georges Dock Pumping Station for a groundwater heat pump (other industrial/commercial/public services). No drinking water abstractions have been identified in the surrounding area. There are no pollution incidents to groundwater within a 1km radius of the Site.

Overall, therefore, data suggests that the underlying ground water quality is likely to be of medium quality. Due to the location of the Site on and close to the Mersey Estuary the ground water is likely to be saline.

15.2 Potential Effects

During the construction phase effects impacts on water quality could occur if good practice construction practices are not followed and mitigation measures are not implemented on the proposed Site. The potential effects of the new ferry terminal construction on water quality could include:

- Incorrect disposal of Site effluent;
- Pollution of groundwater or surface water runoff through chemical, oil and fuel spills;
- Introduction of other pollutants (e.g. drilling runoff) into the surface water drainage system;
- Pollution of the groundwater or surface water run-off due to unforeseen contamination; and
- Increased vertical contamination percolation following removal of hardstanding;

In particular, the site activities may have an adverse effect on surface water quality in terms of:

- Impacts on water quality due to deposition or spillage of soils, sediments, oils, fuels, or other construction chemicals;
- Impacts on water quality due to the mobilisation of fine sediments that may contain contaminants into the water column or through uncontrolled site run-off;

- Impacts on water quality from dewatering operations (where required);
- Temporary, localised effects on sea bed morphology within the Mersey Estuary; and
- Temporary effects on the navigation of vessels in the Mersey Estuary.

15.3 Relevant Legislation and Guidance

- Environmental Protection Act 1990;
- Water Industry Act 1991, as amended;
- The Water Framework Directive (WFD) 2000/60/EC;
- Directive 2009/147/EC on the Conservation of Wild Birds;
- Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora;
- Environmental Permitting (England and Wales) Regulations 2016;
- Control of Pollution (Oil Storage) (England) Regulations 2001, as amended;
- Environment Agency Pollution Prevention Guidelines – General Guidance to the Prevention of Water Pollution (PPG01) 2013;
- Clearing the Waters for All, Environment Agency, June 2017;
- BS 6031:2009 Code of Practice for Earthworks; and
- Environmental Damage (Prevention and Remediation) Regulations 2009.

15.4 Procedure

15.4.1 Management of Shallow Groundwater

If encountered, shallow groundwater should be managed in a controlled manner, and the Contractor will have due regard for underlying aquifers and adhere to the Environment Agency's Groundwater Protection Policy.

There will be no infiltration of anything other than clean, uncontaminated rainwater into the ground other than with the express written consent of the Environment Agency, which may be given for those parts of the Site where it has been demonstrated that there is no resultant unacceptable risk to controlled waters.

15.4.2 Site Drainage

The Contractor will hold a foul and surface water drainage plan on Site showing the location of all known drains and outfalls and will implement working practices to ensure that contaminated water does not impact upon controlled waters. The Contractor will make relevant staff aware of the existing drainage network.

Site drainage will be managed to prevent sediment laden or contaminated runoff from entering watercourses or drains without consent. Under no circumstances will excavation waste, arisings, spoil, chemicals, fuels, silt or sediments be discharged to the drainage system, surface water or groundwater. In the event of a blockage, a specialist trade contractor will clear out the drains and the waste material will be disposed of accordingly.

Trade effluent from the Site shall not be discharged to surface or foul water drains without obtaining consent from the Environment Agency or Thames Water respectively.

Construction of the drainage system should be designed and managed to comply with British Standards (BS) 6031:2009 'The British Standard Code of Practice for Earthworks', which details methods that should be considered for the general control of drainage on construction sites. Discharge rates and volumes of water discharged would be agreed with the EA and United Utilities. Where appropriate, cut-off drainage would be provided around the Site during the Works when there is no on-Site drainage network in place.

Water use will be monitored through meters or similar monitoring equipment, and reported against targets set out by the Contractor, which will be agreed with LCC.

15.4.3 Hazardous Substances

Significant quantities of hazardous substances are not anticipated to be used during the construction works. However, some fuels and oils may be required to be present on the Site.

Hazardous substance stores (including fuel and chemical stores) and stockpiles at risk of spillage / leakage of polluting materials will be provided with above ground secondary containment. Bunded compounds will have an impervious base, which can hold at least 110% of the capacity of the tank or drum it contains to minimise the risk of hazardous substances entering the drainage system or the underlying soils and / or groundwater.

All pipelines and fuelling points will be protected from vandalism and unauthorised interference and will be turned off and locked when not in use. Drip trays will be used when filling smaller containers from tanks or drums to avoid drips and spills from entering the ground or drainage system.

Labels will be used to clearly indicate the contents of containers. There should be no storage of hazardous substances near open drains. All fuel storage and associated pipework will be above ground and located on hardstanding.

Deliveries will be supervised, and a suitable number of spill kits will be available in areas where hazardous materials are used or stored. Areas used for vehicle washing and / or parked vehicles shall include oil interceptors.

On Site vehicle routing will take into consideration the location of any storage areas to ensure that accidental impact does not occur; and

In case of accidental spillage, the pollution incident control procedure set out in Section 13 & Section 18 of this CEMP will be followed.

Temporary stockpiling of materials would be located away from the River Mersey and drains. Drums and barrels would be stored in designated bunded safe areas within the Site compound to reduce the risk of silt and pollutants entering the surface water drainage system;

Surface water from the landward areas would be treated before draining to Peel Ports' private sewer, and surface water from the new jetty would be treated and drained to the river, subject to an approved discharge consent.

15.5 Documentation

The following documents will be held on Site:

- Copies of Environmental Permits / discharge consents and records of any effluent monitoring, which will be held in a designated file by Contractor and will be available for inspection at any time;
- Copies of effluent monitoring records (if required by any discharge consent or Permit);

- A drainage plan for the Site, kept up to date as work on Site progresses;
- An Environmental Incident Logbook for use in the event of a pollution incident; and
- Copies of liaison with the Regulator in the event of an incident.

16. Pollution Incident Control Procedure

16.1 General

This procedure applies to public safety, emergency and other unplanned activities during the construction works. All staff are responsible for complying with the requirements of the procedure.

As a best practice measure, the Contractor shall implement pollution prevention policies and procedures on Site in accordance with the measure and principles set up within this Framework CEMP.

16.2 Potential Effects

Construction site activities such as deliveries, oil and chemical storage and emergencies may result in unplanned pollution incidents that would have adverse effects on the environment, human health and properties.

Considering the nature of the site, additional risks include the interaction of the construction works with the existing navigational routes.

16.3 Relevant Legislation and Guidance

- Environmental Protection Act 1990;
- Environmental Permitting (England and Wales) Regulations 2016, as amended;
- Water Industry Act 1991, as amended;
- Environmental Damage (Prevention and Remediation) Regulations 2009: Guidance for England and Wales, as amended; and
- Pollution Prevention Guidance 61 (PPG61): Working at construction and construction sites (it is noted PPGs are no longer maintained by the EA).

16.4 Procedure

The Contractor will establish a spill control procedure as part of their operating procedures, which will be adhered to in the event of a spill.

Incidents that shall be reported to the Contractor include:

- Spills of chemicals, oils, fuels, unplanned or non-consented discharges;
- Release of fumes and gases; and
- Any incident that could lead to enforcement action from LCC or any other regulatory body, public complaint or media attention.

In the event of a spillage or other pollution incident, the Contractor will be notified immediately and will take immediate steps to prevent environmental pollution, for example:

- Protection of drains following a spillage of oil or other chemical;
- Use of spill kits following a spillage of oil or other chemical; and
- Turning off equipment or other source of fumes, noise or dust.

A suitable number of spill kits will be kept on Site in the vicinity of the work in progress and areas of hazardous material storage, which as a minimum should contain absorbent granules, sand bags and drain covers. Where possible, absorbent pads and booms shall be used instead of granules and sand bags. Used spill kits must be disposed of appropriately, for example as hazardous waste, where relevant.

If it is considered that a fugitive release to air, water or ground may have occurred, the following action will be taken:

- Ensure that it is safe to remain in the area;
- Locate and switch any isolation switches, valves or pumps if possible;
- Contact the following bodies where appropriate and follow their instructions:
  - Environment Agency (Tel: 0800 80 70 60);
  - Liverpool City Council (Tel: 0151 233 3000);
  - Fire Brigade - 999 (emergencies) 0151 296 4000 (non-emergencies); and
  - MMO Marine Pollution incidents line (0300 2002024).

Where possible, damage control measures should be undertaken to prevent dispersion of gases or pollution from entering drains or water courses. For example, create containment sumps, pump liquid to temporary storage areas (such as lined skips) and block or clear drains as appropriate.

Liaison must be undertaken with Mersey Docks Harbour Company (MDHC) as Harbour Authority to ensure suitable management / control mechanisms during the construction works in line with the Port Marine Safety Code (PMSC) of a Safety Management System (SMS).

Construction activities and associated risk management and emergency response must be undertaken in lined with the most updated Navigation Risk Assessment (NRA).

16.5 Documentation

- A log of environmental incidents and remedial actions taken will be maintained on the Site and held by the Contractor; and
- Site Review Record Sheet as presented in **Appendix D (**or similar), to be maintained and completed as necessary.

17. Site Environmental Auditing and Verification Monitoring

17.1 Introduction

Regular independent environmental audits should be undertaken to ensure that the requirements of this CEMP are being met. The frequency of the audits will be dependent upon the potential for the works being carried out to give rise to environmental impacts but are generally every once every two to four weeks during the main phases of demolition or construction.

The audits will include a Site inspection and a review of documentation and will be recorded on the Site Record Sheet presented in **Appendix D**, or similar. This will include a review of the in-house auditing.

Non-conformances will be reported to the Contractor's environmental manager with a deadline for remedial action, where necessary.

Independent dust, vibration and noise monitoring will also be undertaken, in addition to that outlined in **Sections 7 and 8** above.

17.2 Environmental Reviews

Environmental issues will be included as an item on the agenda at Progress Meetings, attended by the Contractor, Sub Contractors, relevant Trade Contractors and other members of the Project Team where appropriate. Where relevant, the following should be discussed:

- Results of the monitoring;
- Complaints, including cause and remedial action;
- Neighbourhood liaison;
- Communications with LCC and other statutory bodies; and
- Incidents that have taken place.

17.3 Documentation

The following documentation must be retained on Site for inspection as indicated in the previous sections of the EMP:

- Complaints log book with details of the response made to complaints received;
- Noise and vibration monitoring record sheets with details of corrective actions taken where the action levels are exceeded;
- Dust monitoring records;
- Plant maintenance and defect records;
- Details of waste recycling targets and records;
- Records of quantities of waste produced, reused, recycled and disposed of to landfill;
- Waste transfer notes, hazardous waste consignment notes and waste carrier's registration;
- Copies of Environmental Permits, discharge consents and licenses;
- Results of discharge water quality testing; and

Environmental incident logbook containing details of environmental incidents and corrective action taken.

APPENDICES

A. Figures

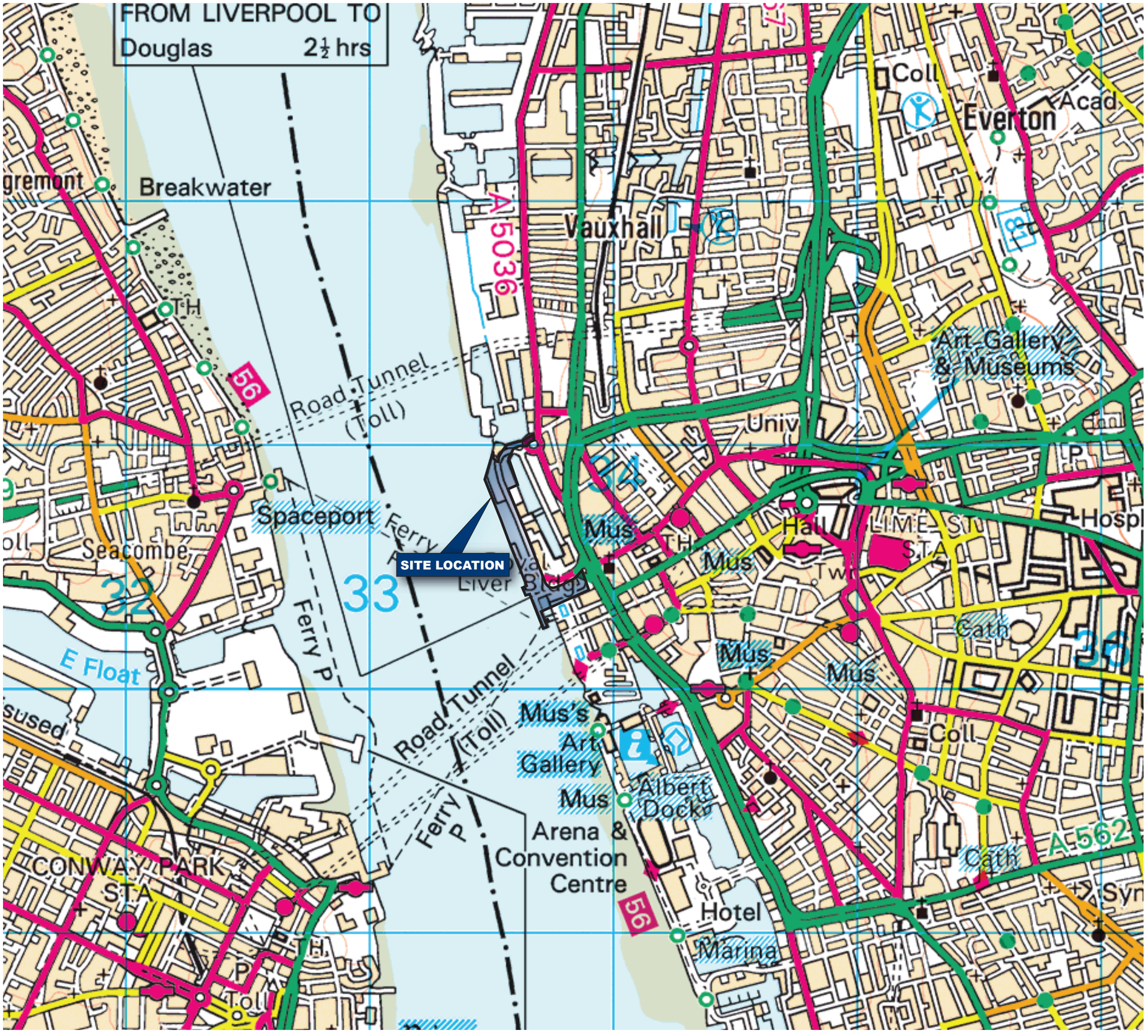


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Figure Title	Figure 1: Site Location
Figure Ref	WIE12464-100_GR_CEMP_1A
Date	2018
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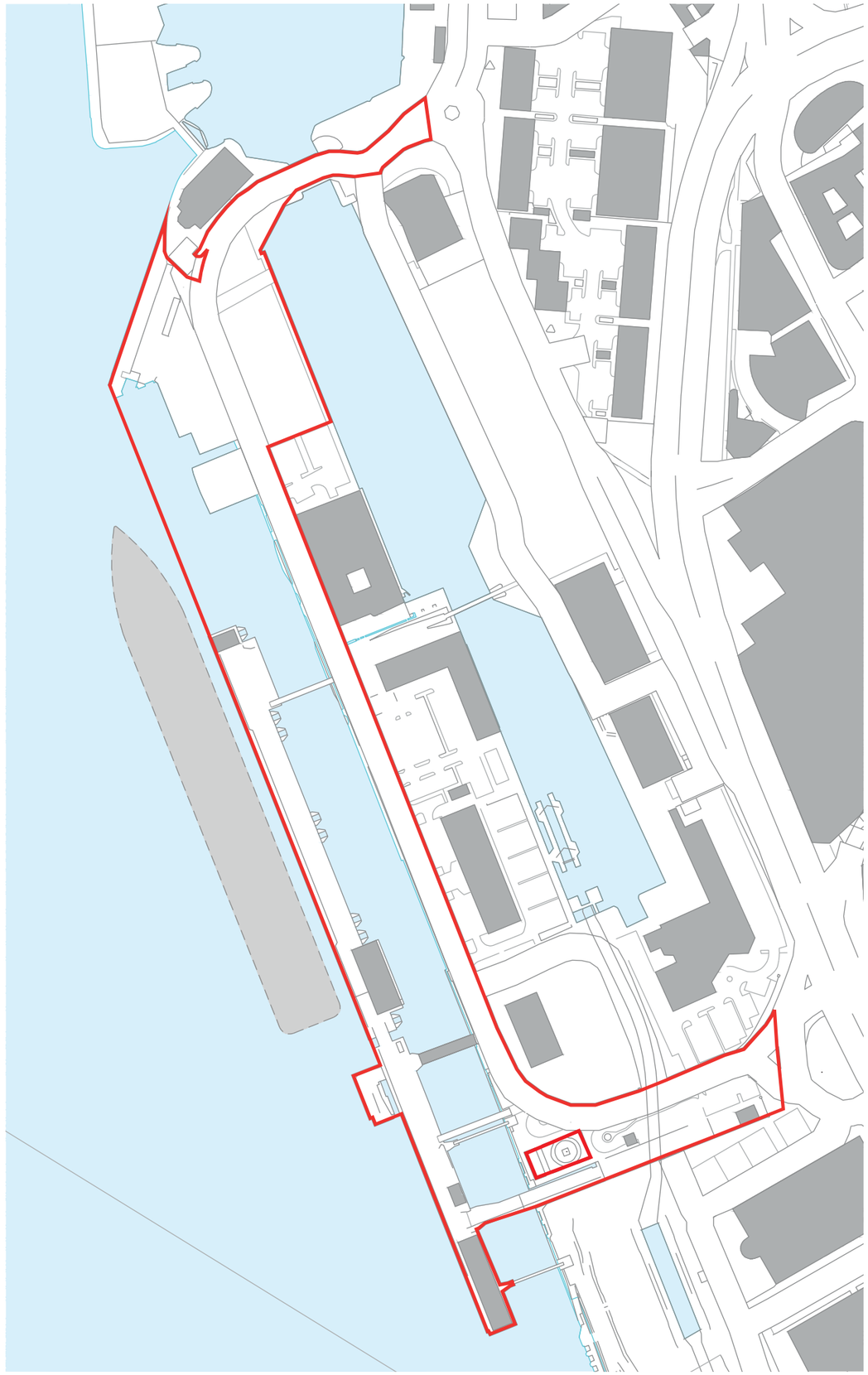

Site Boundary

N

Project Details	WIE12464-100: Liverpool Cruise Terminal
Figure Title	Figure 2: Site Boundary
Figure Ref	WIE12464-100_GR_CEMP_2A
Date	2018
File Location	\\s-lncs\wiel\projects\wie12464\100\graphics\cemp\issued figures

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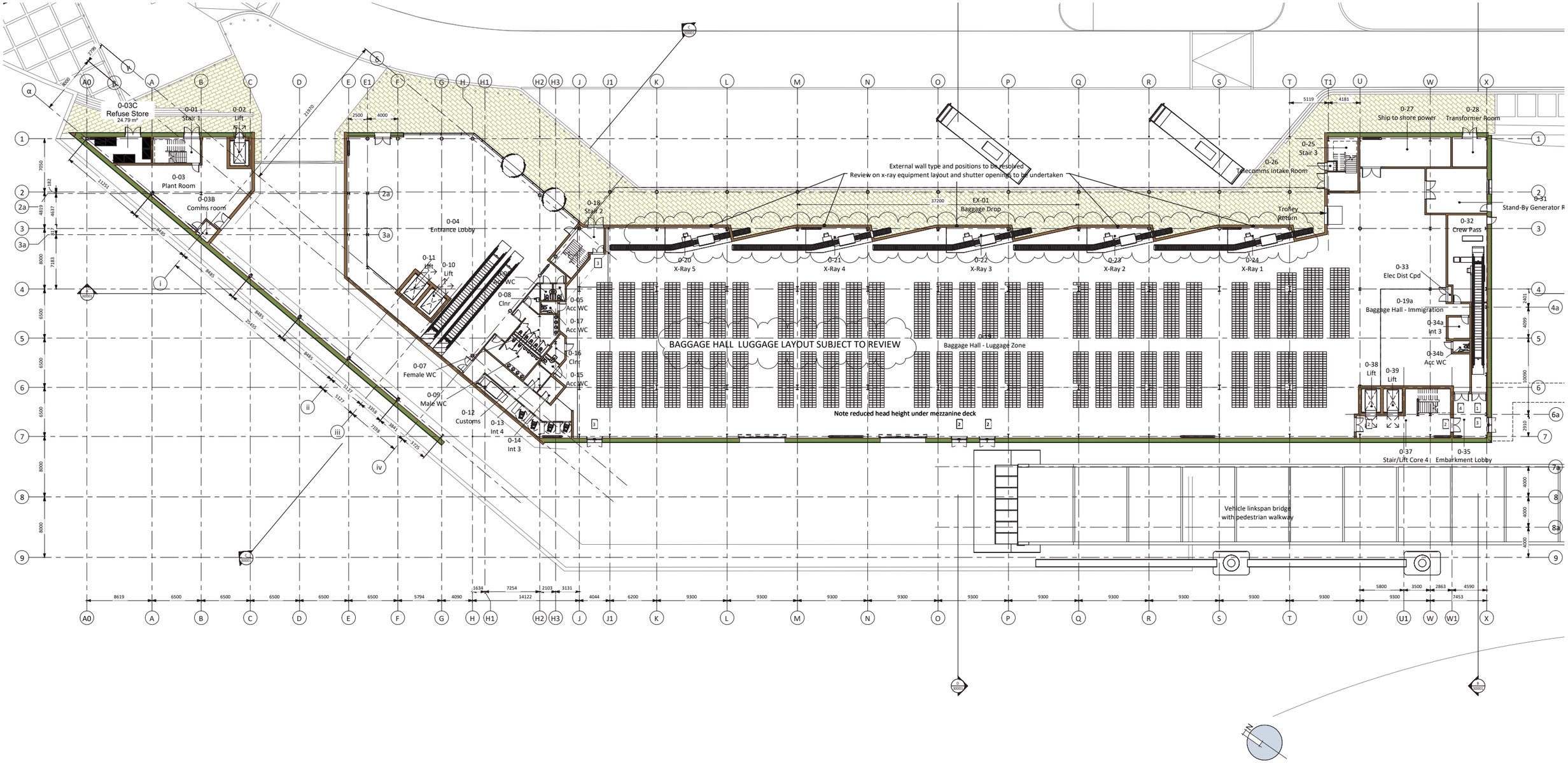

Project Details	WIE12464-100: Liverpool Cruise Terminal
Figure Title	Figure 3: Proposed Site Layout
Figure Ref	WIE12464-100_GR_CEMP_3A
Date	2018
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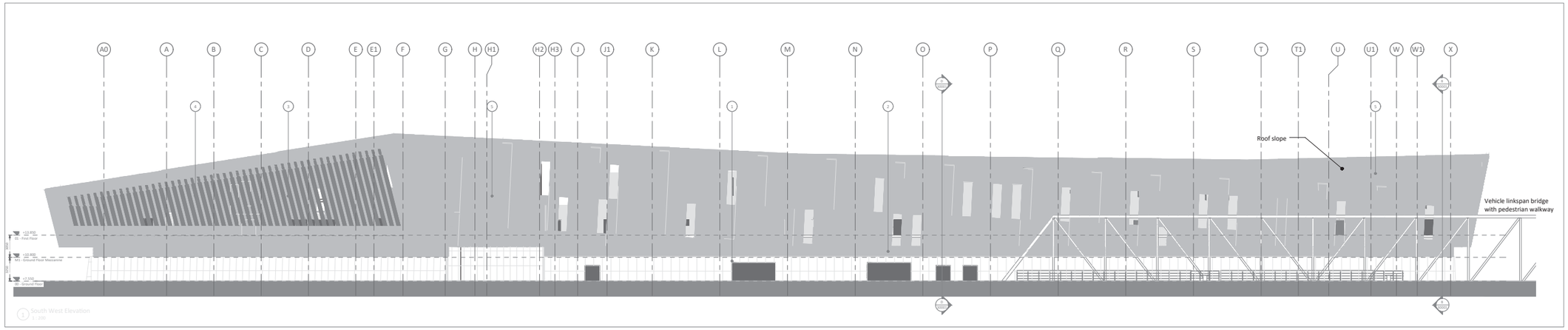

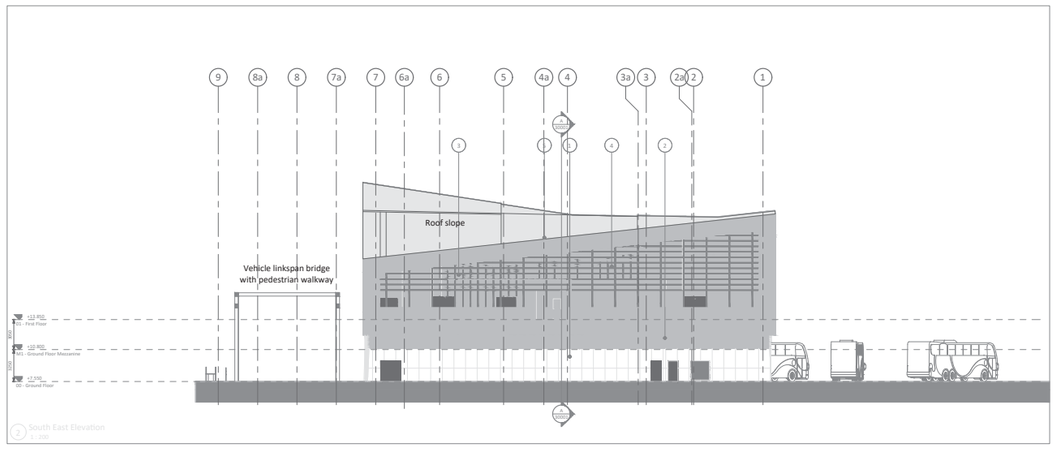

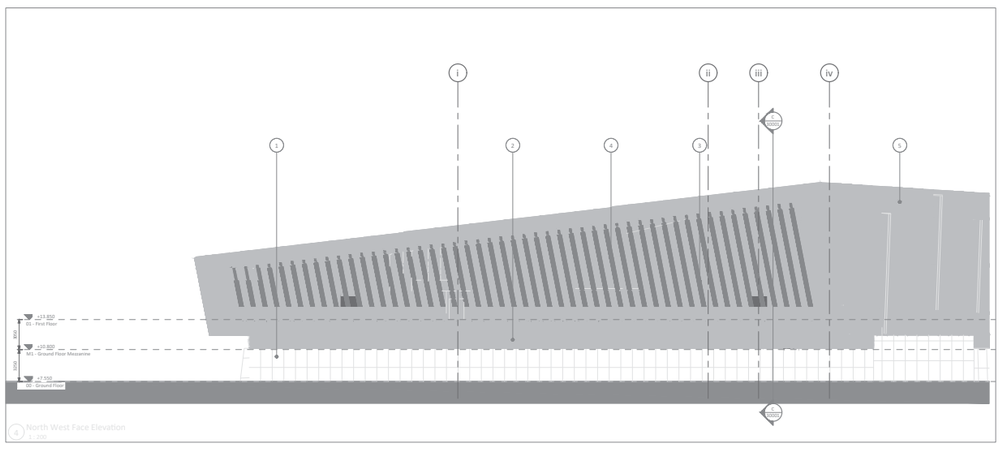

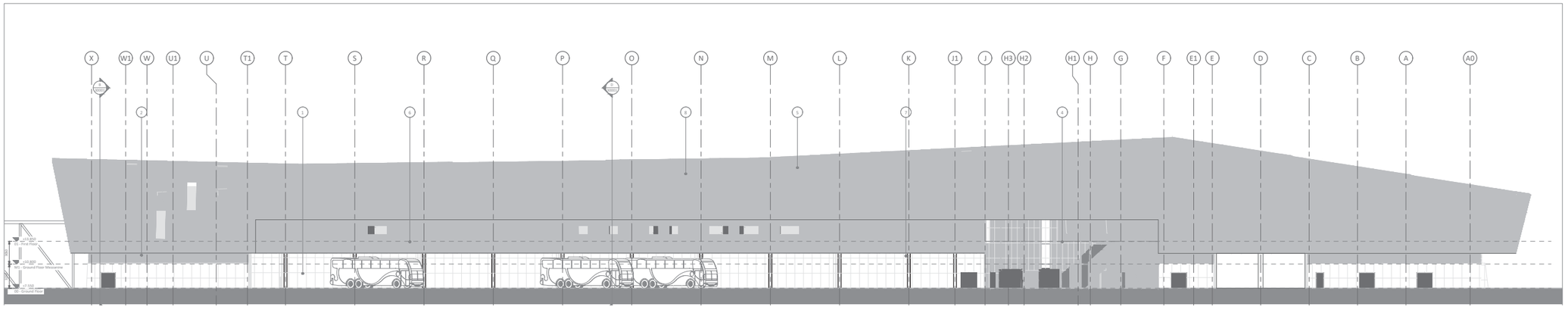

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Figure Title	Figure 4: Proposed Building Elevations
Figure Ref	WIE12464-100_GR_CEMP_4A
Date	2018
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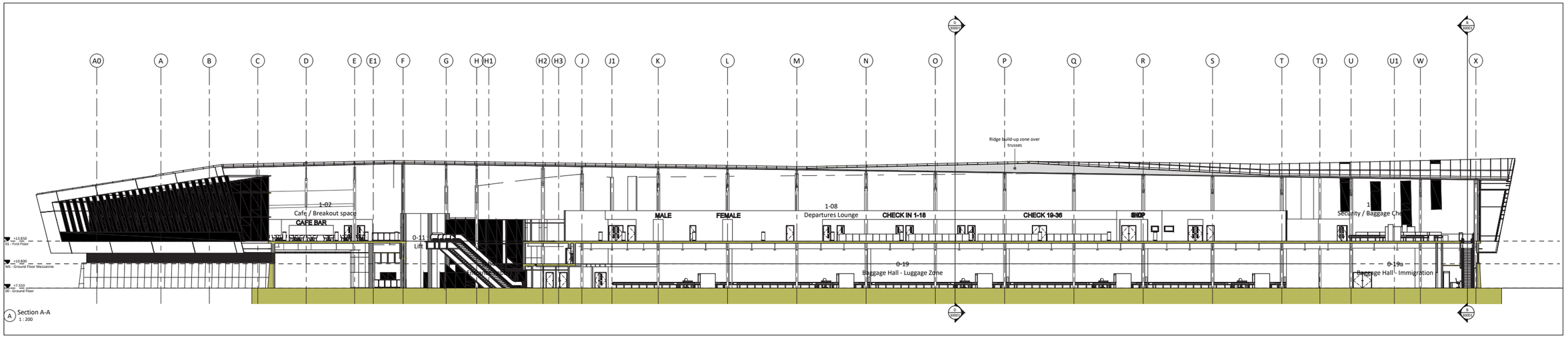

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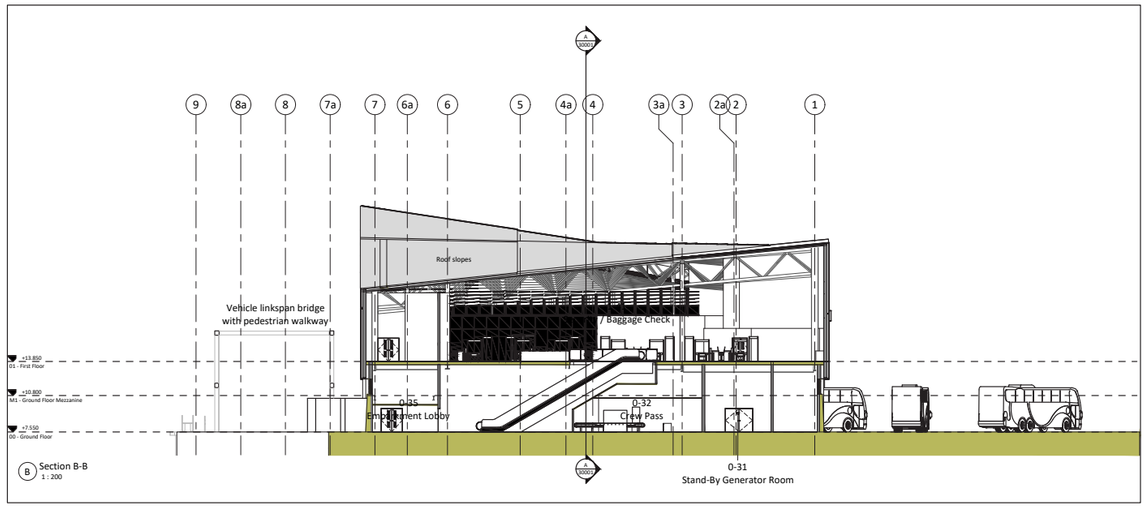

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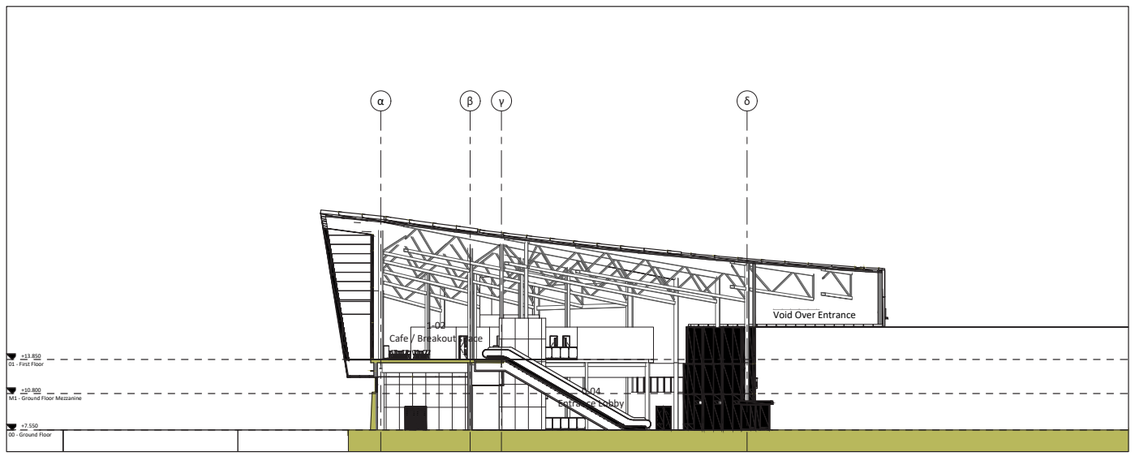

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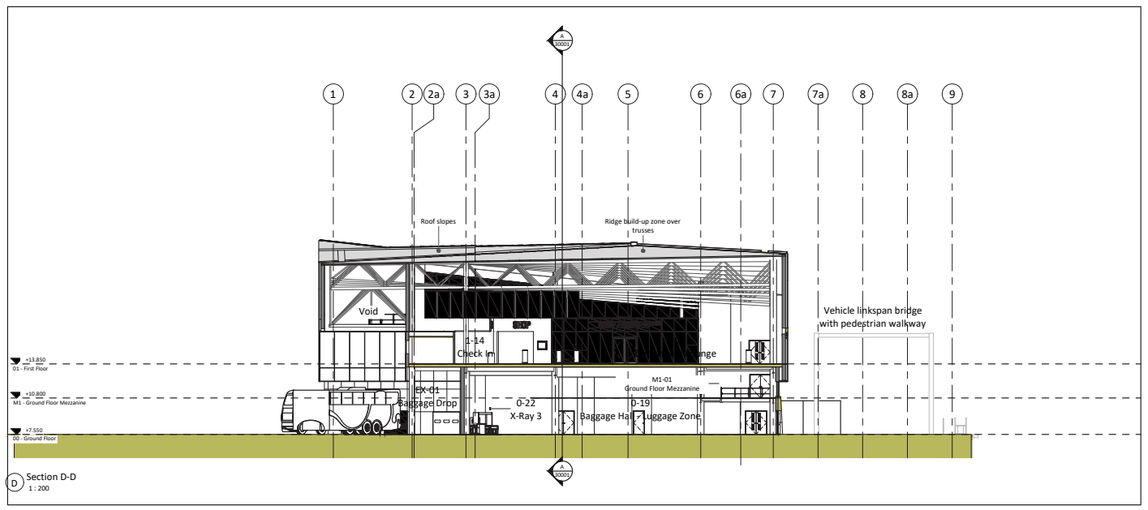

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Figure Title	Figure 5: Proposed Building Sections
Figure Ref	WIE12464-100_GR_CEMP_5A
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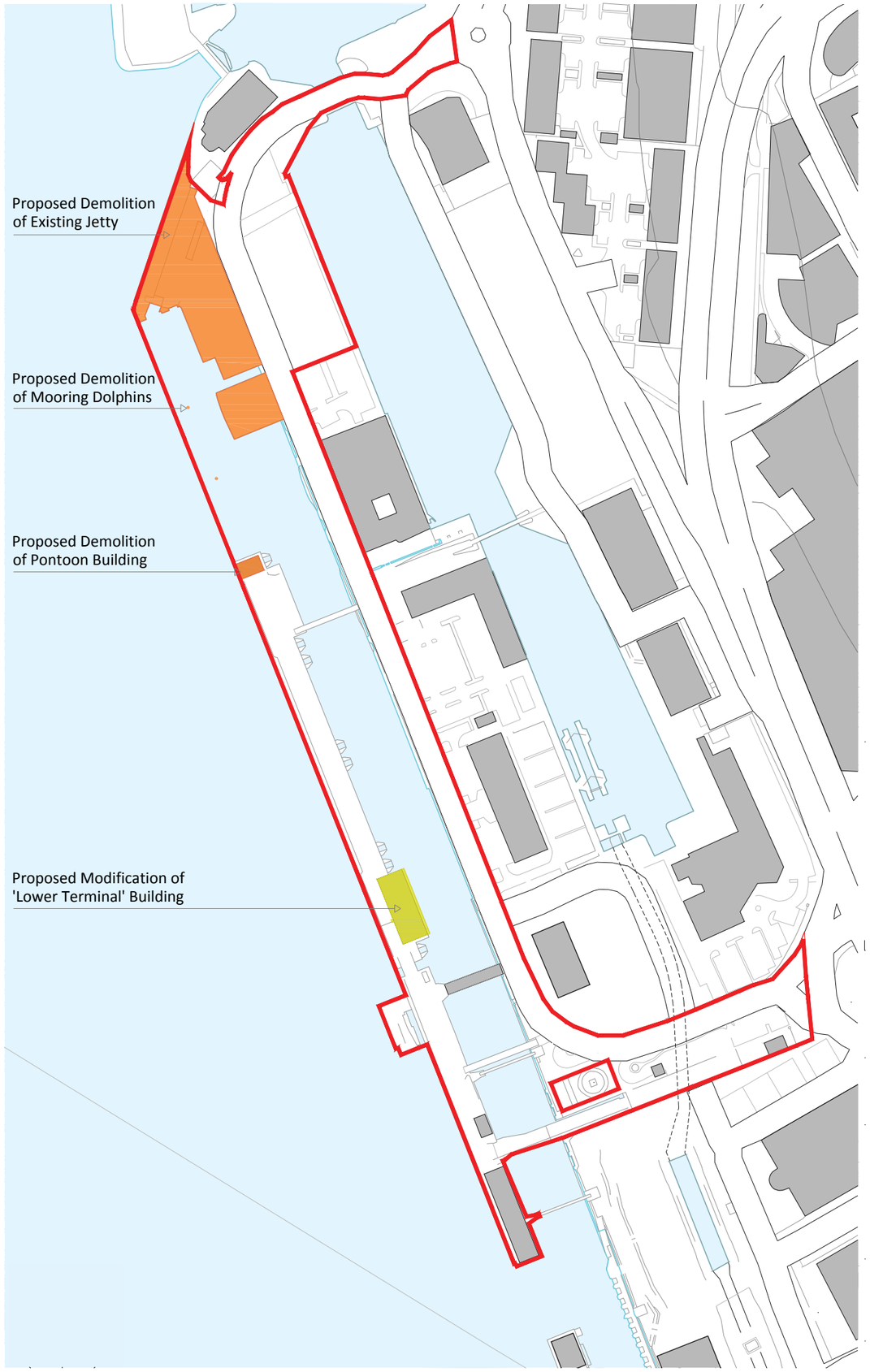

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Site Boundary

Proposed Demolition Works

Proposed Building Modification

N

Project Details	WIE12464-100: Liverpool Cruise Terminal
Figure Title	Figure 6: Parameter Plan 2 - Demolition Plan
Figure Ref	WIE12464-100_GR_CEMP_6A
Date	2018
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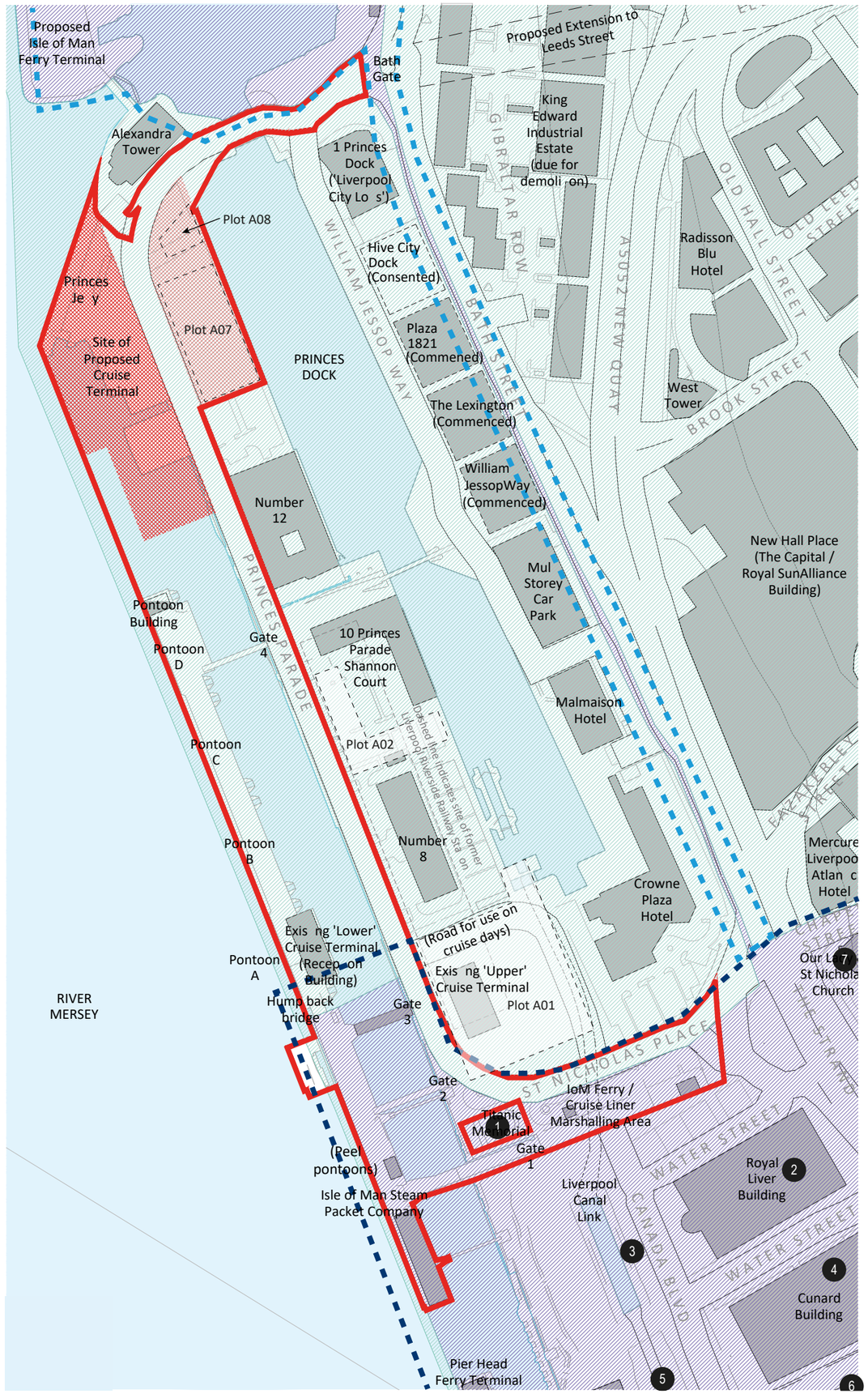
Source: Stride Treglown



Source: Stride Treglown

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- Site Boundary
- World Heritage Site
- World Heritage Site Buffer
- Stanley Dock Conservation Area
- Castle Street Conservation Area
- Proposed Passenger Pick-up / Drop-off Area

Listed Buidlings

1. Memorial to Heroes of the Marine Engine Room (Grade II Listed)
2. Royal Liver Building (Grade I Listed)
3. Monument to Sir Alfred Lewis Jones (Grade II Listed)
4. Cunard Building (Grade II Listed)
5. Monument to Edward VII (Grade II Listed)
6. Port of Liverpool Building (Grade II Listed)
7. Church of Our Lady and St. Nicholas (Grade II Listed)

N

Project Details	WIE12464-100: Liverpool Cruise Terminal
Figure Title	Figure 7: Existing Land Use
Figure Ref	WIE12464-100_GR_CEMP_7B
Date	2019
File Location	\\s-lncs\wiel\projects\wie12464\100\graphics\cemp\issued figures

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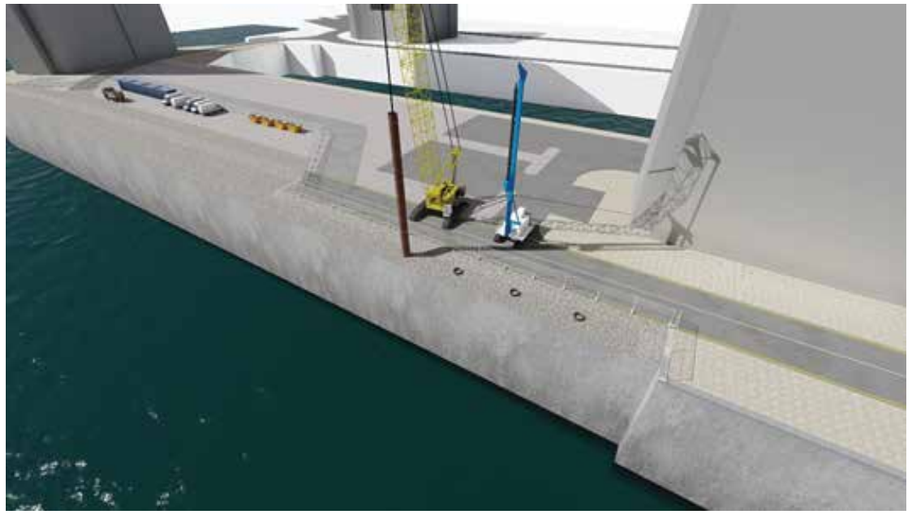
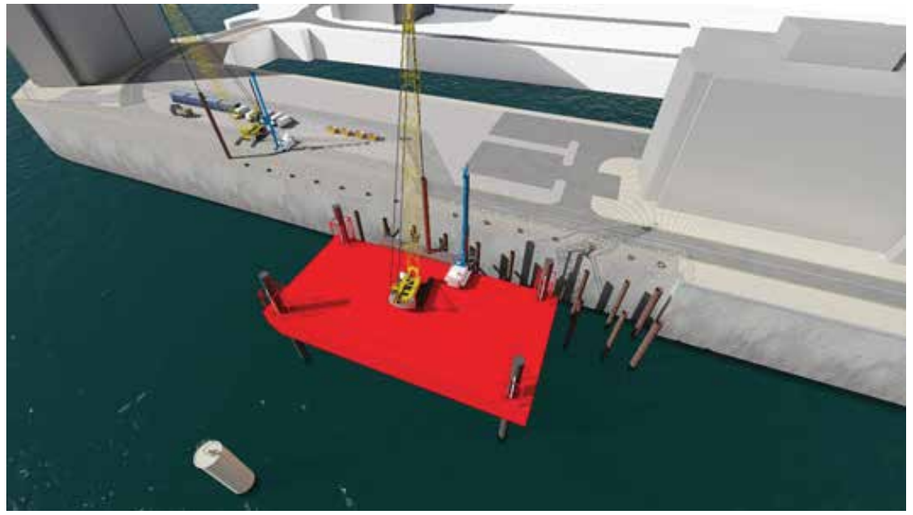
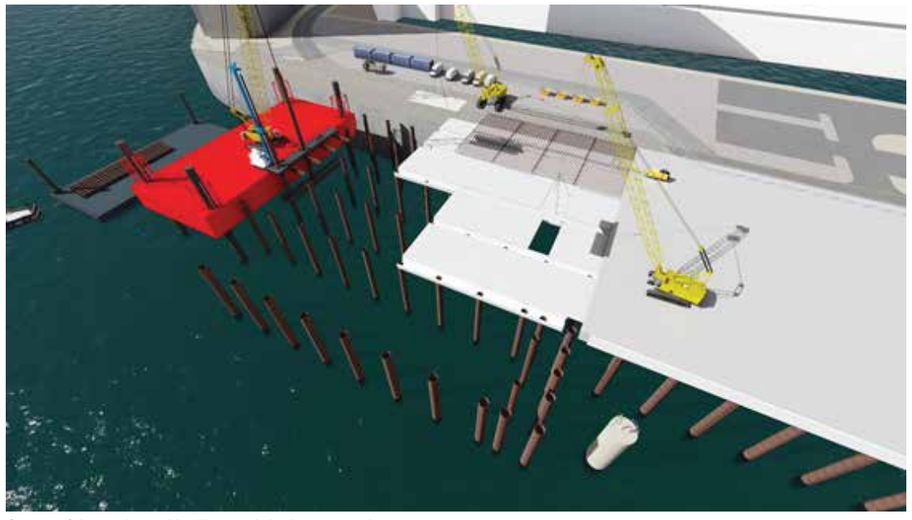


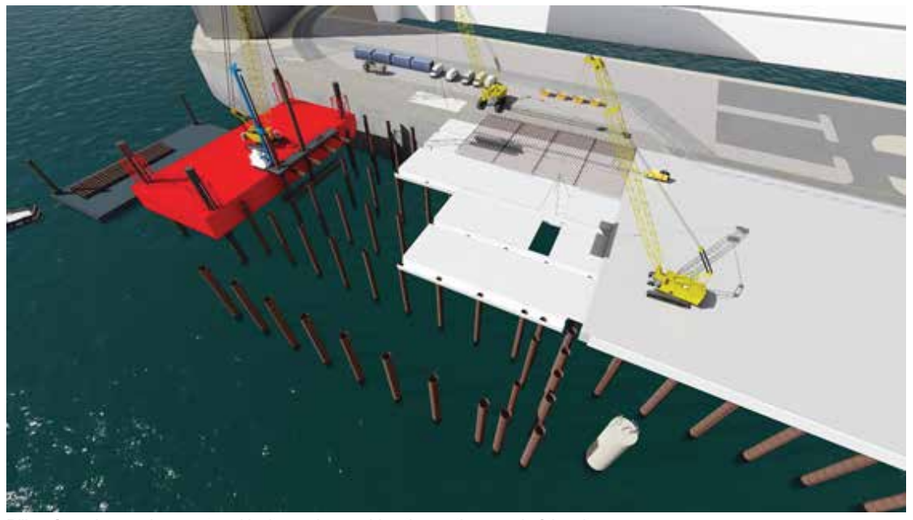
Installation of the landside piles



Piling using marine plant



Status of the project with piling and deck construction

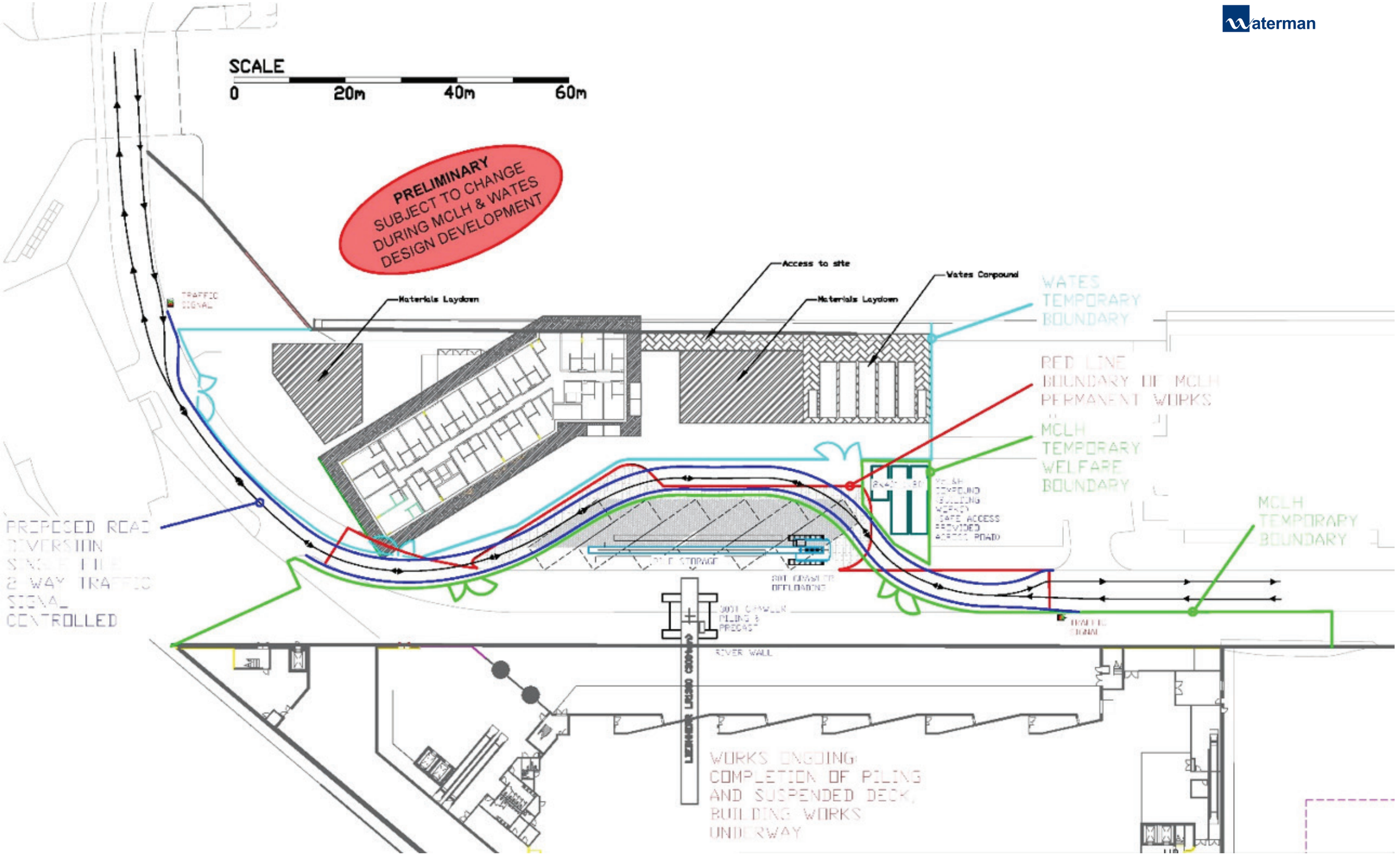


Piling Complete and precast and insitu works reaching the northern end of the site

Southern end of the deck completed to allow works on the building to commence (note the deck will never look as open as this as the building frame will have commenced at this stage

Project Details	WIE12464-100: Liverpool Cruise Terminal
Figure Title	Figure 8: Deck construction operations
Figure Ref	WIE12464-100_GR_CEMP_8A
Date	2018
File Location	\\s-lncs\wiel\projects\wie12464\100\graphics\cemp\issued figures

Project Details	WIE12464-100: Liverpool Cruise Terminal
Figure Title	Figure 9: Site Setup
Figure Ref	WIE12464-100_GR_CEMP_9A
Date	2018
File Location	\\s-lncs\wiel\projects\wie12464\100\graphics\cemp\issued figures



Project Details	WIE12464-100: Liverpool Cruise Terminal
Figure Title	Figure 10: Proposed Traffic Management Plan and Site Setup
Figure Ref	WIE12464-100_GR_CEMP_10A
Date	2018
File Location	\\s-lncs\wiel\projects\wie12464\100\graphics\cemp\issued figures

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B. Cormorant Ecological Conservation Management Plan

Waterman Infrastructure & Environment Limited
Merchants House, Wapping Road, Bristol, BS1 4RW
www.watermangroup.com

Liverpool Cruise Terminal

Technical Note – Cormorant Mitigation

Date: Date: October 2019

Client Name: Liverpool City Council

Document Reference: WIE12464-100-TN-14-2-2

This document has been prepared and checked in accordance with
Waterman Group's IMS (BS EN ISO 9001: 2015, BS EN ISO 14001: 2015 and BS OHSAS 18001:2007)

Issue	Prepared by	Checked & Approved by
	Niall Machin	Gavin Spowage
Second Issue	Associate Director	Associate Director

1. Introduction

1.1. The shadow Habitat Regulations Assessment (HRA ref WIE12464-100-11-2-3-AA, Waterman January 2019) for the Liverpool Cruise Terminal proposed ecological mitigation for cormorant *Phalacrocorax carbo* in the form of a floating pontoon structure. MEAS and Natural England have advised that the floating pontoon should be a permanent structure. This is secured by a planning condition.

1.2. Small numbers of cormorant (up to 12) were recorded using on-site dockside structures in 2017 winter ornithological surveys. As the scheme will result in the loss of structures, particularly Princes Jetty, used by roosting/resting cormorant during construction, a floating pontoon for roosting/resting cormorant will be installed. To ensure the loss of the jetty is fully mitigated, the floating pontoon will be a permanent installation. The new jetty will also provide cormorant resting/roosting locations.

1.3. This Note sets out further detail on the design and location of the floating pontoon and sits as part of the strategic approach to cormorant mitigation in the wider Liverpool Waters vicinity of which the Cruise Terminal is part.

1.4. A strategic approach to cormorant mitigation within the overall Liverpool Waters area is being coordinated by Arup on behalf of Peel Land & Property (Ports) Ltd. The provisions within this Technical Note are covered by and conform with the overarching strategic approach.

1.5. This Technical Note constitutes an Ecological Conservation Management Plan (ECMP) for cormorants for the Liverpool Cruise Terminal development.

2. Pontoon design and location

Design

2.1. Floating platforms are used by wintering and other bird species, including cormorant, as night time roosts and daytime resting areas. Cormorants utilising such structures have become a feature of many of the UK's urban areas where large bodies of water occur.

2.2. A schematic design is shown as **Figure 1**. This is designed to enable a single 3m by 3m pontoon to be initially delivered by the neighbouring Isle of Man Ferry Terminal scheme in October 2019, with additional pontoons being added to form a larger structure as other nearby developments, including the Liverpool Cruise Terminal come forward.

Individual 3m by 3m pontoon design

2.3. Refer to **Annex A** for proposed pontoon design.

Larger joint pontoon design

2.4. It is known that a larger pontoon resource is required to jointly deliver cormorant mitigation for the Isle of Man Ferry Terminal, Liverpool Cruise Terminal, Northern Relief Road and, potentially, the C02 project. **Figure 1** therefore shows how four 3m by 3m blocks can form one single larger pontoon unit. The final design may instead be a square 6m by 6m arrangement.

2.5. Whilst each individual scheme is expected to deliver appropriate mitigation for roosting/resting cormorant displacement, there is a degree of 'double counting' of the birds involved. In particular, the Isle of Man Ferry Terminal, Northern Relief Road and C02 developments will impact more or less the same group of cormorants that currently rest/roost around West Waterloo Dock/Princes Dock and the dockside structures. The cormorants using land impacted by Liverpool Cruise Terminal just to the south would also interact with the West Waterloo/Princes Dock birds.

2.6. Therefore, it is appropriate for the individual developers to deliver a structure which could support around 15-20 roosting/resting cormorant. The design in **Figure 1** would accommodate upwards of 20 cormorants. It has been agreed that the relevant developers (Liverpool City Council, Isle of Man Government Department of Infrastructure, and Peel Land & Property (Ports) Ltd) will jointly provide this four-pontoon solution. However, a single 3m by 3m pontoon described in **Annex A** has been installed by the Isle of Man Government under marine licence L/2019/00239/1, to meet the requirements of condition 5.2.9 of that licence in advance of the other three pontoons (which can then be attached to the single pontoon when they are installed), as the project timescales for the Isle of Man scheme required the pontoon to be installed and in situ by 17th October 2019 at the latest. That pontoon was installed on 16th October 2019. The date of installation of the second 3m x 3m pontoon for the Liverpool Cruise Terminal is currently unknown.

Maintenance and Monitoring

2.7. The design will have an estimated life of at least 12 years with minimal maintenance. Minimal management is required – just removal of bird droppings once per year (off site, not into the Dock).

2.8. The current pontoon and all subsequent pontoons, including the pontoon installed for the Liverpool Cruise Terminal development, will be subject to an Adaptive Management Plan and annual winter bird surveys. An Adaptive Management Plan has been drafted by Waterman (ref: WIE12464-100-17-2-3) and forms an Appendix to the Liverpool Cruise Terminal CEMP document. The effectiveness of the mitigation (i.e. the pontoon) will be reviewed annually and action taken to ensure appropriate habitat for cormorant is maintained.

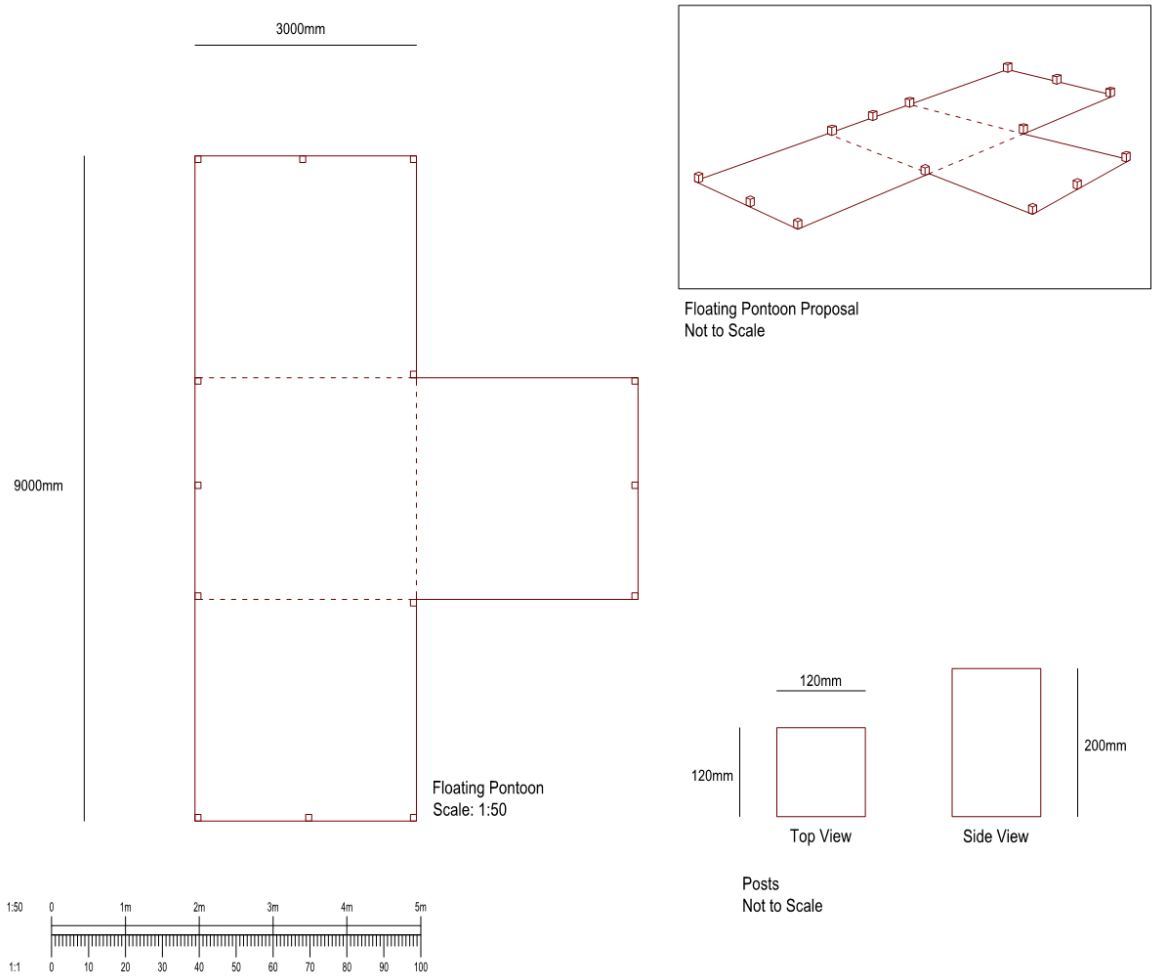

Figure 1: Proposed Cormorant Pontoon Design

Location

2.9. The floating pontoon(s) would be located in the eastern part of Princes Half Tide Dock, see **Figure 2**.

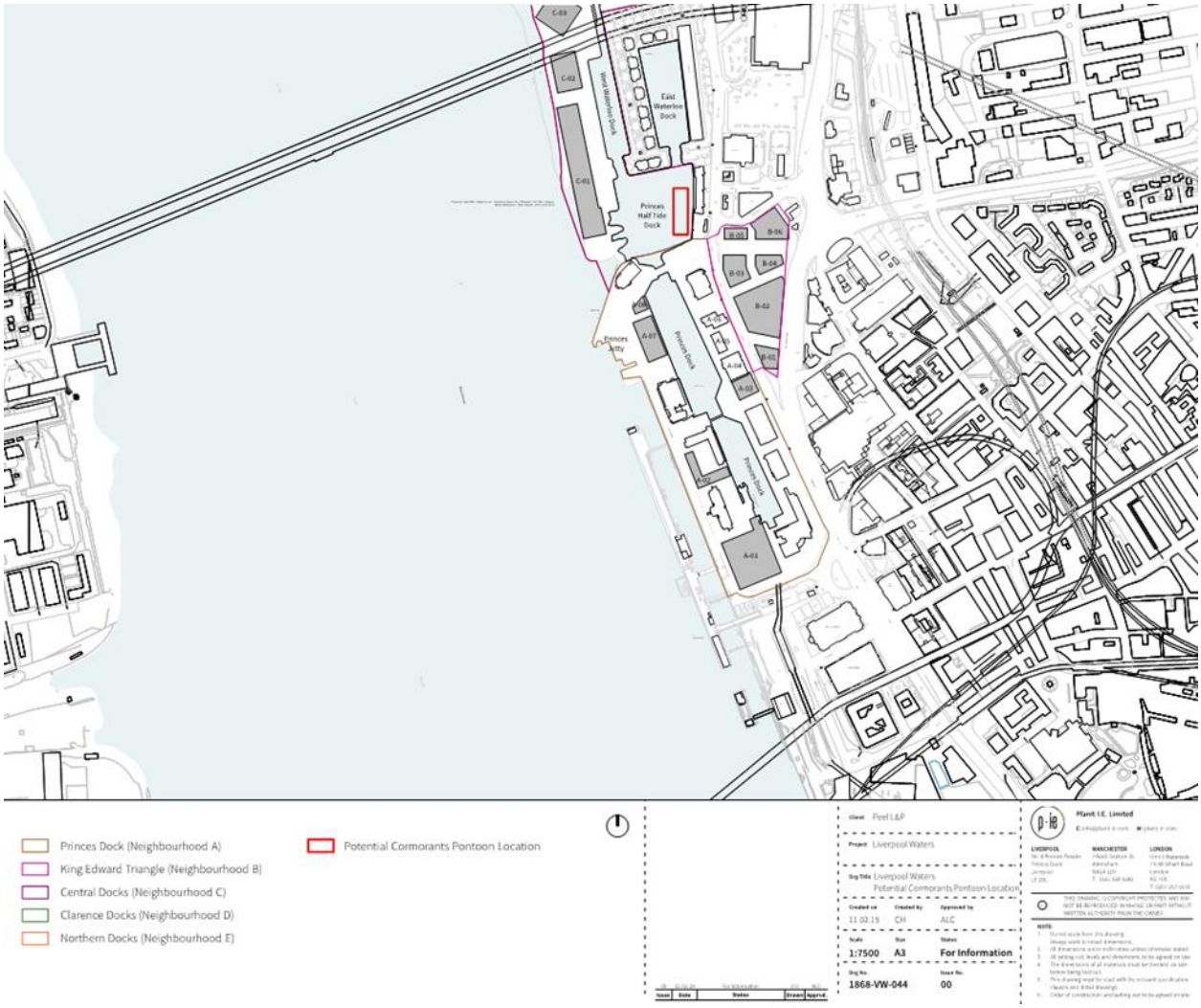

Figure 2: Proposed Cormorant Pontoon Location

3. Strategic approach

3.1. In their comments dated 18th March 2019 relating to the shadow HRA report submitted in support of the planning application for the nearby Isle of Man Ferry Terminal proposed development (ref: 18F/3231), Natural England (NE) stated:

We are highly encouraged that development teams from a number of projects in the area are working together to provide a combined mitigation pontoon. We have advised that a strategic approach to mitigation would be the most beneficial approach to ensure impacts arising from the number of developments is considered, therefore allowing for more certainty on deliverability of mitigation within a holistic manner. We advise that a strategic mitigation strategy should be provided and ideally in advance of projects coming forward so that the strategy can be agreed and in place, therefore allowing a smooth process through the planning stages.

3.2. In response to NE's advice, Peel, the site owners and holders of the outline permission for the Liverpool Waters Masterplan have agreed to co-ordinate a strategic approach to cormorant mitigation for Liverpool Cruise Terminal (LCT), Isle of Man Ferry Terminal (IoM), Northern Link Road (NLR)

and C02. Peel have identified a new permanent pontoon facility to be provided in Princes Half Tide Dock – see **Figure 2** above.

3.3. The final large joint pontoon structure would comprise 4 interlocking units forming a single structure of sufficient size and design to deliver the mitigation for the IoM, LCT, NLR and C02 schemes, i.e. catering for at least 20 cormorants.

3.4. Peel, in association with the individual developers, will oversee the Annual Monitoring of the pontoon facility in terms of winter bird monitoring surveys. The facility will be subject to an Adaptive Management Plan (AMP) which sets out any additional actions required for successful mitigation, e.g. responding to the monitoring in terms of adaptations that may be required to the structure to make it more suitable for cormorant. The AMP will also address management or maintenance requirements and respond to further additions/additional structural elements/habitats should other schemes come forward in the vicinity that require ecological mitigation of this sort.

3.5. The strategic approach to cormorant mitigation within the overall Liverpool Waters area, including the AMP for the cormorant pontoons, is being coordinated by Arup on behalf of Peel Land & Property (Ports) Ltd. The provisions within this Technical Note are covered by and conform with the overarching strategic approach.

ANNEX A

Cormorant Pontoon – Design Basis Statement and Method Statement

REPORT

IOM Ferry Terminal – Bird Pontoon

Design Basis Statement

Client: Sisk

Reference: PB8850-RHD-ZZ-XX-RP-Z-0001

Status: Draft/P02

Date: 30 July 2019

Royal HaskoningDHV

Enhancing Society Together

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Document title:	IOM Ferry Terminal – Bird Pontoon
Document short title:	Design Basis Statement
Reference:	PB8850-RHD-ZZ-XX-RP-Z-0001
Status:	P02/Draft
Date:	30 July 2019
Project name:	IOM Ferry Terminal
Project number:	PB8550
Author(s):	Stephen Salmon
Drafted by:	Stephen Salmon
Checked by:	Mike Primrose
Date / initials:	26/07/2019
Approved by:	Alistair Reid
Date / initials:	26/07/2019

Classification
Project Related

Disclaimer

Table of Contents

1 Introduction

The scope of the design comprises 1 No. 3 x 3m pontoon for bird roosting including Cormorants for a 12-year design life. The pontoon will be located in Princes Half-Tide Dock, Liverpool.

The overall design is based on an adaptation of an existing RSPB design, as outlined in the RSPB Design and Management of Rafts notes, by forming the lower section in steel with upper section remaining as per the standard design. The RSPB design notes are included in Appendix A.

2 Key Parameters

2.1 Geometry

The habitat pontoon will be made of 1 No. 3 x 3m unit. The design includes a capability for the addition of further pontoons, linked by shackles.

The freeboard will be approximately 250 to 300mm excluding wind induced heeling effects and maintenance personnel.

The pontoon will be moored in position using chains to anchor blocks installed on the dock bed. This anchoring system will allow movement under wind loading. Given the open water nature of the dock this is not anticipated to present any significant issues.

2.2 Wind

Wind velocities have been extracted from another project undertaken in the area and are listed in Table 1.

Return Period	10minute at +10m	Wind speed at sea level so 30sec gust
1 in 1yrs	20.8	22.8
1 in 10yrs	24.7	27.1
1 in 50yrs	28.5	31.2

Table 1 – Design wind velocities

The loads reported are based on a 250mm freeboard.

2.3 Water Levels

Normal dock water level is around +9.8mCD, the published seabed level in the dock is +0.2mCD giving a water depth of 9.6m.

The existing seabed level is understood to be significantly higher than the above published level, prior to construction the seabed level will be confirmed by hydrographic survey. The anchor assemblies e.g. length and diameter of chains, expected movements, etc. will then be adjusted to suit the seabed level.

The existing seabed level in the dock is not known. Should this be different to that assumed above the chain lengths and reported movements will require recalculating.

2.4 Seabed Composition

The seabed material in the dock is assumed to comprise soft, cohesive material i.e. deposited mud and silt. This is considered suitable for the use of anchor blocks.

2.5 Wave climate

There is no significant wave loading assumed as the dock is enclosed with a limited fetch for locally generated wind waves.

2.6 Live loads

A uniformly distributed load of 0.40kPA and point load of 1.00kN has been assumed. This matches the recommend guidance provided in BS EN 1991-1 Table 6.10 for a Category H roof i.e. not accessible except for normal maintenance and repair.

Ad additional load case of 3 No. persons (equivalent to 0.75kN each) on one side has also been assumed. This allows for 3 maintenance personnel or other unauthorised access.

Cormorants have been proposed as the primary users of the pontoon accessing it by flying. These birds have typical body masses of up to 5.0kg. Consequently, they are not anticipated to have any significant impact on the freeboard or stability of the pontoon. By inspection their live loading is lower than that assumed in the design.

3 Results

To achieve an initial 250-300mm freeboard with all the timber and gravel in-situ 762mm diameter tubes filled with polystyrene is required. The polystyrene will reduce the risk of the pontoon sinking should the tubes be perforated.

These tanks are to act as support for the decking with additional angles to support the planking. The tubes will be sealed with square end plates that will allow welding to the square frame that holds the deck in place.

Diagonal bracing will be attached to the end plates to secure the floatation tanks.

The freeboard and trim of the pontoon is adjustable via the addition and positioning of steel plates on the deck (these will be gravel covered). Freeboard corrections will be achieved by adding the plates at the centre of the pontoon. Trim corrections will be made by adding plates to the edges of the pontoon.

It should be noted that any reductions in freeboard beyond the assumed 250-300mm will have a disproportionate effect on reserve buoyancy due to the tube shape.

3.1 Stability

Full live load
Max total load =0,40kN/m^2 x 3m x 3m = 3.60kN

With this load the freeboard will reduce by 30mm.

With the UDL loading on one side only the heel will be in the region of 1.0° Therefore the unit is deemed stable for the expected use.

Additional point loads
Max total load = 3 x 0.75kN = 2.25kN

With this load the freeboard will reduce by 20mm.

With this loading on one side only the heel will be in the region of 1.2° Therefore the unit is deemed stable for the expected use.

3.2 Anchorage

The anchor assemblies comprise catenary chains attached to sinkers positioned on the seabed. Using a 12.0m length 25kg/m catenary chain the anchor sinkers need to have a submerged weight of 250kg. This is equivalent to a dry concrete mass of 420kg or 280kg of steel.

4 Designers Risk Assessment

No.	Risk	Impact	Mitigation	Residual Risk
1	Floating structure that, though designed for wild life, will occasionally be accessed by people	Instability could result in operative having an unplanned entry to the water.	• Structure designed to have good stability will little tilt when unevenly loaded. • Operatives to wear life jackets when accessing the pontoons. • Operatives to be given adequate training/instruction as to safe working practice. • Hand railing will not be installed as that would negatively impact the purpose of the structure.	Typical risks of working near water. Suitable procedures need to be in place.
2	Floating structure is within an active area	Significant movement of the pontoons could risk other structures within the basin	• Movement kept below reasonable limit for design winds from 1:50year event • Supports on each side to take full wind load therefore there will be share capacity in the perpendicular anchors that will give appropriate safety factor.	Under extreme conditions the anchor blocks could be dragged a short distance on the seabed and may require repositioning
3	Corrosion of floatation tanks	Corrosion could eventually result in a hole in a take that would result in its loss of buoyancy	• Tanks filled with expanding foam such as even with a hole water will not be able to fill the tanks.	Significant areas of corrosion could allow the foam to be damaged and lost. An appropriate inspection regime is recommended
4	Lifting	The pontoon will have to be transferred into the water by lifting on slings.	• Structure kept to minimum weight • Tanks integral part of structure so slings under tanks during lifting not anticipated to put undue stresses into pontoon.	Typical risks of lifting large object into water. Suitable method statements would need to be produced

Appendix A – RSPB Design and Management of Rafts Note

a million voices for nature

Design of management of rafts

Rafts are a useful way of providing island habitat in areas of deep or fluctuating water levels. Their purpose is to improve breeding success by providing areas safe from flooding, disturbance or predation. Rafts are unlikely to attract terrestrial predators and so are useful where islands would be too close to shore for safety. They also provide wildfowl with loafing spots and are often used as resting places by various bird species during the winter.

Main factors to consider when making a raft

There are many conflicting requirements when constructing a nesting raft.

- The ability to float, preferably with the deck just above the water line.
- The ability to rise and fall easily with the water over the maximum flood range.
- Stability, so that the raft is not tipped or spun by current, waves or wind.
- A dry, sheltered nest site, which does not attract the attention of crows or other avian predators. The nest area must be high enough not to be swamped by storm waves.
- Means of access and some protection from waves and current for young birds.
- Harmonious blending with the surroundings if possible.
- Practical factors e.g. water not excessively deep, lake shore accessible by vehicle, for bringing in boat, raft and materials, and for regular maintenance checks.
- On SSSIs, formal consent may be required from NE, SNH or CCW.

Construction

Although rafts vary in character and design, some basic considerations apply to each.

1. - Timber rafts tend to absorb water and sink, although pine or other light wood floats better than heavy timber. In most cases, additional floats must be used if the raft is to last for more than one season.

2. - **Flotation blocks**: Small rafts can be floated with plastic 4.5 litre containers. Slightly larger rafts will stay afloat with 22 litre plastic drums. Rafts in the range of 1.2 - 1.8 m in dimension require closed cell polystyrene blocks, polystyrene scraps, airtight metal drums (including old oil drums). Polystyrene is easily held in place and can be adjusted to achieve right buoyancy. It should be packed into strong polythene to prevent it from breaking up and littering the environment. Metal drums need to be weighted so that they do not float too high. The flotation blocks must be thoroughly cleaned before they are brought to the site to prevent pollution. Annual checks and maintenance is important to ensure that the raft remains secure and firm, and that the flotation devices are not disintegrating or leaking.

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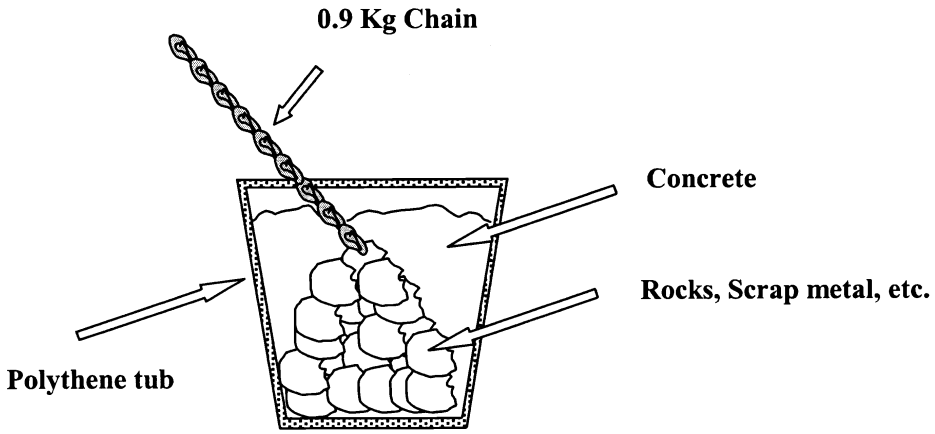
3. - **Anchors:** Two anchors are better than one and should be attached to opposite corners of the raft to keep it from swinging in the wind. Anchor to the bottom, not to the shore, to prevent vandalism and to keep rats or weasels from getting to the raft.
    a. - Anchors can be made from breeze blocks, concrete blocks etc. The wire anchor rope should be tied to a short section of chain or to an eye bolt; for large rafts use 19 mm circumference flexible steel wire rope with a 4 ton breaking strain to ensure that the mooring is secure. An anchor weighing about 50 kg is suitable for most rafts. It can be made in a large polythene garden tub half filled with scrap metal or rocks. Wrap one end of an appropriate length of chain around the scrap and fill the tub with concrete. Once the concrete has set, the anchor can be turned out of the mould and the chain bolted to the raft. Three thickness of heavy gauge (24mm) polypropylene rope can be used instead to save money, especially if the raft is in deep water. Where strong winds or currents are likely, several 50kg anchors may be needed to securely hold a 3m x 2m turned raft.



    b. - Where one large anchor is too cumbersome to manage, a smaller (e.g. 9 litre) container can be used as a mould and concrete sinkers can be cast with holes through their centres. One sinker can be fastened to the end of the wire and others can be threaded on and allowed to slide to the bottom before fixing the other end of the wire to the raft.

4. - Where more than three rafts are to be moored in a string there should be some additional anchor points from the middle rafts to keep the string from sagging before a strong wind and dragging the main moorings.

5. - Various nest boxes and duckling ramps can be added to the raft superstructure depending on the species of birds that the raft is intended for. Duck baskets should be at least 1.2 m apart and facing away from each other. They should be tilted slightly upwards at the front and lined with dead grass or some wood shavings. Baskets should be positioned in early January and left until early September, when they should be taken up, cleaned of nesting material and stored under cover.

Species specifications:

1. - Wader and tern nesting rafts, in most cases, should be bare of vegetation and covered with a material attractive to the intended nesting species.
2. - Wildfowl rafts require more vegetation. Rushes, reeds or small willows are suitable, planted either around the edges or over the deck of the raft leaving pathways to the nest box or central clearing. Plants survive best on raft designs with an open mesh or slatted platform just above the water

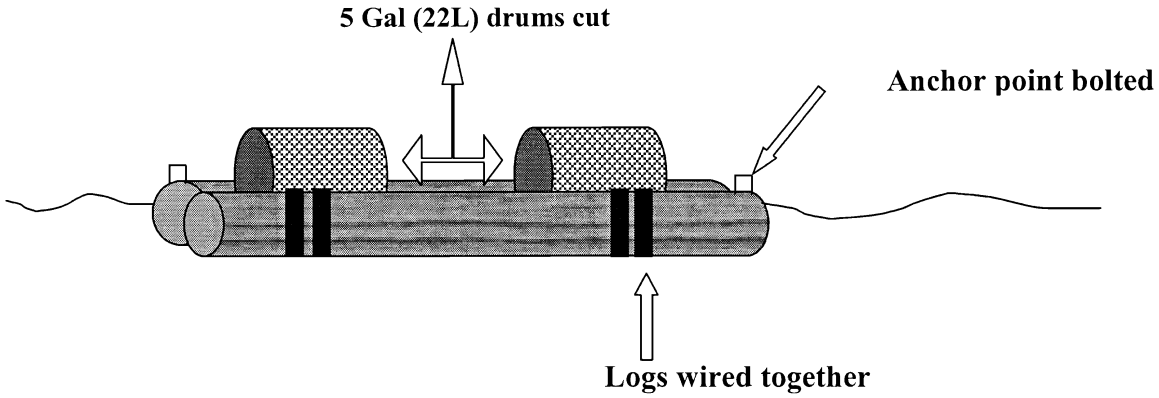
line, covered with moisture-holding mulch in which the plants can root and through which they can reach the water.

Some raft models

The area and water characteristics determine the best design for a raft. Some of the designs used on RSPB reserves are described below as a guide.

Simple log or telegraph pole rafts

Logs from nearby felling operations or used GPO poles are often available free and can be used to provide the basis both for simple rafts and more elaborate designs. Without any additional support, the timbers eventually sink low in the water and sprout a floating garden, which should prove to be attractive to nesting wildfowl if the raft is sited in a calm area.



The standard raft

This raft is made of pressure treated (do not use CCA treated) softwood and is 3 meters square. Design includes chick shelters, a re-entry ramp and an optional security fence. Buoyancy is provided by two high-density polystyrene blocks. Raft is anchored to concrete blocks by a chain attached to a marker buoy. It is covered with gravel and rocks, and any plant growth is removed each winter.

Raft platform:
Mainframe: 100x200mm timber, bolted together in each corner through overlapping ends (two upper, two lower), one top inset 150mm to allow for re-entry ramp. Deck 25x150mm planking, laid on and nailed (75mm galvanized nails) to lower mainframe timbers. Sub frame 50x75mm runners to support flotation and strengthen deck, nailed (150mm nails); main flotation holders/deck support 50x100mm runners; sides 25x150mm planking, nailed flush with top of upper mainframe timbers along the lower sides to hold in gravel etc, and flush with the bottom of the mainframe timbers along the upper sides to hold the flotation devices in place.

Buoyancy:
Blocks of 380x600x2700mm high density polystyrene foam, painted (optional) with BP Aquaseal 44 bituminous paint (as suitable for use inside cold water tanks) to water seal and strengthen the polystyrene; two optional straps per float block, 1,420mm strips of polystyrene webbing (or 50mm chair webbing as a temporary measure, eg during launching) with eyelet holes for nailing to frame. Once in the water, the weight of the raft is sufficient to hold the polystyrene in place without any additional fixings, even in extreme conditions.

Mooring:
Mooring ring bolted through center of mainframe timber (bolt fixed with two nuts so that it can swivel freely), connected preferably to a chain or a 20mm diameter hawser-lay polypropylene rope (which will not rot, but can be chafed), with hard eyes and shackles each end. Tether a 30-inch circumference marker buoy to the raft end of the chain or rope with a length of polypropylene rope to allow the raft to be detached, without having to pull up or lose the anchor.

Anchor:
Multiple small weights (up to $1m^3$ concrete as a total) for ease of transport. Four buckets 250mm high by 300mm diameter of concrete, eyebolt set in centre; weights connected in pairs by shackles to 300mm lengths of chain; fixed to mooring by placing two pairs of weights together with the connecting chains forming a cross, and attaching the mooring rope shackle to the point where the chains cross. Exposed sites where wind and waves are strong may require more anchor weights.

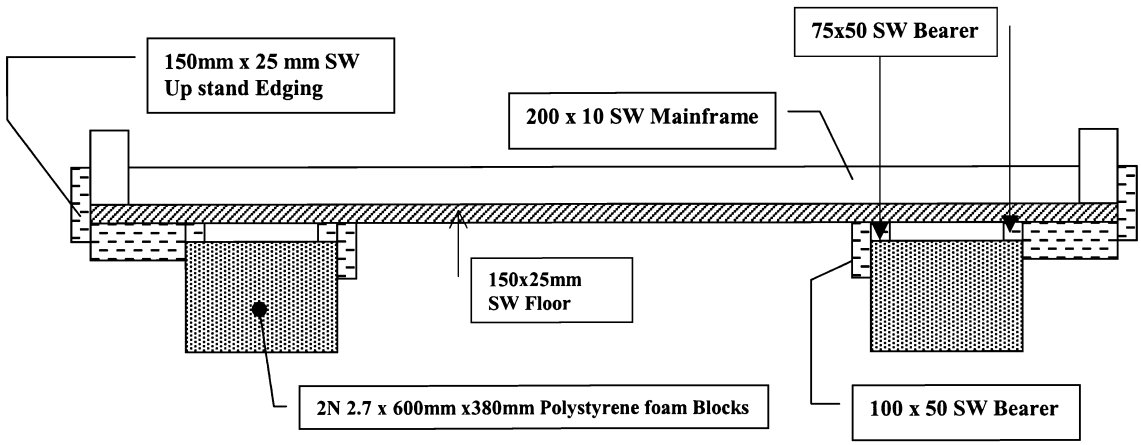
Shelters (to protect from rain):
These comprise 1m long 25x150mm planks located in opposite corners, nailed flat onto end of upper mainframe timber, side plank and 50x75mm end block.

Gravel covering:
Preferably of 15mm-25mm gravel with larger pieces and rocks to provide shelter, and give sufficient weight to push running board down to water level.

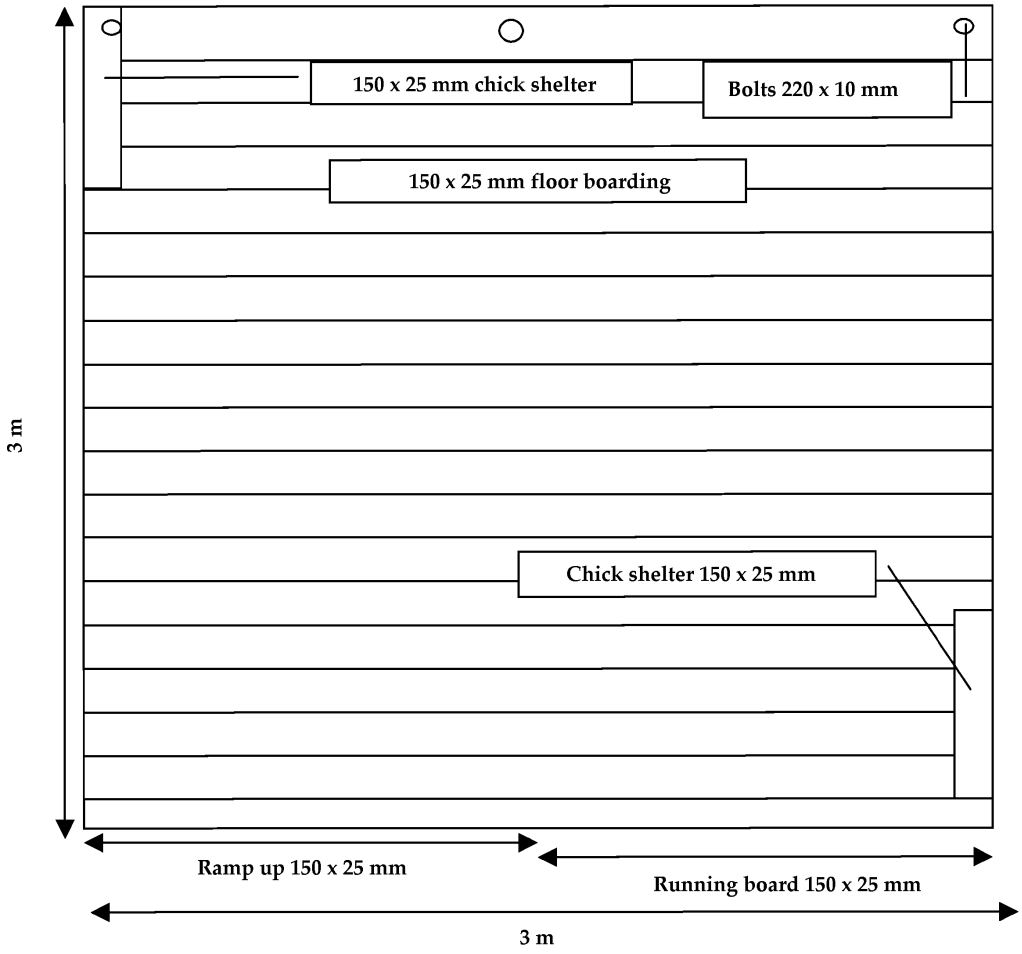
Re- entry system (for chicks falling overboard):
These are located on opposite (lee) side of raft to the mooring ring: running board 3m, 25x150mm plank nailed to bottom of the two lower mainframes. Ramp (1.5m, 25x150mm plank) sloping up to top corner of mainframe, supported by up stand, nailed. Block gap under raft behind ramp with 25x150mm skirt plank.

Optional removable security fence:
These comprise four frames 230mm by 0.3m, made from 50x50mm planks covered with 25mm chicken wire, bolted along each side and fixed at top corners.

Side view



View from above

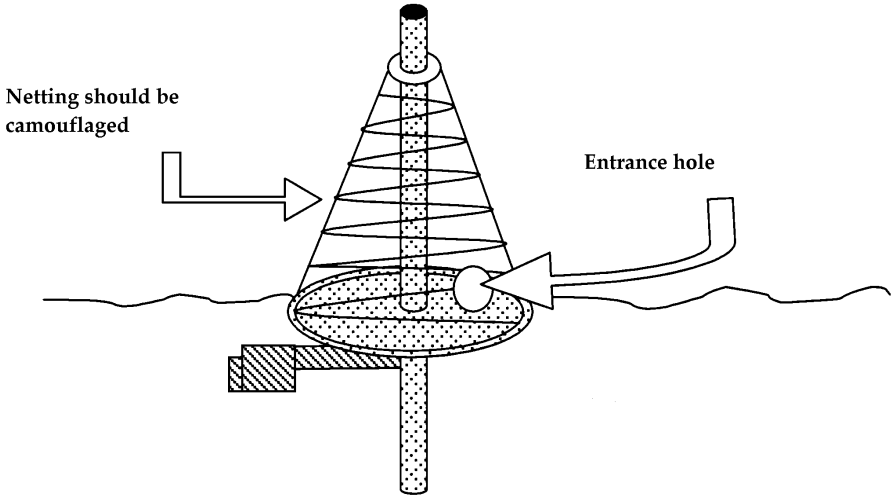


A floating wildfowl nest for use on rivers

This design, successfully used on the Ray, near Oxford, is intended to overcome the problems posed by strong currents, which make it difficult for wildfowl to nest successfully on rivers. Chick survival is best where the floating nest is sited on a quiet backwater with gently sloping banks so that, when a chick leaves the nest, it can get to the shore and climb out despite the current.

1. - Drive a suitable length of 50mm diameter steel pipe into the riverbed to provide an anchor pole on which the floating nest can rise and fall with changes in water level.
2. - Cut out a circular platform from marine plywood and cut a hole in its centre so that it fits over the anchor pipe.
3. - Screw three boards to the circular plywood piece, so that they form an equilateral triangle to make a frame underneath the platform for the floats.
4. - Strap three 4.5 litre plastic or metal tins to the triangular frame, one each side. If metal tins are used, they should be well painted with bitumen paint and coated inside with a spoonful of old engine oil before capping.
5. - Attach three metal struts, evenly spaced, to the edge of the platform, joined at the upper end to a ring that fits over the anchor pipe. This upper ring, with the hole in the platform, forms the bearing on which the nest rises and falls on the pipe.

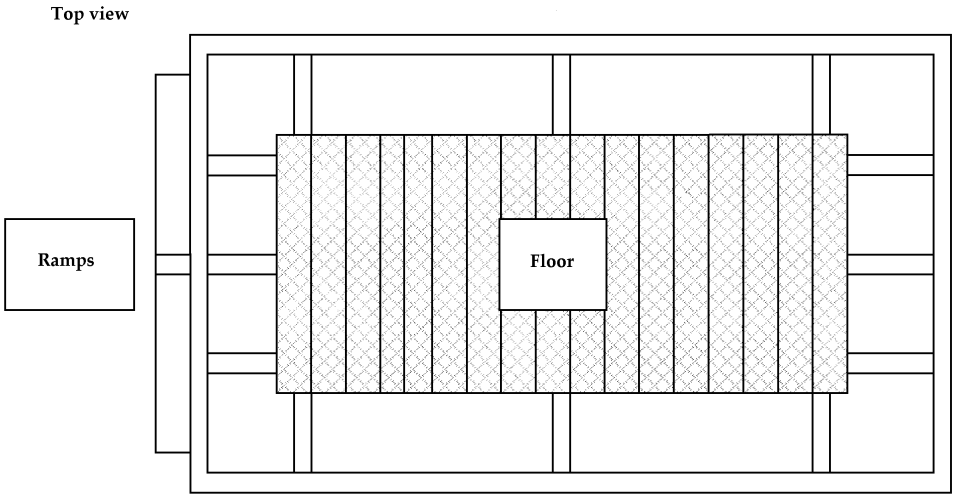
6. - Fasten a conical covering of light but firm netting around the outside of the strut assembly, and use vegetation to provide some shelter. Leave a 150 mm diameter entrance on one side.
7. - Slide the platform down over the pipe. If it tends to spin in the current, attach a rudder to the floats to keep it properly orientated. The entrance hole should be arranged to face the nearest bank.



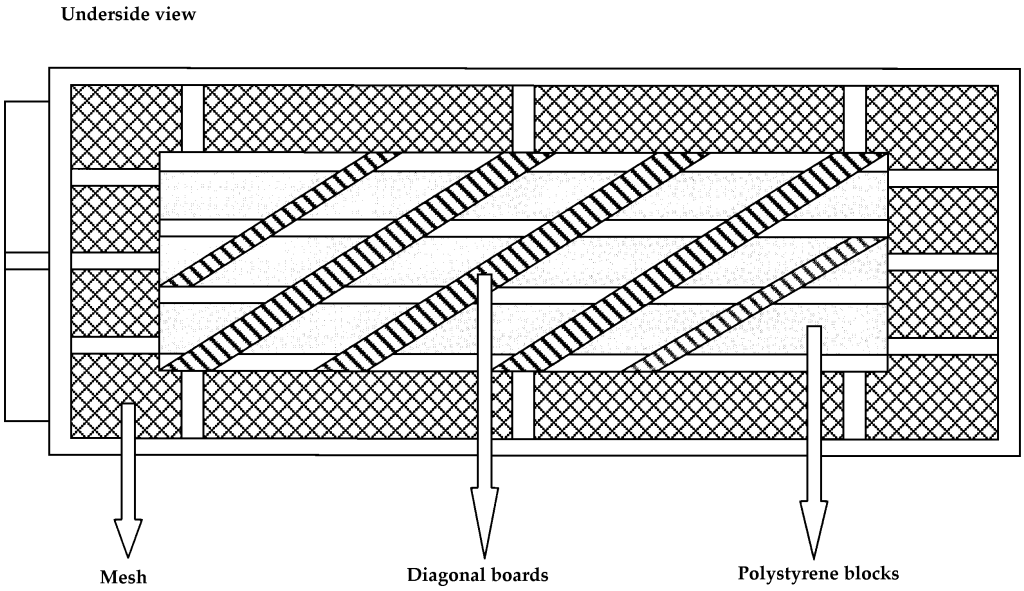
A square raft

This design is popular and has proved to be highly effective and weatherproof. Similar structures are in use in many reserves.

a. - Construct a framework of 25 x 150mm boards or similar. Nail the flooring across the top of the frame leaving the margins open to take vegetation and nail duckling ramps to one end of the raft. Use galvanized nails since they do not rust.



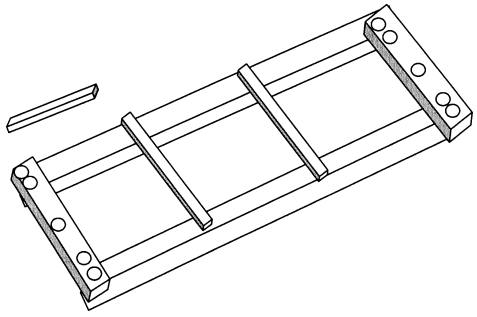
b. Turn the raft over. Staple close-mesh galvanized wire netting across the bottom of the raft, leaving the central part free to hold the flotation blocks.
c. Place 150mm thick polystyrene blocks in the uncovered centre of the frame. Hold the polystyrene in place with diagonal boards nailed across the frame.



d. - Turn the raft right way up. Cut out blocks of rush, willow etc. to fit into the margins of the frame. Fit anchor bolts to two opposite corners. Fix a nesting box or basket if required. You can cover the raft with some gravel. Finally, tow the raft into the position and anchor it firmly.

A heavier variation:

The raft described below is very successful when attracting terns to nest. Bare shingle is required for the nesting, but a completely exposed raft results in high chick mortality. At about one week old, tern chicks leap overboard at the slightest disturbance. This can be prevented by providing them with small shelters to hide underneath.



1. - Drill the sleepers as indicated in the diagram, using a brace and a bit, and bolt them together with eight 250mm coach bolts. Drill and fix anchor bolts in the end sleepers.
2. - Drill and bolt the cross members to the side sleepers. These are required to make a rigid structure and to resist the upward pressure of the floats.
3. - Nail the side battens into position; these help hold the shingle in place.
4. - There are two ways to floor the raft. One is to trap plastic-coated chain link fencing, covered in heavy-duty polythene, under the cross braces. Staple the fencing firmly to the sleepers. Alternatively, nail old garage doors or other suitable sturdy timber to the cross members and spread the flooring with a layer of concrete to help keep the shingle in place.
5. - Float the raft. Unless you have mechanical help, placing approximately 0.8 cubic metres of polystyrene blocks under the raft for flotation will require a number of water-hardy volunteers.
6. - The amount of polystyrene needed varies with the weight of the raft so trials are necessary. Provide some extra flotation to compensate for the shingle, which is added afterwards. The polystyrene stays in place between the sleepers due to its buoyancy and should not need fastening.
7. - Spread a layer of shingle over the flooring.
8. - Fix ramps or walls to the rafts sides, place a shelter on it, tow it into position and anchor it by means of bolts in the end sleepers.

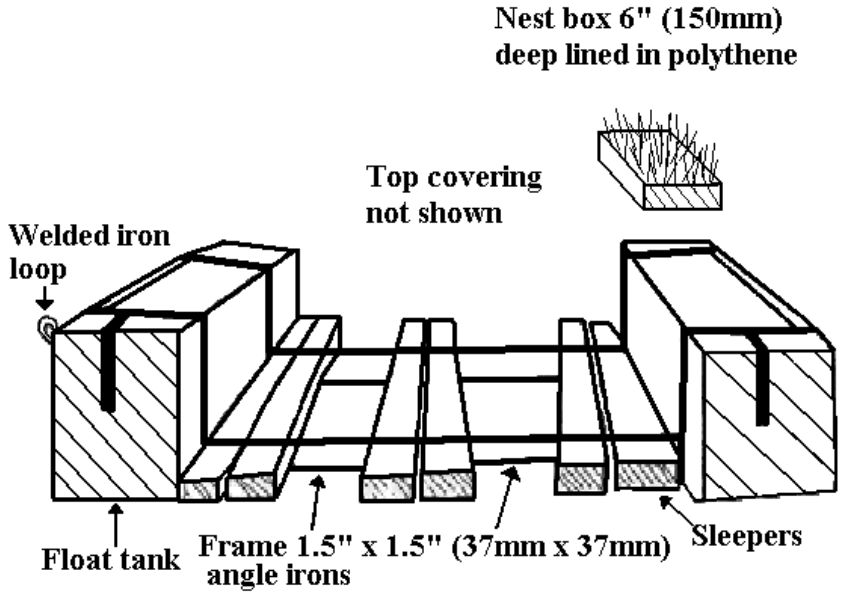
Welded Rafts

These two models were designed for the specific needs of a particular area. They require a great deal of skills and therefore are only suitable if none of the previous ones can be used. The designs shown have proved to have an estimated life of at least 12 years with minimal maintenance. These types depend on availability of suitable welding equipment and skills, and sheet-metal float tanks used by gravel companies for ferrying electrical equipment around wet pits.

Type A
Weld together three float tanks and attach a rim of logs with welded metal straps. To moor the raft, fix a wire anchor rope to a 50 kg scrap iron or concrete anchor. This simple but strong raft gives a surface area of 6.7 square metres. It successfully attracts ducks and geese, but has two disadvantages. It is so buoyant that the nest floats at least a foot above the water so that, unless a ramp is attached to help them, once the chicks leave the raft they cannot return. Soil ultimately dries out or is dislodged and must be replaced at intervals along with fresh vegetation.

Type B
This rather elaborate design features a semi-flexible welded frame, which makes the raft very durable in exposed conditions. The float tanks are the same size as in the previous design; the sleepers are topped with a grid that holds nesting cover.

Construction:
- Weld the frame together and to the float tanks. Weld two anchor bolts to opposite corners.
- Manoeuvre the completed frame into the water.
- Slide the sleepers into position. Leave gaps between the pairs of sleepers so that plant roots can reach the water.
- Cover the top of the frame's central section with narrow-mesh galvanized metal.
- Fix the nesting boxes on top of the floats
- Cover the mesh with mulch or soil and suitable plants. Plant up the nesting boxes.
- Tow the raft into position and anchor from the anchor bolts.



REPORT

IOM Ferry Terminal – Bird Pontoon

Method Statement

Client: Sisk

Reference: PB8850-RHD-ZZ-XX-RP-Z-0002

Status: Draft/P02

Date: 30 July 2019

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Document title:	IOM Ferry Terminal – Bird Pontoon
Document short title:	Method Statement
Reference:	PB8850-RHD-ZZ-XX-RP-Z-0002
Status:	P02/Draft
Date:	30 July 2019
Project name:	IOM Ferry Terminal
Project number:	PB8850
Author(s):	Mike Primrose
Drafted by:	Mike Primrose
Checked by:	Ben Hughes
Date / initials:	25/07/2019
Approved by:	Alistair Reid
Date / initials:	26/07/2019

Classification
Project Related

Disclaimer

Table of Contents

1 Introduction

This method statement relates to the installation of 1 No. floating pontoon in Princes Half-Tide Dock. The pontoon will form part of the Isle of Man Ferry Terminal scheme and wider Liverpool Waters Strategic Ecological Mitigation Plan.

1.1 Site Location

The site is located on the East side of Princes Half-Tide Dock is shown in Photo 1.

Photo 1 – Princes Half-Tide Dock site

The pontoon is to be moored clear of the navigation channel for the Liverpool Canal Link that extends across the West side of the dock. There is therefore no risk to navigation.

2 Pontoon and Anchor Assemblies

The pontoon will comprise a below water level welded steel frame with an above water timber covering (pressure but not CCA treated softwood timber). The design is an adaptation of ‘the standard raft’ described in RSPB document Design and Management of Rafts.

The anchor assemblies comprise steel sinkers and standard anchor chains.

All the above components will be fabricated off-site.

The topside of the pontoon will be covered in a layer of washed gravel.

3 Installation

3.1 Off-Site Fabrication

The pontoon and anchor assemblies will be fabricated off-site and transported to Princes Half Tide Dock by road.

3.2 Survey

A hydrographic survey of the dock will be undertaken to confirm the seabed level which will then allow the final mooring locations to be confirmed. In particular the water depth will allow the sinker positions and weights to be confirmed.

3.3 Lifting into the Dock

The pontoon will be lifted into the dock by a small mobile crane or HIAB, located alongside one of the quay walls.

3.4 Means of Access

A safe means of access between the pontoon and quay will be set up. Operatives working on the pontoon will also wear correct Personal Protective Equipment (PPE) which will include self-inflating life preservers at all times.

3.5 Gravel Placement

The gravel covering to the pontoon topside will be placed by hand and raked level. All gravel will be pre-washed to minimise dust.

3.6 Anchor Assembly Installation

The anchor assemblies will be attached to floatation bags and then be lifted into the dock by the mobile crane or HIAB.

A small craft will then tow each of the anchor assemblies to the anchor locations and release the sinkers. The floatation bags will remain attached to the free end of the mooring chains.

3.7 Mooring into Final Location

The completed pontoon ill then be towed to the final location by a small craft. Each of the free anchor chains will then be attached to the pontoon and the floatation bags removed and retained.

4 Maintenance

The annual maintenance of the pontoon topside is envisaged to be undertaken in-situ. Access to the pontoon will be via a small boat. The pontoon design allows for the maintenance access in terms of flotation and stability.

The anchor assemblies are not envisaged to require maintenance in the 12-year design life.

5 Decommissioning

The decommissioning of the pontoon is envisaged to be undertaken after a period of 12 years.

The pontoon will be disconnected, temporarily positioned against a quay wall and a safe means of access installed using the previously described procedure.

The gravel covering of the topside will be removed by hand and disposed of off-site.

The pontoon will then be disconnected from any further pontoons, if installed, prior to being lifted from the dock by small mobile crane or HIAB.

The pontoon will be then be disposed of off-site with transportation by road.

There are two possibilities envisaged with regards to removal of the anchor assemblies.

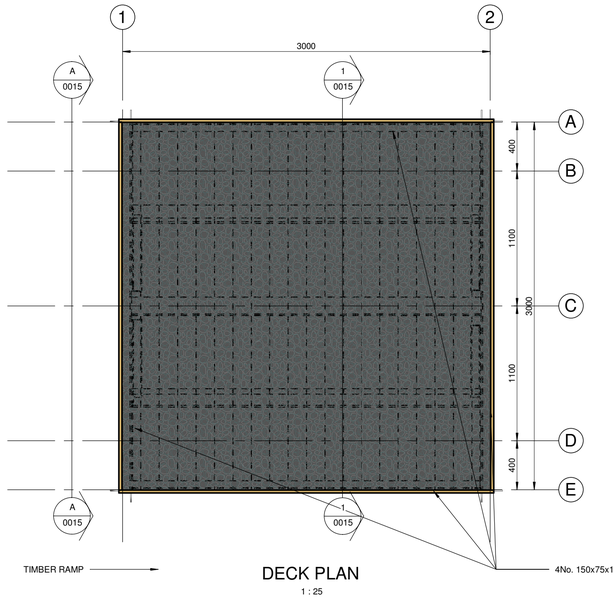
1. The sinkers on the seabed may have embedded into what is assumed to be a soft mud / silt material. If this is the case it is proposed to cut the chains at seabed level. This would leave the sinkers in place as they pose no risk to navigation or to the environment. This will also mitigate the need for any air-lifting or dredging works that would otherwise be required to extract the sinkers.

2. In the event the sinkers remain on the seabed or to a shallow embedment, it is proposed they will be lifted by floatation bag, be towed to near one of the quay walls and be lifted by small mobile crane or HIAB.

In either option the removed elements of the anchor assemblies will be then disposed be of off-site with transportation by road.

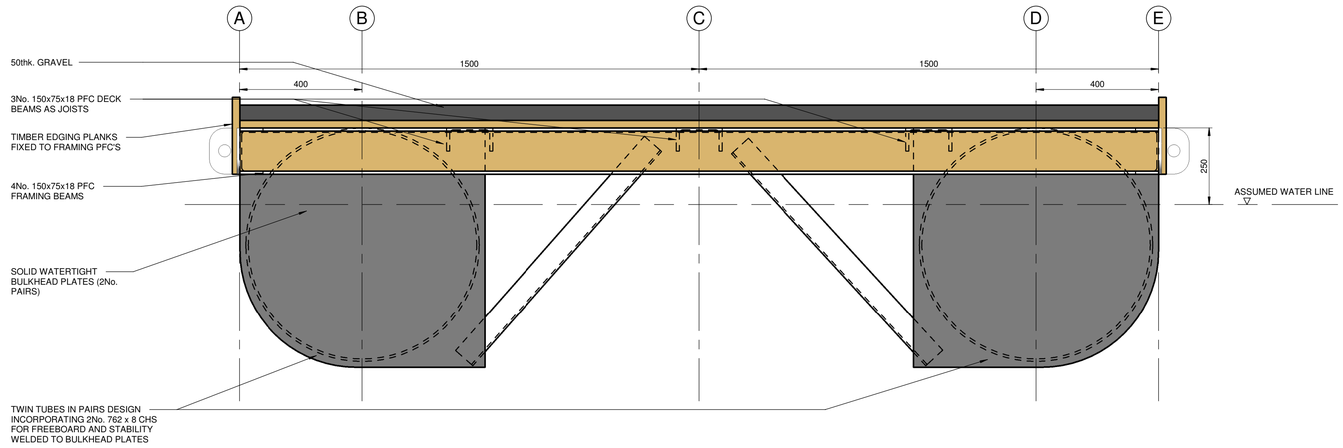
The works in the dock will be undertaken using a diving contractor operating from a quay side.

PB8850-RHD-XX-XX-DR-C-0015



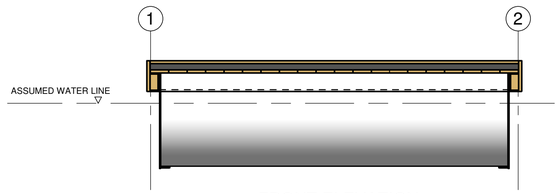
DECK PLAN

1 : 25



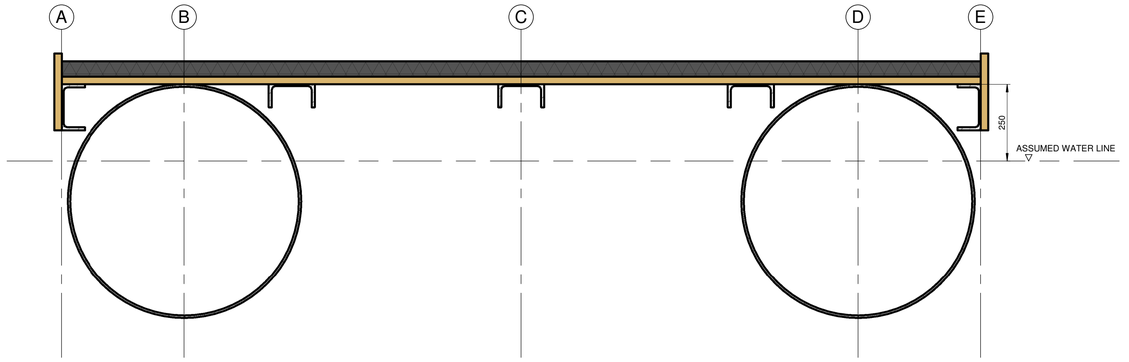
VIEW ON A

1 : 10



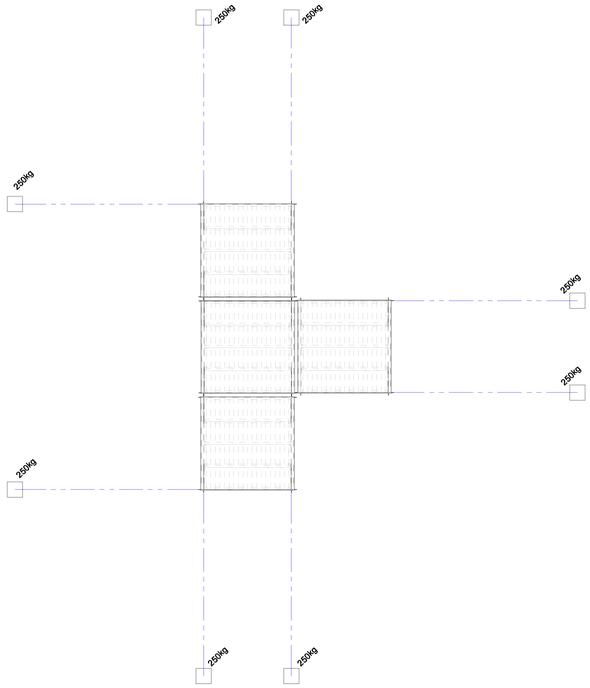
FRONT ELEVATION

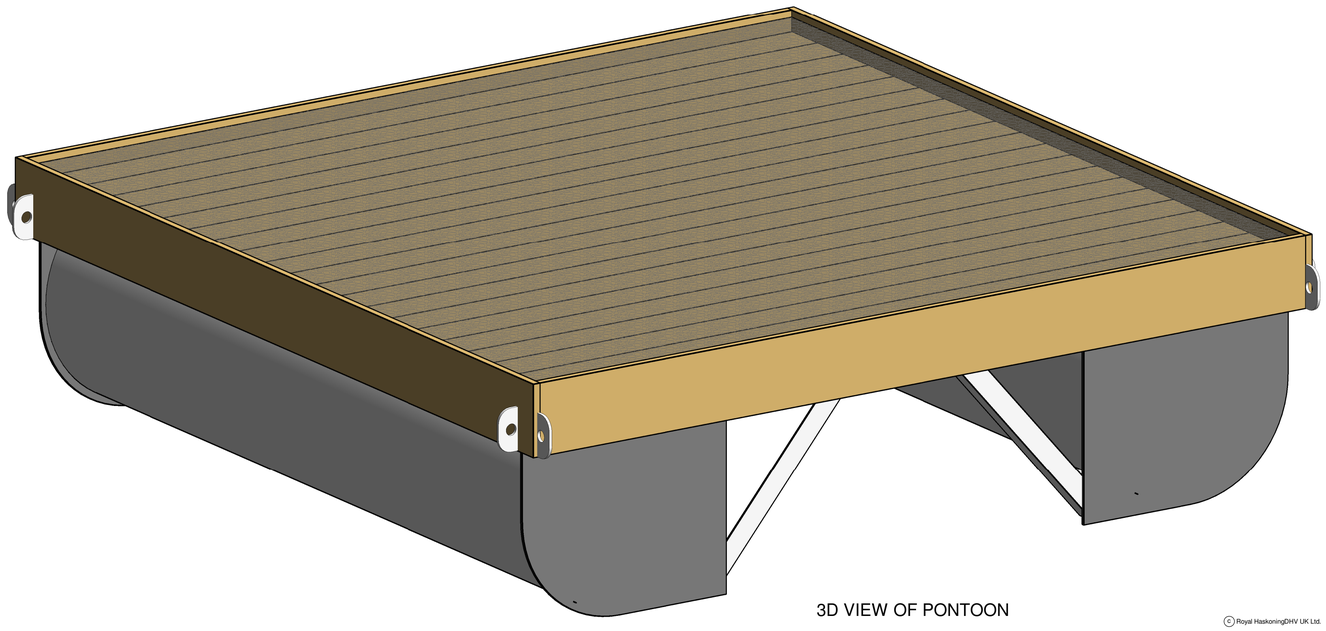
1 : 25



SECTION B-B

1 : 10





3D VIEW OF PONTOON

NOTES

1. THIS DRAWING SHOWS A CONCEPTUAL GENERAL ARRANGEMENT FOR THE PROPOSED COMPENSATORY HABITAT PONTOON.
2. ALL DIMENSION IN MILLIMETERS
3. STEEL S2 75 WITH C5-M DURABILITY HIGH COATING TO BS EN 12944.
4. TUBES TO BE FILLED WITH CUT POLYSTYRENE BLOCKS
5. 8No. ANCHOR BLOCKS AND CHAINS TBC BASED ON FINAL WATER DEPTH.
6. ALL WELDS TO BE 6mm FILLET WELDS.
7. GRAVEL TO BE NOMINALLY 50THK. 20mm SINGLE SIZED PRE-WASHED.

REV	DATE	DESCRIPTION	DRW	CHK	APR
P1.0	12.07.2019	FIRST ISSUE	DD	MP	AR

REVISIONS

CLIENT

BUILDERS SISK CONTRACTORS Established 1859

PROJECT

ISLE OF MAN FERRY TERMINAL

TITLE

PONTOON GENERAL ARRANGEMENT

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Liverpool L3 9NG
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Royal HaskoningDHV
Enhancing Society Together

DRAWN	CHECKED	APPROVED
DD	MP	AR

DATE	SCALE AT A1	REF.
07/10/19	As indicated	

DRAWING No.	SUITABILITY	REVISION
PB8850-RHD-XX-XX-DR-C-0015	S3	P1.0

C. Dust, Noise and Vibration Monitoring Sheets

DUST MONITORING RECORD SHEET

Date of monitoring:

Weather:

Name of person undertaking monitoring:

Monitoring position	PM_{10} level recorded			TSP level recorded			Start Time	Thresholds exceeded?	Source and/or Activities
	Min	Peak	Av. (15 min)	Min	Peak	Av. (15 min)			
1.									
2.									

EVALUATION (to be completed during every monitoring visit)	
Have any complaints been received? Comments:	Y / N
Is action needed to mitigate dust? If not why not? Comments:	Y / N

REMEDIAL ACTION (to be completed if action is required)	
Discussion Details of action to be undertaken:	
Has action been satisfactorily implemented? Comments:	Y / N

NOISE MONITORING RECORD SHEET

Date of monitoring:

Name of person undertaking monitoring:

Monitoring position	Noise level recorded, dB	Time	Action Level	Level exceeded?	Source / Observations
1.					
2.					

EVALUATION (to be completed during every monitoring visit)	
Have any complaints been received? Comments:	Y / N
Is action needed to mitigate noise? If not why not? Comments on action required:	Y / N

REMEDIAL ACTION (to be completed if action is required)	
Discussion Details of action to be undertaken:	
Has action been satisfactorily implemented? Comments:	Y / N

VIBRATION MONITORING RECORD SHEET

Date of monitoring:
Name of person undertaking monitoring:

Monitoring position	Vibration level recorded, ppv	Time	Action level exceeded?	Source / Observations
1.				
2.				

Note: Action Level is 1-3 mm/s.

EVALUATION (to be completed during every monitoring visit)	
Have any complaints been received? Comments:	Y / N
Is action needed to mitigate vibration? If not why not? Comments on action required:	Y / N

REMEDIAL ACTION (to be completed if action is required)	
Discussion Details of action to be undertaken:	
Has action been satisfactorily implemented? Comments:	Y / N

D. Site Review Record Sheet

FORM A: SITE REVIEW RECORD SHEET

(To be completed in conjunction with Form B)

Date of site visit: **Time:** **Name of person undertaking visit:**

Checklist:

Issue	Observation	Required Action (numbered)
General		
What activities are currently being undertaken at the site?		
Does the site appear clean and tidy from the outside? Including hoarding, viewing apertures, entry points, pedestrian signs, pavement ramps etc.		
Can all road signs/names be seen?		
Is the reception clearly signed and does the receptionist know how to deal with unexpected visitors? Were you escorted to the person you are visiting?		
Is the site clean and tidy internally?		

Issue	Observation	Required Action (numbered)
Are all site facilities within the site boundary?		
Are site operatives using the correct rest facilities (ie not congregating in public areas?)		
Are site operatives aware of the Site Environmental Policy and how it relates to them?		
Are site operatives appropriately dressed and is the radio ban being enforced?		
Does the main contractor operate an Environmental Management System?		
Has the site registered with the Considerate Constructors Scheme? If yes, has a minimum score of 24 been achieved?		
Does the main contractor have an environmental materials policy, used for sourcing of construction materials to be utilised on site.		

Issue	Observation	Required Action (numbered)
Is floodlighting limited to working hours and shielding in place where light may cause a nuisance?		
Energy / CO_2		
Are there any energy saving measures in place on the site?		
Is onsite energy use / CO2 produced from onsite energy use being monitored, recorded and reported monthly. Who is the named individual responsible for this?		
Is the distance travelled by transport to and from the site being monitored to enable CO2 emissions to be calculated? Is this recorded and reported monthly?		
Public Relations and Community Liaison		
Have any complaints been received from the public or neighbours? If so, give details.		
Are gates kept closed and entry points manned?		

Issue	Observation	Required Action (numbered)
Are pedestrian walkways signed and clear of obstructions and allow access for mobility impaired people or people with sight/hearing difficulties?		
Is the vehicle routing both on and off site being followed?		
Are vehicles queuing to access the site and are vehicles waiting to enter or leave the site switched off?		
Is wheel washing and street sweeping being undertaken and is it effective at reducing mud on the roads?		
Water and Wastewater Management		
Is a drainage plan held on site and methods of preventing silt and oils from entering the drainage system in use?		
Are there any unauthorised discharges?		
Is water use being minimised and monthly water consumption figures being recorded?		
Bulk Chemical / Fuel Storage		

Issue	Observation	Required Action (numbered)
Are liquids stored appropriately i.e. bunded and labelled?		
Is there any evidence of spillages? Are spill kits available?		
Are drip trays being used to fill small containers?		
Are deliveries of fuel and oil supervised and fuelling points protected from vandalism?		
Are there stockpiles of material on the site? If so, where and are they appropriately stored to prevent damage/theft etc?		
Waste Management		
What types and quantities of waste are collected on site?		
Are records being kept to show the amount of waste collected and how much is being reused or recycled?		

Issue	Observation	Required Action (numbered)
Are waste certificates and other documents in order (Hazardous Waste Consignment Notes / Waste Transfer Notes)?		
Air Quality		
Are lorries sheeted when leaving the site?		
Are any dust clouds observed? If so, where?		
Have dust action levels been exceeded? If so, give details.		
Noise and Vibration		
Can noise be heard as the site is approached? If so, where is it coming from?		
Is a sign displayed prominently detailing the Contractor, contact details for complaints etc?		
Have noise action levels been exceeded? If so, give details		
Have vibration action levels been exceeded?		

Issue	Observation	Required Action (numbered)
If so, give details		
Have any statutory bodies visited the site? Council (EHO), Environment Agency etc.		
Are there any incidents recorded in the environmental incidents logbook?		
Other		
Other observations:		

FORM B: ENVIRONMENTAL ACTIONS SHEET
(To be completed in conjunction with Form A)

For the attention of **(Name of Contractor)**

All **actions** arising from the site visit on are numbered below and should be rectified immediately. Confirmation should be forwarded to the Project Manager **within the time specified** using this form

Required Action number	**Description of how Action has been rectified**	**To be auctioned within the following timescale**

Signed: Print name:

Date:

Please forward to the Project Manager

E. Adaptive Management Plan

Liverpool Waters/Docks

Ecology Adaptive Management Plan (Cormorants)

October 2019

Waterman Infrastructure & Environment Limited
Second Floor, South Central, 11 Peter Street, Manchester, M2 5QR, United Kingdom
www.watermangroup.com

Client Name: Liverpool City Council
Document Reference: WIE12464-100-17-2-3
Project Number: WIE12464-100

Quality Assurance – Approval Status

This document has been prepared and checked in accordance with
Waterman Group's IMS (BS EN ISO 9001: 2015, BS EN ISO 14001: 2015 and BS OHSAS 18001:2007)

Issue	Date	Prepared by	Checked by	Approved by
First	July 2019	Niall Machin Associate Director	Gavin Spowage Associate Director	Gavin Spowage Associate Director
Comments		Incorporates conclusions of meeting with Peel, Arup and LCC on 2nd July to agree strategic approach to cormorant mitigation.		
Second	August 2019	Gavin Spowage Associate Director	John Hughes Regional Director	John Hughes Regional Director
Comments		Incorporates monitoring methodology from Arup		
Third	October 2019	Gavin Spowage Associate Director	John Hughes Regional Director	John Hughes Regional Director
Comments		Incorporates Natural England's consultation comments		

Disclaimer

This report has been prepared by Waterman Infrastructure & Environment Limited, with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporation of our General Terms and Condition of Business and taking account of the resources devoted to us by agreement with the client.

We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.

This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at its own risk.

Contents

1. Introduction

1.1. This Adaptive Management Plan has been produced in response to Natural England's responses to recent planning applications affecting Liverpool Docks, notably the new **Liverpool Cruise Terminal** and the **Isle of Man Ferry Terminal**.

1.2. Waterman Infrastructure & Environment Ltd (Waterman) was commissioned by Liverpool City Council (LCC) and the Isle of Man Government Department of Infrastructure to prepare ecological advice in relation to both the construction of the new Liverpool Cruise Terminal and the Isle of Man Ferry Terminal.

1.3. For the Liverpool Cruise Terminal, this Plan supports the discharge of planning condition 8 (planning application ref: 17O/3230) in relation to minimising the adverse impacts on the population of cormorants *Phalacrocorax carbo* a component species of the bird assemblage feature of Liverpool Bay Special Protection Area (SPA). In relation to Planning Condition 8 and the cormorant Ecological Conservation Management Plan (ECMP), Natural England (NE) have recommended (letter dated 30th May 2019, ref 19DIS/0919) that an Adaptive Management Plan (AMP) is provided:

> *" to set out how monitoring will be undertaken, what additional actions may be required in order to deliver successful mitigation (e.g. movement of the pontoon), and also to consider the long term validity of the mitigation"*

1.4. For the Isle of Man Ferry Terminal, the provision of an Adaptive Management Plan (AMP) has been requested to discharge Planning Condition 26 (planning application Ref: 18F/3231) and the Marine Licence condition 5.2.10 (Marine Licence application Ref: L/2019/00239/1):

> Planning Condition 26 - "*No development shall commence until an Ecological Conservation Management Plan (ECMP) has been submitted to and approved in writing by the Local Planning Authority. The ECMP (…) should (…) include the following details: (..) ii) The provision of an Adaptive Management Plan (AMP) setting out the arrangements for monitoring the usage and effectiveness of the proposed mitigation and arrangements for ensuring any adaptations reasonably necessary to improve the success of the mitigation measures with respect to cormorants will be provided;*
>
> Marine Licence condition 5.2.10 - *"An Adaptive Management Plan (AMP) relating to the Cormorant Mitigation Plan (CMP) must be submitted to MMO prior to the commencement of any activity included with this licence. The AMP must ensure that appropriate monitoring, review and adaptation of the mitigation measures described in the CMP will be provided. This must be submitted at least 6 weeks before the scheduled installation of the pontoon detailed in condition 5.2.9. Monitoring reports must be provided to MMO at the intervals as determined within any agreed AMP.*

1.5. Waterman have produced plans for a permanent floating pontoon to provide roosting/resting opportunity for cormorant: this will be located in Princes Half Tide Dock and be sufficiently large as to provide mitigation for a number of schemes in the docks including Liverpool Cruise Terminal, Isle of Man Ferry Terminal, the Northern Link Road and, potentially, the C02 proposals.

1.6. The design and location details for the floating pontoon are set out in the respective Technical Notes for each of the schemes (WIE12464-100-TN-14-2-2 for Liverpool Cruise Terminal and WIE13897-100-TN-10-2-1 for the Isle of Man Ferry Terminal).

1.7. A strategic approach to cormorant mitigation within the overall Liverpool Waters area is being

coordinated by Arup on behalf of Peel Land & Property (Ports) Ltd. The provisions within this Adaptive Management Plan are covered by and conform with the overarching strategic approach.

1.8. Adaptive Management Plans are tools for improving resource management by learning from outcomes ('learning by doing'), usually through a partnership of stakeholders. This Plan is supported by the following organisations:

- Liverpool City Council
- Natural England
- Merseyside Environmental Advisory Service (MEAS)
- Peel Land & Property (Ports) Ltd
- Isle of Man Government Department of Infrastructure

1.9. The objective of this AMP is to ensure that the proposed cormorant specific mitigation remains valid, appropriate and compliant with the Habitat Regulations throughout the lifetime of the development. The AMP enables co-ordinated, appropriate and timely actions to be implemented in response to potential issues that may arise from other relevant, adjacent developments. This AMP will form part of a strategic and more collective approach to mitigation in the wider area that will be adopted in the long term, as part of other developments that may impact upon the designated sites and their interest features in the vicinity.

2. Cormorant Monitoring Approach

2.1. The pontoons are considered suitable to provide roosting habitat for cormorant in the non-breeding season. Other species, such as herring, lesser-black-backed and black-headed gulls and oystercatcher will use a wide range of roosts and the pontoons also provide suitable habitat for these species.

2.2. In order to determine if and how cormorants are using the new pontoon facility a 5 year programme of annual monitoring will be undertaken. All surveys would be undertaken by an experienced ornithologist and would be coordinated by Arup on behalf of Peel Land & Property (Ports) Ltd. The surveys will be completed as part of Arup / Peel's programme of ecological monitoring of the wider Liverpool Waters site. **However, for the first year, the monitoring would be specific to the mitigation pontoon itself (with any additional data and evidence from the wider survey work used to support the monitoring).**

2.3. The previous bird survey data collected will be used as a baseline to identify if numbers have declined and if any there have been any negative impacts on the populations using the site.

2.4. The monitoring methodology will include four visits per month between September and March inclusive, two during high tide and two during low tide to monitor bird numbers using the rafts and the site. A suitable vantage point will be selected which is safe for the surveyor due to active construction being undertaken on the site, but also allows for a clear sight on the rafts and the wider site area. Both high and low tide surveys will start two and a quarter hours before high/low tide and end a quarter of an hour after high/low tide (i.e. duration of 2.5 hours). Paired visits (high and low tide) will be undertaken on the same day where possible (or if not, consecutive days) during daylight hours.

2.5. Table 1 details the peak numbers (peak number of individuals recorded at one time, seen together) of cormorants using the site over seven months (four surveys per month) during autumn/winter. This shows that only low numbers of individuals are using the area, with a peak count of 14 birds on the 15th November high tide count.

Table 1: Peak cormorant numbers recorded at the Isle of Man Ferry Terminal site during winter and passage 2017-2018[1]

Date	Sept 17	Oct 17	Nov 17	Dec 17	Jan 18	Feb 18	Mar 18
No. of cormorant	4	6	14	4	6	3	4

2.6. The trigger point for the rafts to be revised or relocated will be where the bird monitoring shows that there is a decrease in numbers utilising the rafts or surrounding area. Peak monthly counts for the Site noted an average of just under 6 individuals using the Site. The lowest peak count in any month was three individuals recorded using the Site (in Feb).

2.7. The high and low tide counts covering 28 visits recorded zero cormorants on-site on 3 occasions (2 high and 1 low tide), and only 1 bird on another 4 occasions (2 high and 2 low tide). The lowest sequence was three consecutive visits when six cormorant used the Site (occurred on four occasions).

2.8. The trigger point for initial action of further investigation will be if **no cormorants are using the**

[1] AECOM Isle of Man Ferry Winter Bird Survey March 2018

pontoon in any one month. This is a simple and clear trigger and has been endorsed by Natural England.

2.9. In terms of initial action following the trigger point, the ecologists will make an assessment of likely contributory factors, which would involve (but not be restricted to);

- Studying weather patterns (e.g. has adverse or unseasonable weather impacted numbers?);
- Making a visual inspection of surrounding land and land uses (and making inquiries of relevant authorities) to ascertain if any activities are occurring, or have recently occurred, that may have displaced cormorant (e.g. canoeing, boating, fireworks, dock repair works, building development etc);
- Consulting the local ornithological groups to ascertain if additional information is available on cormorant numbers locally on the River Mersey (increasing or decreasing).

2.10. Where the trigger point occurs, monthly monitoring for the following month will be increased to 6 visits per month to help better understand trends and the causes of the reduction and what further action, if any, may be required.

2.11. Depending on the outcome of action set out in paragraphs 2.09-2.10 above, the project ecologists may also notify LCC where they consider that changes to the rafts may be required (e.g. size, design, location) and also subsequently input into a specification to procure a contractor to make such changes.

2.12. Success of the monitoring programme will be identified where the monthly peak count averages six or more cormorants using the rafts and site during September to March period: this will be assessed by the project ecologists, acting on behalf of the Isle of Man Government Department of Infrastructure and LCC, at the end of the first year of monitoring results to assess the success of the pontoon mitigation (see also 2.20 below). As part of the first year review, we will also undertake a review of annual peak means against the baseline to check there is no downward trend, e.g. if the birds are present but in dwindling numbers.

2.13. Where rafts require relocation as part of the AMP this will be implemented and maintained by Liverpool City Council in collaboration with other interested parties (e.g. Peel; Isle of Man Government Department of Infrastructure), and an amended monitoring period will re-start from when the rafts are moved. Other measures of success would include: target species using the pontoons and not being disturbed e.g. by boat traffic or other human activity; no non-target species recorded to be using the pontoons (e.g. Canada geese); and structural success in terms of the pontoons remaining in place and not having failed e.g. sinking etc.

2.14. Where pontoons or posts are deemed to have failed or require additional maintenance, repair or replacement will be carried out preferably during late winter or early spring before birds start to nest and wintering bird activity is low. Where deemed necessary through monitoring, additional mitigation may be installed, or locations may need to be changed to maximise the effectiveness.

2.15. The results of the 5-year monitoring programme would be written up in an annual report for the client and shared with Natural England and other relevant stakeholders. The annual report would make recommendations about the success of the pontoon in terms of its intended cormorant mitigation role.

2.16. Monitoring of the physical condition of the pontoons will also be undertaken, most likely at the same time as the ornithological surveys. The floating pontoon design is expected to have a

minimum estimated life of 12 years with minimal maintenance. As per RSPB guidance, yearly maintenance of the floating pontoons will be carried out. Resurfacing of the floating islands will be necessary if they are to remain attractive for birds every year. It will also be vital to remove the excess of droppings which can build up over the course of the year.

2.17. Where pontoons are deemed to have failed or require additional maintenance, repair or replacement will be carried out preferably during late winter or early spring before birds start to nest and wintering bird activity is low. Where deemed necessary through monitoring, additional mitigation may be installed, or locations may need to be changed to maximise the effectiveness.

2.18. Further adaptive measures may also be required to minimise disturbance, for example through control of boat traffic.

Programme

2.19. Arup have proposed within their Liverpool Waters Strategic Ecological Mitigation Plan (LW SEMP) Interim Note that the monitoring of the cormorant mitigation pontoons will be included within the annual surveys being undertaken across the entire LW scheme (as included within the LW Neighbourhood Ecological and Biodiversity Strategies (NEBS)). This will include monitoring for wintering/passage birds including high water and low water surveys and also monitoring for breeding birds (e.g. ringed plover, little ringed plover, lapwing) and foraging common tern. The NEBS produced for Central Docks in July 2019 (provided in **Appendix A**) outlines the surveys that will be completed including, duration, timing and methodology.

2.20. However, as stated in para 2.2 above, specific monitoring of the cormorant mitigation pontoon itself would be carried out in Year 1. At the end of Year 1, the monitoring approach and data would be reviewed in terms of the approach to Years 2-5 and how this fits with the wider strategic monitoring and action detailed within the future Liverpool Waters Strategic Environmental Management Plan (SEMP).

2.21. Section 2 of the Central Docks NEBS sets out specific methodologies for the following surveys:

- Section 2.2: Breeding birds, including specifically little ringed plover and black redstart;
- Section 2.3: Wintering and passage bird surveys, including cormorant; and
- Section 2.4: Common tern surveys.

3. Review of Projects

3.1. In tandem with the annual bird surveys, a review of planning applications which may impact upon the docks and cormorant ecology would be undertaken.

3.2. This would include reviewing scheme mitigation plans and reviewing whether the cormorant mitigation installed to date requires any alteration.

4. Adapting the Mitigation

4.1. The Adaptive Management Plan table of issues and responses, set out below, would be maintained. Data from the annual bird surveys and the planning application reviews would be fed into this table and appropriate remedial measures identified and implemented.

4.2. Implementation measures may involve a range of clients/stakeholders, including those signed up to this Plan.

Table 1: Adaptive Management Plan

Issue	Evidence	Remedial action	Timetable	Responsibility
Describe issue, e.g. damaged pontoon side	*Describe evidence, cite source, e.g. winter bird survey (date)*	*e.g. repairs required*	*Date*	*E.g. Liverpool City Council*

4.3. The Adaptive Management Plan will be issued to Natural England on an annual basis for review and approval.

Appendices

Appendix A: Central Docks Neighbourhood Ecological and Biodiversity Strategy

Peel Land & Property (Ports) Ltd.

Central Docks Condition 16

Neighbourhood Ecological and Biodiversity Strategy

0-15-08

Issue | 23 July 2019

Job number 266384-00

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ARUP

Document verification

ARUP

Job title		Central Docks Condition 16			**Job number** 266384-00
Document title		Neighbourhood Ecological and Biodiversity Strategy			**File reference**
Document ref		0-15-08			
Revision	**Date**	**Filename**	Central Docks NEBS.docx		
Draft 1	12 Feb 2019	**Description**	First draft		
			Prepared by	Checked by	Approved by
		Name	Amy Martin/Joseph Shepherdson	Rory Canavan	Rory Canavan
		Signature			
Draft 2	08 Mar 2019	**Filename**	Central Docks NEBS_V2 080319.docx		
		Description	Draft updated following Arup review		
			Prepared by	Checked by	Approved by
		Name	Amy Martin	N/A	N/A
		Signature			
Issue	09 May 2019	**Filename**	Central Docks NEBS_V3 170419.docx		
		Description	Draft updated following comments from Natural England, MEAS and Peel Sustainability Manager		
			Prepared by	Checked by	Approved by
		Name	Amy Martin	N/A	N/A
		Signature			
Issue	23 July 2019	**Filename**	Central Docks NEBS_V5 230719.docx		
		Description	Updated to make reference to the Liverpool Waters SEMP		
			Prepared by	Checked by	Approved by
		Name	Amy Martin	N/A	N/A
		Signature			
				Issue Document verification with document	✓

Contents

Executive Summary

Outline consent for the Liverpool Waters Scheme was granted in June 2013, subject to a total of 77 planning conditions. Condition 16 of the Liverpool Waters Outline Consent (10O/2424) states:

"*Prior to the submission of the first application for any reserved matters approval in each respective neighbourhood, an Ecological & Biodiversity Strategy based on the Principal Application Documents and Detailed Neighbourhood Masterplan that relates to that particular neighbourhood and has regard to the wider application site shall be submitted to and approved in writing by the Local Planning Authority. The strategy shall summarise the means of safeguarding all protected species of relevance and supporting habitats during construction and operation within the respective neighbourhood including consideration of pathways to protected European sites by the following measures:*

i. *The means, method and timeframe for carrying out updated bird surveys and impact assessments for bats and migratory and/or over wintering birds;*
ii. *The methodology and timeframe for carrying out (seasonal) monitoring of fish and other water species within the dock system;*
iii. *Working practices to address phasing of construction, construction vehicles, routing and speed limits during removal of existing buildings, vegetation and other suitable breeding habitats;*
iv. *Details of habitat creation;*
v. *Design of buildings and spaces in terms of layout, design, materials and lighting to avoid creating barriers to bird migration and aviation and reduce risk of bird strikes particularly in relation to tall buildings;*
vi. *Means and methodology for the monitoring and management of water quality within the dock system which shall inform mitigation to safeguard fish and other water species, including the aeration of dock water spaces;*
vii. *Methods for controlling leisure boat activity within the dock system;*
viii. *Methods for controlling gulls and pigeons roosting on buildings;*
ix. *Mechanisms for monitoring and reviewing the effectiveness of agreed ecological and biodiversity mitigation against identified targets and means for enhancing mitigation where those targets are not met; and*

Mechanisms to ensure protection of Sefton Coast SAC (Seaforth Docks to Formby Point) from recreational disturbance overseen by the Liverpool Waters Coordination Panel in accordance with Schedule 6 of this permission."

This document presents the Neighbourhood Ecological and Biodiversity Strategy for the Central Docks Neighbourhood (Neighbourhood C). The strategy relates to the Central Docks Neighbourhood and has regard to the wider Liverpool Waters application site. The strategy summarises the means of safeguarding all protected species of relevance and supporting habitats during construction and operation

within the respective neighbourhood. This includes consideration of impact pathways to European designated sites.

The strategy is intended to provide guidance in relation to ecology and biodiversity for all reserved matters applications within the neighbourhood and addresses Condition 16.

1 Introduction

1.1 Background

This strategy has been produced to discharge a planning condition under Part C of the Liverpool Waters (LW) scheme (Planning Application reference: 10O/2424). The LW scheme, which secured outline consent on the 19th of June 2013, covers an area of 60 hectares of former dockland located along Liverpool's Waterfront. The project will provide a mixed-use development of up to 1,691,100 sqm. The outline planning consent is split into multiple parts:

- **Part A-** Overall Development Quantum and Parameters
- **Part B-** Time Limits
- **Part C-** Information to be submitted prior to the submission of applications for reserved matters approval
- **Part D-** Details to be provided with Reserved Matters Applications
- **Part E-** Compliance Conditions

Across parts A to E there are a total of 76 conditions within the outline consent (originally 77, see s96a section for further details). 16 of these are pre-commencement conditions which therefore require discharging prior to any submission of detailed reserved matters applications (i.e. a specific development plot). These conditions are listed within Part C of the outline consent.

In June 2018, these 16 conditions were discharged for Princes Dock (Neighbourhood A) to allow for reserved matters applications to come forward for development in this neighbourhood alone. Each condition required a strategy to be produced which provided high level information on how specific requirements would be met.

To progress development within Central Docks (Neighbourhood C), Peel Land and Property are seeking to discharge these 16 pre-reserved matters conditions for this neighbourhood. The following strategy sets out the information required to discharge a pre-reserved matters condition for Central Docks, Liverpool Waters.

1.2 Consultees

Where relevant, advisory or statutory consultees have been engaged with during the production of the strategy. Additionally, liaison has taken place across all conditions between other sub-consultants to ensure each condition conforms to all other relevant conditions.

1.3 Standalone Applications

There have been several consents for developments within Central Docks. These developments have come forward as standalone applications and although measures have been considered to ensure general conformity with the outline

consent, they have not directly followed the LW process. Due to the definition of "committed development" only the standalone applications which have commenced on site can be considered and referenced within the condition strategy. For clarity these are:

- C04 – C06 (17F/1628)
- Northern Link Road (17F/2628)

Developments which have been determined but have not commenced:

- Isle of Man (18F/3231)

Developments which are currently being determined for planning are:

- C02 (18F/3247)
- District Heating Network, Phase 1 Part 2 (19F/0079)

As these applications have not been granted consent, they only hold limited weight and are not classed as committed development. Where relevant, these have been considered within the strategy but reference to the original outline consented plots for these emerging developments is still made where needed.

1.4 Part D Conditions

The following strategy has been produced to discharge Part C conditions, as such, it sets a high-level strategy for the Central Docks Neighbourhood. Further detail will be provided through the discharge of Part D conditions '*Details to be provided with Reserved Matters Applications*'. Therefore, Part C conditions will establish the strategy, and Part D conditions will provide further details when reserved matters applications come forward.

1.5 S96a Amendment Application (18NM/2766)

In November 2018, a non-material amendment was consented for the Liverpool Waters Outline Consent. The amendments included:

1. Liverpool Waters Parameter Plan Report (November 2011) to Liverpool Waters Parameter Plan Report (October 2018), where changes within the document include:
    - PP003 Phasing Plan
    - PP004 Development Parcels
    - PP005 Development Plots
    - PP006 Building Heights
    - Illustrative Masterplan
2. **The wording of Condition 3:**

The development hereby approved shall only be implemented in general conformity with the following submitted application documents (The Principal Application Documents):

- Updated Planning Application form (November 2011);
- Statement of Key Development Principles (November 2011);
- LW Parameter Plan Report (incorporating Parameter Plans) (October 2018)
- Design and Access Statement (November 2011);
- Building Characterisation & Precedent Study (November 2011) ("BCPS");
- Public Realm Characterisation & Precedent Study (November 2011) "(PRCPS)";
- Conservation Management Plan for the Protection, Conservation and
- Preservation of Heritage Assets (November 2011);
- Liverpool Waters Indicative Masterplan (October 2011)

Received by the Local Planning Authority on the 8th & 16th December 2011 & October 2018.

3. The wording of condition 71:

No more than 27.24% (460,000sqm) of the entire total consented development floorspace set within the LWOPP shall be erected within Neighbourhoods A, B and C, and no development shall commence in Neighbourhoods D and E, until the Transport Assessment (November 2011) submitted and hereby approved with the application has been reviewed, updated and agreed by the Local Planning Authority in writing and identified measures have been secured to undertake the highway works and public transport enhancements identified as necessary within that updated Transport Assessment in a phased manner in relation to the development as a whole and in accordance with the Highway and Public Transport Enhancement Strategy referred to in Condition 19 and the monitoring and review and enhancement arrangements referred to in Schedule 3 of this permission.

4. The removal of condition 75 of the LW Outline Planning permission

5. The wording of Schedule 3:

The Highway & Public Transport Enhancement Strategy monitoring and review mechanisms referred to in Condition 10 and required in advance of any development in neighbourhoods D and E and anymore development floorspace greater than 27.2% (460,000sqm) of the entire total consented development floorspace within Neighbourhoods A, B and C (or 2021, whichever the earlier) shall identify the range, methodology, format and timetable of travel monitoring. The results of the monitoring shall be submitted annually to the Local Planning Authority commencing concurrently with submission to the Local Planning

Authority of the first Detailed Neighbourhood Masterplan for neighbourhood B, C D or E required by Condition 11.

6. **The wording of Schedule 5:**

- The Pontoon and Princes Jetty shall be provided in conjunction with the development plots set out in the approved Princes Dock Neighbourhood Masterplan (May 2018).
- Central Park shall be commenced at the same time as the start of any construction work to provide buildings in any of development Parcels 3a, 3b, 3c, 3d and 3f.
- Bath Gate will be commenced and completed in conjunction with plot A05 (Plaza 1821).

Where relevant, the strategy will refer to the above amendments.

1.6 Section 96a Amendment Application (April 2019)

An additional non-material amendment has been submitted to Liverpool City Council (application currently pending decision). The amendments include:

1. Liverpool Waters Parameter Plan Report (October 2018) to Liverpool Waters Parameter Plan Report (April 2019), where changes within the document include:
    - PP005 Development Plots
    - PP006 Building Heights
    - PP007 Access and Movement
    - Illustrative Masterplan
2. **The wording of Condition 3:**

The development hereby approved shall only be implemented in general conformity with the following submitted application documents (The Principal Application Documents):

- Updated Planning Application form (November 2011);
- Statement of Key Development Principles (November 2011);
- LW Parameter Plan Report (incorporating Parameter Plans) (April 2019)
- Design and Access Statement (November 2011);
- Building Characterisation & Precedent Study (November 2011) ("BCPS");
- Public Realm Characterisation & Precedent Study (November 2011) "(PRCPS)";
- Conservation Management Plan for the Protection, Conservation and

- Preservation of Heritage Assets (November 2011);
- Liverpool Waters Indicative Masterplan (October 2011)

Received by the Local Planning Authority on the 8th & 16th December 2011, October 2018 and April 2019.

1.7 Site and Scheme Description

1.7.1 Liverpool Waters

Liverpool Waters is a major project involving the regeneration of 60ha of redundant docks in the heart of the city of Liverpool on the eastern bank of the River Mersey. The development is over 2km in length; extending from Princes Dock in the south to Bramley Moore Dock in the north. Virtually the entire Liverpool Waters site comprises reclaimed land which was created to form docks commencing in the late 18th century. Over a third of the Liverpool Waters site consists of docks with open water. By the early 21st century all of the docks were redundant by virtue of the changing nature of the shipping industry.

The Liverpool Waters joint vision (Peel and Liverpool City Council) involves regenerating the historic dockland site to create a world-class, high-quality, mixed-use waterfront quarter in central Liverpool that will allow for substantial growth of the city's economy. The aspirational scheme will create a unique sense of place, taking advantage of the site's cultural heritage and integrating it with exciting and sustainable new development.

The principal proposed land uses at Liverpool Waters will be commercial offices and other business uses, residential development and tourism-related uses. More specifically this includes:

- Residential (about 9000 dwellings)
- Business space, mainly offices.
- Hotel and conference facilities.
- Buildings for assembly and leisure.
- Restaurants, cafes, pubs and wine bars.
- Comparison (non-food) shops serving local needs.
- Community institutions (clinics, health centres, nurseries, schools and places of worship).
- Offices and services in local shopping centres.
- Convenience (food) shops.
- Parking.
- A cruise-liner terminal and an energy centre.
- Servicing.

1.7.2 Central Docks

The Central Docks Neighbourhood will provide a new dynamic urban focus around public open space and the Leeds-Liverpool Canal extension. It is intended to be the business, entertainment and leisure fulcrum of the Liverpool Waters

scheme. There will be significant changes in the south of the neighbourhood including the new Isle of Man Ferry Terminal and cultural buildings. Central Docks is the location of the secondary tall buildings cluster and will also have a new public open space – Central Park. The plots identified for development within the masterplan for the Central Docks Neighbourhood are shown on Figure 1.1.

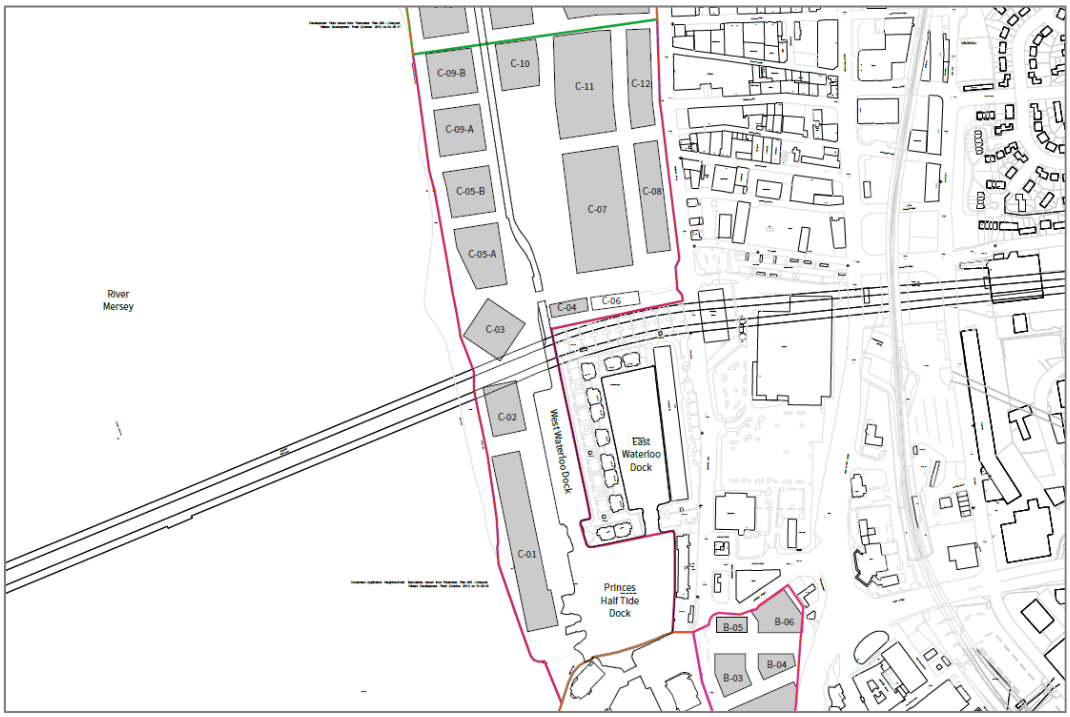

Figure 1.1: Central Docks Development Plots (C-01 to C-12). Image taken from Parameter Plan 005 Liverpool Waters Development Plots. Drg. No. 1868-VW-005 (Planit I.E. Limited, 2018).

Development within Central Docks (Neighbourhood C; Phase 2 of Liverpool Waters) is anticipated to take place over a period of 16 years between 2020 and 2036.[1] The amount of each proposed land use within the Central Docks Neighbourhood was designed to reflect firstly, the character and location of the neighbourhood, secondly the balance considered reasonable between the primary land uses (residential/business/tourism) and finally a reasonable balance of shops, services and other supporting land uses (Table 1.1).

Table 1.1: Proposed land uses at Central Docks.

Proposed Land Use	**Central Docks Neighbourhood**
Residential	2,900 units
Office/Business	165,900 m^2
Hotel/Conference	35,300 m^2
Assembly/Leisure	30,700 m^2
Restaurants/Cafes	11,900 m^2

[1] Planit I. E. Limited (2018) Parameter Plan 003 Liverpool Waters Phasing Plan. Drg No. 1868-VW-013.

Proposed Land Use	Central Docks Neighbourhood
Pubs/Bars	12,600 m^2
Local Shops – Non-food	8,700 m^2
Community	600 m^2
Local Services	2,600 m^2
Local Shops – Food	4,200 m^2
Parking	180,400 m^2
Servicing	17,500 m^2
Cruise Terminal/Other	16,600 m^2

1.8 Part C - Condition 16

Condition 16 of the Liverpool Waters Outline Consent (10O/2424) states that prior to the submission of the first application for any reserved matters approval in each respective neighbourhood, an Ecological & Biodiversity Strategy based on the Principal Application Documents and Detailed Neighbourhood Masterplan that relates to that particular neighbourhood and has regard to the wider application site shall be submitted to and approved in writing by the Local Planning Authority. The strategy shall summarise the means of safeguarding all protected species of relevance and supporting habitats during construction and operation within the respective neighbourhood including consideration of pathways to protected European sites.

Ove Arup & Partners Ltd. (Arup) have been commissioned by Peel Land and Property (Ports) to address Condition 16 by producing the Neighbourhood Ecological and Biodiversity Strategy (NEBS) for Neighbourhood C (Central Dock). Condition 16 consists of ten points which are addressed within the NEBS (Table 1.2).

Table 1.2: Relevant section of the NEBS which address the ten points of Condition 16 of the Liverpool Waters Outline Consent.

Condition 16		Relevant section within NEBS
i.	The means, method and timeframe for carrying out updated bird surveys and impact assessments for bats and migratory and/or over wintering birds.	2.1 to 2.5
ii.	The methodology and timeframe for carrying out (seasonal) monitoring of fish and other water species within the dock system.	2.6
iii.	Working practices to address phasing of construction, construction vehicles, routing and speed limits during removal of existing buildings, vegetation and other suitable breeding habitats.	4.1
iv.	Details of habitat creation.	5
v.	Design of buildings and spaces in terms of layout, design, materials and lighting to avoid creating barriers to bird migration	3.1

Condition 16		Relevant section within NEBS
	and aviation and reduce risk of bird strikes particularly in relation to tall buildings.	
vi.	Means and methodology for the monitoring and management of water quality within the dock system which shall inform mitigation to safeguard fish and other water species, including the aeration of dock water spaces.	2.7
vii.	Methods for controlling leisure boat activity within the dock system.	3.3
viii.	Methods for controlling gulls and pigeons roosting on buildings.	3.2
ix.	Mechanisms for monitoring and reviewing the effectiveness of agreed ecological and biodiversity mitigation against identified targets and means for enhancing mitigation where those targets are not met.	6
x.	Mechanisms to ensure protection of Sefton Coast SAC (Seaforth Docks to Formby Point) from recreational disturbance overseen by the Liverpool Waters Coordination Panel in accordance with Schedule 6 of this permission.	3.4

The NEBS will set out a strategy for the Central Docks Neighbourhood based on the results and mitigation measures included in the Liverpool Waters Environmental Statement (ES) produced for the Outline Consent (WYG, 2011a).[2] It was intended that the mitigation measures would apply to the overall Liverpool Waters development area and therefore are split across each of the neighbourhoods:

- Neighbourhood A – Princes Dock.
- Neighbourhood B – King Edward Triangle.
- Neighbourhood C – Central Docks.
- Neighbourhood D – Clarence Docks.
- Neighbourhood E – Northern Docks.

This Central Docks NEBS will therefore outline methodologies for carrying out updated surveys and the mitigation measures that should be included with the Neighbourhood. A NEBS has already been produced for Princes Dock (Neighbourhood A) (WYG, 2018).[3] This sets out measures for the Princes Dock Neighbourhood however for efficiencies and practicality, also includes measures (e.g. biennial passage/wintering bird surveys) which should be undertaken across the entire Liverpool Waters site as opposed to in isolation at the different neighbourhoods. The Central Docks NEBS therefore incorporates these measures to align with the Princes Dock NEBS, in addition to specific measures for Neighbourhood C. By adopting this joined up methodology there is an opportunity for a strategic approach to be adopted in which the mitigation measures and biodiversity enhancements for the Central Docks Neighbourhood

[2] WYG (2011a) Liverpool Waters Environmental Statement.
[3] WYG (2018) Princes Dock Condition 16 Neighbourhood Ecological and Biodiversity Strategy.

can be considered strategically in respect of ensuring maximum biodiversity benefits across the whole Liverpool Waters scheme.

Part D of the Outline Consent (details to be provided with reserved matters applications) includes Condition 34 – Ecological & Biodiversity Statement (EBS). This states that prior to the commencement of development within any neighbourhood, the approval in writing of the Local Planning Authority (LPA) must be obtained to a detailed EBS based on the NEBS explaining how the specific scheme in that neighbourhood or part neighbourhood will provide for the protection and enhancement of protected species and supporting habitats, including the provision of new and replacement habitats by means of the following:

i. provision of detailed and quantitative surveys to be able to assess in detail any potential impacts of the development upon bats and migratory and/or over-wintering birds;
ii. mitigation to safeguard fish and other water species;
iii. details of habitat creation;
iv. siting and design of replacement roosting sites within Nelson Dock for displaced winter water birds (specifically cormorants);
v. provision and management of new/compensatory habitats;
vi. the design of buildings and spaces based on the Detailed Neighbourhood Masterplan for the land;
vii. for development involving the Hydraulic Engine House, Victoria Clock Tower or the office and workshop buildings south of Collingwood Dock, detailed internal bat surveys;
viii. measures to control leisure boat activity and behaviour within the dock system to minimise disturbance of wildlife within the docks;
ix. measures to discourage gulls and pigeons from nesting/roosting on buildings; and
x. mitigation for any areas affected by invasive, non-native plants and noxious weeds.

The Central Docks NEBS will therefore outline the methodologies, measures and options to allow for the production of detailed plot-specific EBSs for each reserved matters application in order for Condition 34 of the outline consent to be discharged.

1.9 Liverpool Waters Sustainability Principles

Peel Land and Property (Ports) Ltd. (Peel L&P) support the United Nations Sustainable Development Goals (SDGs) and their vision is to encourage the creation of highly sustainable, future-proofed developments (Peel L&P, 2019).[4] Peel L&P have prioritised the four SDGs that are most relevant to their business activities:

- SDG 8 – decent work and economic growth.

[4] Peel Land & Property (Ports) Ltd. (2019). Sustainability 5 Year Business Plan.

- SDG 11 – sustainable cities and communities.
- SDG 12 – responsible consumption and production.
- SDG 15 – life on land.

Based on these SDGs, seven sustainability principles have been developed by Peel L&P. Three of these principles are considered most relevant to this NEBS:

- Principle 3: *Develop highly sustainable and smart built environments* – minimum standards will be BREEAM Very good for commercial buildings and Home Quality Mark for residential buildings. All building development shall achieve a BREEAM Communities rating of excellent.
- Principle 5: *Put more back into the natural environment than is taken out* – ensuring that the development delivers a net gain for biodiversity and natural capital, protects existing habitats and provides benefits for people and wildlife.
- Principle 6: *Support the health and wellbeing of communities by creating beautiful, functional and well-used green public realm* – green infrastructure will be used to cool the microclimate and benefit local air quality, biodiversity and water management as well as to provide character and connectivity for people throughout the neighbourhoods.

2 Update Surveys and Impact Assessments

2.1 Preliminary Ecological Appraisal

Due to the time elapsed between the original ecological surveys and production of the ES for Liverpool Waters, each plot-specific reserved matters application should include a Preliminary Ecological Appraisal (PEA). The PEA should identify key ecological constraints, design options, requirements for further surveys and mitigation measures within each plot. These should subsequently be detailed within the plot-specific EBS.

The PEA should be undertaken in accordance with CIEEM guidelines (CIEEM, 2017).[5] With regards to habitats and vegetation, a PEA should follow the Phase 1 Habitat survey guidelines as set out by the Joint Nature Conservation Committee (JNCC, 2010).[6] The PEA should also conform to the mandatory British Standard BS42020:2013 Biodiversity Code of Practice for Planning & Development.

2.2 Breeding Birds

Thirty-nine breeding bird species were recorded during the initial survey work completed in 2009 for the Liverpool Waters Outline Application.[7] Of these 39 species, 16 were considered to be holding territory on site and nine species were confirmed to have successfully bred within the site boundary. The key species recorded to be holding territory within Liverpool Waters were black redstart *Phoenicurus ochruros*, lapwing *Vanellus vanellus*, skylark *Alauda arvensis*, starling *Sturnus vulgaris*, linnet *Linaria cannabina*, mallard *Anas platyrhynchos*, ringed plover *Charadrius hiaticula*, and swallow *Hirundo rustica*. Species recorded within the Central Docks Neighbourhood in 2009 included lapwing, skylark, linnet and ringed plover. A singing male black redstart was recorded approximately 150m to the north east of Central Docks. Little ringed plover *Charadrius dubius* were not recorded during the breeding bird surveys undertaken in 2009; however they had previously been recorded breeding within the Liverpool Waters site and the habitat remains suitable.

Species specific breeding bird surveys should therefore be undertaken in the Central Docks Neighbourhood. The focus of the surveys should be on Schedule 1 species which are considered to be likely breeding on site. It will be possible to assess all breeding species on site (including those listed above) by undertaking five visits (mid-April – end of June) following the Common Bird Census methodology. In addition to recording the Schedule 1 species, this method would also record species such as skylark, lapwing, linnet, ringed plover and meadow pipit *Anthus pratensis*. For efficiency, and in line with a strategic approach,

[5] CIEEM (2017). Guidelines for Preliminary Ecological Appraisal, 2nd edition. Winchester: Chartered Institute of Ecology and Environmental Management.
[6] JNCC (2010). Handbook for Phase 1 Habitat survey - a technique for environmental audit. Peterborough: Joint Nature Conservancy Council.
[7] WYG (2009). *Liverpool Waters Breeding Bird Survey Report*. Appendix 7.6 of the Liverpool Waters ES (2011).

surveys for breeding bird species should be undertaken across the entire Liverpool Waters site, thereby providing data for applications within all neighbourhoods.

2.2.1 Little Ringed Plover

Annual surveys should be undertaken in the year prior to construction and during the subsequent four years of development at the Central Docks Neighbourhood. The surveys will look to identify whether little ringed plover *Charadrius dubius,* have colonised the vacant plots for nesting and foraging. Ringed plover have previously been recorded breeding within the site; the surveys for little ringed plover should therefore also target ringed plover. The survey data should inform the construction mitigation strategies of the development in Central Docks with the aim of preventing disturbance to little ringed plover and ringed plover nest sites.

The surveys should be undertaken by a suitably qualified ecologist and follow the methodology described below. Following the first five years of monitoring, the requirement for continued breeding plover surveys should be reviewed. If appropriate, the frequency of surveys should be reduced to biennial surveys throughout the development of the Liverpool Waters site.

Methodology

The methodology for the little ringed plover survey should be based on the 2007 British Trust for Ornithology (BTO) Breeding Plover Survey (Burton & Conway, 2008).[8] The survey should comprise a transect survey along a pre-defined route around the Central Docks Neighbourhood. The survey should be undertaken between 08:30 and 18:00 and note any little ringed plover (and ringed plover) heard singing, calling, and those identified visually. In addition, any nests observed should be recorded to estimate the number of breeding pairs. Three survey visits should be undertaken between 15 April and 15 July. To reduce bias on the survey data, the transect route should be walked in the alternative direction for each survey. Appropriate field maps should be annotated to show the location of any little ringed plover that are heard or seen; the standard two letter BTO species and activity codes should be used on all surveys (BTO, 2019).[9]

Timing/Weather Conditions

- The survey should consist of at least three visits with one visit between 15 April to 15 May, one visit between 15 May to 15 June, and the third visit between 15 June and 15 July.
- Surveys should be undertaken between 08:30 and 18:00 and last for the duration of time it takes to comprehensively complete the transect route.
- Surveys will avoid poor weather.

[8] Burton, N. H. K. and Conway, G. J. (2008). *Assessing population of breeding ringed plovers in the UK between 1984 and 2007.* Report to the Joint Nature Conservation Committee. BTO Research Report No. 503. Thetford: British Trust for Ornithology (BTO).
[9] BTO (2019). Standard naming and coding of species and subspecies regularly found in Britain and Ireland. Available at https://www.bto.org/about-birds/birdfacts/british-list

Impact Assessment

A breeding plover impact assessment should be undertaken for each new reserved matters application in the Central Dock Neighbourhood, using data collected on the surveys. The impact assessment should be included in the plot specific EBS for submission to the LPA.

The breeding plover impact assessment should follow the same assessment methodology prescribed in the Liverpool Waters ES,[2] and should cover remediation, construction and operational phases of the development. Should the assessment identify that significant impacts on little ringed plover are likely for a particular development, appropriate mitigation measures should be identified. Mitigation measures may include the incorporation of working windows or buffer zones to restrict the impact of potentially disturbing activities on little ringed plover (and ringed plover). In addition, there may be a requirement to provide alternative nesting habitat, where possible.

2.2.2 Black Redstart

As per the NEBS for Princes Dock, annual surveys for black redstart, should be undertaken in the year prior to construction and during the subsequent four years of development at the Central Docks Neighbourhood. The surveys should set out to identify whether black redstart have colonised the existing buildings and/or are using any of the vacant plots for foraging. The survey data should inform the construction mitigation strategies for the new buildings with the aim of preventing disturbance to new black redstart nest sites. The surveys should be undertaken by a suitably qualified ecologist. The methodology for undertaking the survey should closely follow that outlined in Bird Monitoring Methods (Gilbert *et al*., 1998);[10] this may need to be modified slightly to ensure it is site specific. Following the first five years of monitoring, the requirement for continued black redstart surveys should be reviewed. If appropriate, the frequency of surveys should be reduced to biennial surveys throughout the development of the Liverpool Waters site.

Methodology

As identified in the NEBS for Princes Dock, the survey should comprise a transect survey along a pre-defined route around the Central Docks Neighbourhood. Surveys should be undertaken at dawn, and will note any black redstart heard singing, calling, and those identified visually. Five survey visits should be undertaken between mid-April and the end of June. To reduce the bias on the survey data, the transect route should be walked in the alternative direction for each survey. Appropriate field maps should be annotated to show the location of any black redstart that are heard or seen; the standard two letter BTO species and activity codes should be used on all surveys.[9]

[10] Gilbert, G., Gibbons, D. W., and Evans, J. (1998). *Bird Monitoring Methods – a Manual of Techniques for Key UK Species*. RSPB.

Timing/Weather Conditions

- The surveys should consist of a least five fortnightly visits from mid-April to the end of June.
- Surveys should commence early morning (in the hours after sunrise) and last for the duration of time it takes to comprehensively complete the transect route.
- Surveys will avoid cold, wet and windy conditions.

Impact Assessment

As per the NEBS for Princes Dock,[3] a black redstart impact assessment should be undertaken for each new reserved matters application in the Central Docks Neighbourhood, using data collected on the surveys. The impact assessment should be included in the plot-specific EBS for submission to the LPA.

In line with the NEBS for Princes Dock, the black redstart impact assessment should follow the same assessment methodology as set out in the Liverpool Waters ES,[2] and should cover remediation, construction and operational phases of the development. Should the assessment identify that significant impacts on black redstart are likely for a particular development, appropriate mitigation measures should be identified. Mitigation measures may include the incorporation of working windows or buffer zones to restrict the impact of potentially disturbing activities on black redstart. In addition, there may be a requirement to provide alternative nesting habitat.

2.3 Passage/Wintering Birds

2.3.1 Wintering Bird Surveys

Wintering bird surveys should be undertaken in the year prior to construction and during the subsequent four years of development within the Central Docks Neighbourhood; this data will highlight if there is a need to revise mitigation strategies in relation to disturbance of wintering bird roosts. For efficiency and in line with a strategic approach, surveys for passage/wintering species should be undertaken across the entire Liverpool Waters site, thereby providing data for applications within all neighbourhoods. The surveys should be undertaken by suitably qualified ecologists following the methodology described below.

Following the first five years of monitoring, the requirement for continued annual wintering bird and passage surveys should be reviewed; a decision as to the required survey effort should be made based on the results. If appropriate, wintering and passage bird surveys should be reduced to biennial; data from biennial surveys should inform reserved matters application in the docks that are yet to be developed. Based on the review, fully developed neighbourhoods may be excluded from future survey efforts; therefore, reducing the scope of surveys as the neighbourhoods are developed.

Methodology

The survey methodology proposed is based on the BTO's Wetland Bird Survey (WeBS) (BTO, 2017[11]) however utilises a transect rather than dividing the site into blocks. Surveys should consist of a transect with predefined vantage points in each waterfront neighbourhood. The transects should be undertaken by two suitably qualified ecologists. Appropriate field maps should be annotated to show the bird species, high band, flight line and direction; the standard two letter BTO species and activity codes should be used on all surveys.

Target species for wintering bird and passage surveys should comprise waders, wildfowl, gulls & terns, cormorant, grey heron and raptors. All other species, including BoCC Red and Amber list passerines (song birds) should be recorded as incidental species. Surveys should be written up as a factual report; highlighting flight lines, key roosting locations, and any potential breeding activity of target species (early March onwards) within the Liverpool Waters scheme.

Timing/Weather Conditions

- High water surveys should be undertaken between September and March (inclusive) and comprise a minimum four-hour watch period per survey.
- In line with the NEBS produced for Princes Dock, high water surveys should be undertaken during the four hours preceding high tide.
- Low water surveys should be undertaken between September and March (inclusive) and comprise of a minimum four-hour period per survey.
- Low water surveys should be undertaken during the two hours preceding low water and two hours after.
- Surveys should be undertaken in a range of weather conditions, although times of restricted visibility and particularly harsh weather will be avoided.

Impact Assessment

The Liverpool Waters ES identified the presence of a small roost for oystercatcher *Haematopus ostralegus*, and redshank *Tringa totanus*, in Waterloo Dock.[2] Redshank and oystercatcher are components of the water bird assemblage (non-breeding) of the Mersey Narrows and North Wirral Foreshore Special Protection Area (SPA). The potential loss of this roost should be assessed in the context of the European site to determine whether this would result in a likely significant impact.

In line with the NEBS for Princes Dock, an impact assessment for water birds should be undertaken for each new reserved matters application in the Central Dock Neighbourhood, using data collected on the surveys. The impact assessment should be included in the plot specific EBS for submission to the LPA.

In accordance with the NEBS for Princes Dock, the water bird impact assessment should cover remediation, construction and operational phases of the development. It should follow the same assessment methodology as set out in the

[11] BTO (2017). *Wetland Bird Survey – Survey Methods, Analysis & Interpretation*. Thetford: BTO.

Liverpool Waters Ecology and Nature Conservation ES chapter and should include a Habitats Regulations Assessment (HRA) of Likely Significant Effect (LSE) for each of the Natura 2000 sites that may be affected by the development. Assessments should include all of the following sites, in addition to any proposed, new or extensions to current sites which may be designated subsequently:

- Liverpool Bay SPA;
- The Mersey Narrows and North Wirral Foreshore SPA/Ramsar;
- Mersey Estuary SPA/Ramsar;
- Ribble & Alt Estuaries SPA/Ramsar;
- Sefton Coast Special Area of Conservation (SAC);
- The Dee Estuary Ramsar;
- Dee Estuary SPA;
- Dee Estuary SAC; and
- Martin Mere SPA and Ramsar.

As with the NEBS for Princes Dock, the impact assessment should reference the most recent surveys, the baseline bird report for Liverpool Waters, the subsequent monthly update reports produced by WYG between October 2013 and April 2014, and the TEP assessment of the docks for qualifying features of Natura 2000 sites (TEP, 2015).[12] Impact assessments should also utilise any additional data and evidence available from standalone applications. Should the assessment identify that significant impacts on water birds are likely for a particular development, appropriate mitigation measures should be identified. Mitigation measures may include the incorporation of working windows or buffer zones to restrict the impact of potentially disturbing activities on water birds. In addition, there may be a requirement to provide alternative roosting habitat. Any mitigation proposed should be in accordance with the Liverpool Waters Strategic Ecological Mitigation Plan (SEMP) which is currently being developed at the time of writing this NEBS.[13]

2.4 Foraging Common Tern

2.4.1 Common Tern Survey

Surveys for foraging common tern *Sterna hirundo,* should take place in the Central Docks Neighbourhood in the year prior to construction and during the subsequent four years following development of the neighbourhood. The surveys should be undertaken by a suitably qualified ecologist and should follow the methodology described below. Following the first five years of monitoring, the requirement for continued surveys should be reviewed on the basis of the survey results and, if appropriate, the frequency of the surveys reduced.

[12] TEP (2015). Assessment of Supporting Habitat (Docks) for Use by Qualifying Features of Natura 2000 Sites in the Liverpool City Region. Available at http://www.meas.org.uk/media/5279/4157005-assessment-of-supporting-habitat-liverpool-docks-excl-drawings-aug-2015.pdf

[13] Arup (2019) Liverpool Waters Strategic Ecological Mitigation Plan – Interim Note.

Methodology

There is no standard methodology available for foraging common tern within Bird Monitoring Methods.[10] Similar to the Princes Dock NEBS,[3] the following shore-based survey approach is proposed to assess foraging common tern. This approach was outlined in Parson *et al.* (2015)[14] and was designed for little tern *Sternula albifrons*. Surveys for common tern foraging should be carried out by four surveyors, one located in each of the waterfront neighbourhoods. Surveys should be carried out from a vantage point which allows observation of the docks and coastal strip along the Mersey. Appropriate field maps should be annotated to show the flight lines of observed common terns, including their height, direction and foraging activity. The survey should also record breeding behaviour as observed.

Survey results should be written up as a factual report, highlighting flight lines, key foraging locations and any breeding locations for common tern within the Liverpool Waters Scheme and adjacent coastal strip.

Timing/Weather Conditions

- A total of 30 hours of survey effort should be completed between April and August (inclusive).
- Survey effort should be evenly spread across the five-month survey period and comprise approximately two-hour watches, with three watches completed in each month.
- The surveys should be undertaken under a variety of tidal states and times of day to reduce sampling bias.
- The surveys should be undertaken in a range of weather conditions, although times of restricted visibility and particularly harsh weather will be avoided.

Impact Assessment

An impact assessment for common tern should be undertaken for each new reserved matters application in the Central Dock Neighbourhood; the reserved matters applications should incorporate the data recorded within the surveys and any other data collected from standalone applications. The impact assessment should be included in the plot specific EBS for submission to the LPA.

The impact assessment for common tern should cover remediation, construction and operational phases of the development and should include a HRA for Liverpool Bay SPA and Mersey Narrows and North Wirral Foreshore SPA. Impact assessments should reference the baseline reports for Liverpool Waters, in addition to the monthly update reports produced by WYG between October 2013 and April 2014. The impact assessments should also reference the TEP study

[14] Parsons, M., Lawson, J., Lewis, M., Lawrence, R. & Kuepfer, A. (2015). Quantifying foraging areas of little tern around its breeding colony SPA during chick-rearing – JNCC Report No. 548. Available at http://jncc.defra.gov.uk/pdf/Report_548_web.pdf

assessment of supporting Habitat (Docks) for Use by Qualifying Features of Natura 2000 Sites in the Liverpool City Region.[12]

2.5 Bats

Bat activity transect surveys were undertaken at Liverpool Waters by WYG in 2009.[15] Observed levels of bat activity were considered to be low with only 1-2 common pipistrelle bats recorded during each of the three visits undertaken. No bats were recorded within Central Docks and no buildings within Central Docks were recorded to have suitability for roosting bats. The waterfront dock basins were noted to be particularly exposed to the prevailing winds along the River Mersey and the habitats sparse of vegetation. It was concluded that the habitat was of poor suitability for foraging bats.

2.5.1 Preliminary Bat Roost Assessment

Very few buildings remain within Central Docks however there are some industrial units located to the west of Waterloo Road (approximate grid reference SJ33609151). Where a reserved matters application proposes demolition of any existing structures, a bat roost suitability assessment should be undertaken to determine presence/likely absence of roosting bats and to assess the potential of the structure to be used for roosting. This should be carried out by a suitably qualified ecologist in line with current guidance (Collins, 2016).[16] Structures should be searched for signs of bat presence including:

- bat droppings;
- scratch and grease marks;
- live or dead bats; and
- noises of bats calling from within the roost.

In addition, features searched for on structures should include:

- missing mortar; and
- any cracks or gaps at least 10mm in size.

Following this inspection, the structure should be assigned a level of suitability to support roosting bats at different times of year: high, moderate, low or negligible. If the structure is identified to have suitability for roosting bats, further surveys may be required.

Timing/Weather Conditions

Bat roost suitability assessments may be undertaken at any time of year under any weather conditions, providing the weather conditions do not affect the ecologist's

[15] WYG (2009). *Liverpool Waters Bat Survey Report*. Appendix 7.5 of the Liverpool Waters ES (2011).
[16] Collins, J. (ed) (2016). *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn). The Bat Conservation Trust: London.

ability to carry out the survey effectively and safely e.g. not during heavy rain or high winds.

2.5.2 Bat Activity Surveys

Structures confirmed as roosts during the preliminary bat roost assessment, or those assessed as having low, moderate or high bat roost suitability may require further activity surveys to determine the presence/likely absence of bats and characterise roosts (identify species, numbers, access points, timing of use etc.). Surveys should take the form of dusk emergence/dawn re-entry surveys and should be undertaken following current guidance.[16]

Dusk emergence/dawn re-entry surveys involve ecologists visiting at dusk or dawn to listen/record and watch for bats emerging or returning to roosts. The number and timing of visits required depends on the suitability of the structure being surveyed:

- Confirmed/High – three separate survey visits required between May and September with at least two visits in May to August. At least one dusk emergence and one dawn re-entry survey, the third visit may be either dusk or dawn.
- Moderate – two separate surveys (one dusk emergence and one dawn re-entry) required between May and September with at least two visits in May to August.
- Low – One dusk emergence or dawn re-entry survey required between May and August.

Timing/Weather Conditions

Surveys should be taken between May and August/September (see above). The sunset temperature must be above 10°C and no rain or strong winds.

2.5.3 Bat Impact Assessment

Any reserved matters applications which affect structures with potential to be used by roosting bats should include an impact assessment within the plot-specific Ecological and Biodiversity Statement. If any significant impacts during remediation, construction or operation are considered likely, then appropriate mitigation should be identified. This may include application for a bat mitigation licence from Natural England if any roosts and to be disturbed or destroyed.

2.6 Aquatic Species

Surveys for aquatic species were not undertaken within the dock system as part of the survey work undertaken to inform the ES (WYG, 2011).[2] As stated in the Princes Dock NEBS,[3] an initial baseline assessment should therefore be undertaken within the Central Dock system prior to the start of construction. An ongoing programme of monitoring should then be undertaken annually throughout

the development. The surveys should follow the same methodology as included within the Princes Dock NEBS (Table 2.1).

Table 2.1: Methodology for carrying out monitoring of fish and other water species within the dock system.

Survey	Methodology
Baseline	
Phytoplankton survey	Appropriate UKAS accredited methodology.
Fish survey – hydroacoustic and netting	Duncan, A. and Kubecka, J. (1993). *Hydroacoustic methods of fish surveys*. National Rivers Authority R&D Note 196. Fyke net surveys.
Benthic macroinvertebrate survey of dock floor	Samples to be collected using a suitable grab. Samples to be taken from Princes Half Tide Dock, West Waterloo Dock, and the linear waterway to the north of West Waterloo Dock. Minimum of 18 sampling sites. Also, baited traps to be used at a minimum of nine locations to quantitatively sample mobile species. Samples to be processed following Worsfold & Hall (2010).[17]
Benthic invertebrate survey of dock walls	Wall scrape samples to be taken following Worsfold (1998).[18]
Monitoring	
Annual surveys to monitor benthic invertebrates, algae, phytoplankton and zooplankton species.	As above for baseline surveys, unless subsequent improvement to accepted methodologies during development lifespan.
Annual fish survey if low fish population is identified during baseline to monitor improvements. Otherwise no further monitoring except in exceptional circumstances e.g. pollution incident.	As above for baseline surveys, unless subsequent improvement to accepted methodologies during development lifespan.

2.6.1 Invasive Non-Native Species

Marine Invasive Non-Native Species (INNS) such as the tunicate *Styela clava*, are known to be present within the docks in Liverpool (Davis et al., 2007).[19] There is high potential for other marine non-native species to be present in the docks, spread both by natural vectors or via vessels and their ballast/bilge water. If any INNS are recorded within Central Docks during the initial baseline or any subsequent monitoring, an appropriate method statement or management plan

[17] Worsfold, T.M. & Hall, D.J. (2010) *Guidelines for processing marine microbenthic invertebrate samples: a Processing Requirements Protocol: Version 1.0, June 2010.* Unicomarine Report. Available at http://www.nmbaqcs.org/media/1175/nmbaqc-inv-prp-v10-june2010.pdf
[18] Worsfold, T.M. (1998). *Sampling of cryptofauna from natural turfs (flora or fauna) on hard substrata. Version 1 of 26 March 1998*. In: Biological monitoring of marine Special Areas of Conservation: a handbook of methods for detecting change. Part 2. Procedural guidelines, ed. By K. Hiscock. Peterborough: Joint Nature Conservation Committee.
[19] Davis, Martin H., Lützen, Jørgen and Davis, Mary E (2007). *The spread of Styela clava Herdman, 1882 (Tunicata, Ascidiacea) in European waters.* Aquatic Invasions (2007) Volume 2, Issue 4: 378-390

should be implemented during construction to avoid promoting the spread of these species. Method statements or management plans should also be considered in relation to operational requirements, for example should there be a change in usage or activities within Central Docks waters post-development.

2.7 Water Quality

2.7.1 Monitoring

Part vi. Of Condition 16 requires details of the means and methodology for the monitoring and management of water quality within the dock system. This should inform mitigation to safeguard fish and other water species, including the aeration of dock water spaces. The surveys should follow the same methodology as included within the Princes Dock NEBS (Table 2.1).

An initial baseline characterisation survey of the dock system should be undertaken prior to the start of construction. This should include:

- Water quality sampling at several locations within Princes Half Tide Dock, West Waterloo Dock and the waterway to the north of West Waterloo Dock. Parameters to include dissolved oxygen, pH, conductivity, salinity, biochemical oxygen demand, ammonia, nutrients, heavy metals and organics likely to include poly-aromatic hydrocarbons and TBT.
- Sediment quality sampling for sediment oxygen demand, metals, pH and redox potential.
- Bathymetric survey for sediment depth.

An ongoing monitoring programme should be implemented during construction to monitor the above parameters including biochemical oxygen demand, ammonia and nutrients. This should be completed monthly in the first instance however the frequency may reduce over time, depending on the results.

Reports on water quality monitoring should be provided to the Environment Agency, MEAS and The Canal & River Trust. The Principal Contractor should rectify any issues identified during monitoring and implement measures to prevent further impacts arising.

2.7.2 Management Plan

As included in the NEBS for Princes Dock (WYG, 2018[3]), an appropriate water quality management plan should be developed and implemented by the Principal Contractor during the development of Central Docks. This should be produced following the results of the initial baseline assessment and will likely include measures such drainage system investigation to identify pollution risk and/or aeration of dock spaces.

3 Mitigation Through Scheme Design

3.1 Bird Strike Mitigation

Central Docks is the location of the secondary tall buildings cluster with five high-rise (>45m) buildings to be developed. Despite this, previous surveys within Liverpool Waters have found that the majority of birds follow either the River Mersey or the dock system rather than the land which has been allocated for development.[12,20] Nevertheless, the development of the tall buildings cluster within Central Docks has the potential to increase the risk of bird strike.

Measures to reduce the risk of bird strike should be designed into all tall buildings within Central Docks, particularly those with large areas of reflective glass on the northern and southern aspects. This should incorporate day and night time mitigation measures and should be incorporated into the plot-specific EBS required for each reserved matters application under Part D, Condition 34 of the Liverpool Waters outline consent. As is included in the Princes Dock NEBS (WYG, 2018[3]), all reserved matters applications for buildings over five storeys high, or where there are low existing light levels, should consider the requirement for a lighting plan. The design of any ancillary structures of high-risk buildings should also consider the requirement of similar mitigation.

Potential mitigation measures to reduce bird strike which may be included at Central Docks include (US Fish and Wildlife Service, 2016[21]):

- Reducing strikes with glass:
    - Patterning
    - Fritting
    - UV Patterned Glass
    - Screens
    - Netting (mesh size <1.3cm)
    - Architectural features e.g. overhangs, awnings and louvres
- Lighting plan to reduce lighting during bird migration periods (mid-August to mid-November and March to mid-May):
    - Avoid unnecessary lighting including perimeter lighting.
    - Operating lights to be designed so that light levels (brightness) are as low as possible.

[20] Vantage point surveys undertaken by WYG in 2009/2010, 2013/2014.
[21] US Fish and Wildlife Service (2016). *Reducing bird collisions with buildings and building glass best practices*. Falls Church, Virginia: Division of Migratory Bird Management. Available at https://www.fws.gov/migratorybirds/pdf/management/reducingbirdcollisionswithbuildings.pdf

  - Consider use of motion sensors in public areas (where health & safety considerations allow).
  - No upward lighting – lights to be fitted with hoods or louvres to avoid lighting skywards.
  - Height of lighting columns to be reduced/limited to reduce spillage.
  - Building occupants to be made aware of measures to reduce risk of bird strike e.g. use of shades/blinds and turning off lights when not in use.

- Landscaping design should:
  - avoid creating linear features which may funnel birds towards glass features;
  - consider pedestrian and vehicle approaches to buildings to avoid potential for flushing of birds e.g. from trees or shrubs towards glass buildings; and
  - avoid placement of interior planting in close proximity to windows to avoid creating the impression of continuing vegetation.

3.2 Control of Gulls and Pigeons

All buildings within the Central Docks Neighbourhood should incorporate measures to dissuade nesting and roosting of gulls and feral pigeons, appropriate to the design and function of the building. Each reserved matters application should include details of consideration with designed-in measures to be prioritised over additional measures such as spikes, wires or netting. Applicants should consider the implications of installing such measures in also reducing the availability of habitat for other key bird species including cormorant *Phalacrocorax carbo*. Any measures installed must also have regard to appropriate licensing requirements in respect to the protection of breeding birds under the Wildlife and Countryside Act 1981 (as amended).

Suitable designed-in measures include:

- Minimise flat roofs or replace with pitched roofs (over 25 degrees).
- Where flat roofs are required consider incorporation of roof gardens so human disturbance may deter nesting. Additional dissuasion measures may be required in certain locations.
- Avoid interruptions in the roof plane, e.g. skylights, or utilise additional dissuasion measures.
- Avoid roof overhangs with ledges below or incorporate a minimum ledge slope of 45 degrees or additional dissuasion measures.

Additional dissuasion measures which may be considered include:

- Spikes – can be effective on ledges if spaced appropriately however if used on roofs requires complete covering and therefore there is an associated visual impact.
- Wires – may be aligned in parallel rows on flat roofs or ledges to dissuade roosting (ineffective against nesting). Preferable over netting as avoids snagging of other bird species and may be less visually intrusive).
- Netting – requires careful consideration due to potential negative visual impact; difficulty to correctly install and maintain; and potential for individuals to become snagged due to inappropriate mesh size.
- Effective management of litter and waste – avoid accumulations and consider nuisance bird species in design of street furniture, e.g. litter bins.

It is not recommended that measures such as plastic bird of prey decoys, noise emitting devices or wind-driven moving structures are utilised as they are less effective and may have a negative impact on local nesting species, in particular peregrine *Falco peregrinus*.

Additional mitigation measures may be required for priority bird species which will also be deterred by the methods outlined above. All reserved matters applications should consider appropriate inclusion of integrated roosting features for species such as cormorant.

3.3 Control of Leisure Boat Activity

Due to the location of the Central Docks Neighbourhood within close proximity to sites designated for significant water bird populations, the impact of increased boat traffic should be considered within the environmental assessment and Habitats Regulations Assessment accompanying each reserved matters application. The assessments should incorporate survey/monitoring data of SPA species in order to ensure the appropriateness of mitigation measures.

Boats currently access Princes Half Tide Dock, West Waterloo Dock and the waterway to the north of West Waterloo Dock via the Liverpool Canal Dock link. This is accessed from the north from the Liverpool to Bootle stretch of the canal via Stanley Dock.

Impacts from increased boat traffic will require appropriate mitigation to ensure impacts on SPA qualifying species utilising the docks (e.g. cormorant) are avoided. In addition increased boat traffic has the potential to undermine the effectiveness of mitigation measures such as floating pontoons.

Measures to limit boat activity may include restricting traffic in certain seasons or to certain times of the day or year. Additionally, the implementation of a lane or one-way system may help to control traffic.

3.4 Recreational Disturbance

Point x. of Condition 16 requires '*mechanisms to ensure protection of Sefton Coast SAC (Seaforth Docks to Formby Point) from recreational disturbance*

overseen by the Liverpool Waters Coordination Panel in accordance with Schedule 6 of this permission'.

It is proposed that 2,900 residential units will be created within the Central Docks Neighbourhood. There is the potential that residents may travel to Sefton Coast SAC (approximately 5.9km to the north), Ribble and Alt Estuaries SPA/Ramsar (approximately 5.3km to the north) and Mersey Narrows and North Wirral Foreshore SPA/Ramsar (0.9km to the west across the River Mersey) for recreational purposes. This may affect the designated sites either alone, or in-combination with other developments.

A public open space will be created within the Central Docks Neighbourhood – Central Park. It is envisaged that this will be used for recreation which may reduce visits to the European sites. Recreational disturbance effects at Sefton Coast SAC were screened out within the Liverpool Waters HRA (WYG, 2011b)[22] as *"the primary movements of end users will be contained within the footprint of the development and its immediate surrounds."* However, since the Liverpool Waters outline consent was granted, a number of statutory designations have changed (e.g. Mersey Narrows and North Wirral Foreshore SPA and Liverpool Bay SPA). There is also further evidence and understanding of the impacts of visitor pressure on the designated sites (Natural England, 2015).[23]

Recreational pressure, including vehicular access and dog-fouling, is recognised in the formal statutory European Site Conservation Advice Packages for Sefton Coast SAC (Natural England, 2019[24]) which can be assessed as a Medium-High risk to qualifying features of the European site. Recreational pressure is also highlighted in the draft Liverpool Local Plans HRA as a Likely Significant Effect (LSE) (AECOM, 2017).[25] Public access/disturbance is confirmed as an issue in the Site Improvement Plans for Ribble and Alt Estuaries SPA, Sefton Coast SAC and Mersey Narrows and North Wirral Foreshore SPA.

All reserved matters applications for plots within Central Docks should include consideration of recreational pressure within HRA for Sefton Coast SAC, Ribble and Alt Estuaries SPA, Mersey Narrows and North Wirral Foreshore SPA. All future applications should ensure that they provide sufficient information to satisfy further tests of the Habitat Regulations (as required).

All developments should include a commitment to adhering to the objectives of the Visitor Management Strategy (VMS) which is currently being considered to provide a strategic approach to mitigation across the Liverpool City Region (LCR). The Liverpool City Region has commissioned a wider strategic approach to visitor and recreation pressure management; this is to be referred to as the 'Liverpool City Region European Sites Recreational Mitigation and Avoidance

[22] WYG (2011b). Liverpool Waters Habitats Regulations Assessment Screening Report for Proposed Liverpool Waters Scheme. Liverpool: WYG.
[23] Natural England (2015). *Mersey Narrows and North Wirral Foreshore Sites of Special Scientific Interest - Investigation into the impacts of Recreational Disturbance on Bird Declines*. Natural England Commissioned Report NECR201.
[24] Natural England (2019). *European Site Conservation Objectives: Draft Supplementary advice on conserving and restoring site features. Sefton Coast Special Area of Conservation (SAC) Site Code: UK0013076.* York: Natural England.
[25] AECOM (2017). *Liverpool Local Plan Habitats Regulations Assessment*. Liverpool: AECOM.

Strategy'. This work may help inform the delivery of visitor and recreation mitigation to protect European Sites within the City Region. This work is currently ongoing and no firm proposals have been proposed or agreed.

As stated in the NEBS for Princes Dock (WYG, 2018), reserved matters applications which come forward prior to the adoption of the LCR Mitigation and Avoidance Strategy should consider how recreational pressure will be assessed (and potentially mitigated for) as a result of the development. Condition 34 of Part D of the outline consent will ensure that the developer provides sufficient information to assess potential impacts through further surveys and HRA. More certainty over what mitigation (if any) would be required will be able to be provided at this stage. Applicants should include additional mitigation/preventative measures capable of being incorporated into the proposals and/or scheme design that will avoid and/or mitigate recreational pressures on the European sites and any functionally linked habitat. There should be a clear distinction within the reserved matters application documents (e.g. EBS) between those parts of the development which are essential features/characteristics, and those which are proposed as mitigation/preventative measures designed to protect European sites.

Examples of mitigation/preventative measures that may be included (as appropriate to the development of plots):

xi. Design and management of additional public open space outside the proposed development boundary to encourage use away from the European sites (e.g. Central Park).

xii. Restrictions on the number of apartments allowed to keep dogs.

xiii. Provision of information in sales packs, informing residents of the presence and importance of the European sites, and how they can help protect them including an outline 'responsible user code.'

xiv. Contributions to develop a visitor/householder 'responsible coast user code' including encouragement of visits to non-sensitive locations.

xv. Contributions to improving and/or managing access to and/or within the internationally important nature sites including financial contributions.

xvi. Contributions to increase recreation management including location-specific interventions e.g. wardening, signage, path management and habitat management, including financial contributions.

xvii. Contributions to non-sensitive locations in order improve sites to provide greater visitor enjoyment in order to reduce visits to European sites.

Any mitigation proposed should be in accordance with the Liverpool Waters SEMP.[26]

[26] Arup (2019) Liverpool Waters Strategic Ecological Mitigation Plan – Interim Note.

4 Construction Phase Mitigation

4.1 Construction Working Practices

4.1.1 Removal of Existing Buildings and Vegetation

The existing buildings, structures, hardstanding and ephemeral vegetation within the Central Docks Neighbourhood offer suitable nesting habitat for birds. Consequently, projects should demonstrate that breeding birds have been considered in their planning application. To limit disturbance to nesting birds, it is recommended that intrusive works such as vegetation clearance and demolition works are undertaken outside of the bird nesting season (March-August), where possible.

Where it is not possible to undertake intrusive works outside of the nesting season, a suitably qualified Ecological Clerk of Works (ECoW) should undertake a nesting bird check prior to the commencement of works on site. Should an active nest be identified, the ECoW should advise on a suitable species-specific working method and exclusion zone to limit disturbance and avoid damaging nests. The recommended working method may vary depending on the species and the nature of planned works.

4.1.2 Construction Vehicles, Routes and Speed Limits

As a precautionary measure, construction should be undertaken outside of the bird nesting season (March – August inclusive). Where this is not possible, an ECoW will be required to undertake a nesting bird check to ensure nests will not be damaged as vehicles move across the site. As per the NEBS for Princes Dock, vehicle routes and speed limits may need to account for nests.[3] The EcOW should advise the appropriate distance for vehicle traffic to keep from nests.

Wintering bird surveys were undertaken across the entire Liverpool Waters site during the 2018-2019 season (October to March). The reporting of the surveys was not yet published at the time of writing this NEBS, however cormorant, shelduck *Tadorna tadorna*, ringed plover *Charadrius hiaticula*, and oystercatcher have been recorded on site, among other common species. The numbers of cormorant recorded on site is considered to represent a significant proportion of the SPA population (i.e. >1%). Construction vehicle routes and speed limits should therefore be developed based on the data collected during the 2018/2019 surveys along with data collected previously across Liverpool Waters and for standalone applications. Any mitigation should be outlined in detail in the Construction Environmental Management Plan (CEMP) for the individual reserved matters through Condition 39 of the Liverpool Waters outline consent. Any mitigation proposed should be in accordance with the Liverpool Waters SEMP.[26]

The Liverpool Waters ES identified the presence of a small roost for oystercatcher and redshank in West Waterloo Dock. A restricted speed limit should therefore be stipulated for construction vehicles moving around this dock and should be

included within the CEMP. The ECoW may also recommend a speed limit during the nesting bird season (March – August inclusive).

4.1.3 Protection of Roost Sites of Wintering/Passage Birds

In 2011, WYG identified no significant aggregations of water birds associated with the Central Docks Neighbourhood; although, surveys by Arup in the 2018/2019 wintering season, have recorded SPA qualifying species such as cormorant on site.

Consequently, any developments in the Central Docks Neighbourhood, and elsewhere in the Liverpool Waters Scheme, which have the potential to result in increased water bird disturbance should consider, within its supporting environmental assessment and associated HRA, the impact of disturbance on features of all designated sites.

Disturbance pathways through the development of plots within the Central Docks Neighbourhood are likely to be associated with increased noise and visual effects and disturbance to available habitat for roosting and foraging. Impacts resulting from disturbance and interruption of flight paths and shading from buildings should also be considered. Mitigation should be identified through the updated impact assessment and/or the HRA. Any mitigation deemed necessary should be in accordance with the Liverpool Waters SEMP.[26] It should be outlined in detail in the CEMP for the individual reserved matters through Condition 39 of the Liverpool Waters outline consent.

Noise Disturbance Mitigation

Individual developments in the Central Docks Neighbourhood will require piling; this activity has the potential to extend the noise disturbance outside of the Central Docks Neighbourhood and may have potential effects on water birds using other docks within the vicinity. Therefore, effects on water bird roosting and foraging will be extended outside of the Central Docks Neighbourhood and will cover the entirety of the Liverpool Waters Scheme. For each development where piling is required, mitigation should be identified and implemented where appropriate. Any mitigation proposed should be in accordance Liverpool Waters SEMP.[26]

Noise disturbance mitigation measures should be included within the CEMP to reduce the effect of noise disturbance on birds. For Central Docks, these may include the following:

- Adherence to the guidelines set out in The Code of Practice for Noise and Vibration Control on Construction and Open Sites, 2009 and subsequent updates.
- The use of rotary piling method.
- Selection of quietest working equipment available.
- Positioning equipment behind physical carriers, i.e. temporary hoarding.
- Provision of lined and sealed acoustic covers for noisy equipment.
- Directing noise emissions away from plant, including exhausts or engines away from sensitive locations.

- Ensuring that regularly maintained and appropriately silenced equipment is used.
- Maintaining a no idling policy.

It is therefore recommended that the above guidance is followed for each development requiring piling; however, a noise impact assessment should still be undertaken for reserved matters applications through Condition 47 of the Liverpool Waters outline consent to determine whether additional mitigation, such as restrictions on the time of year i.e. a working window, is required.

An in-combination assessment should be undertaken within any HRA coming forward for reserved matters applications. This should consider the impacts of noise disturbance (amongst other impacts) from additional developments within the site, therefore looking at the cumulative and in-combination impacts, which may require additional or adapted mitigation.

Visual Disturbance Mitigation

Developments around West Waterloo Dock and Princes Half Tide Dock will require screening in relation to water birds. In both docks, screening should only be placed at ground level, this will block sight lines to the busiest area of the construction sites (i.e. where most operative and vehicle movements are likely to be concentrated). The developments should also be screened to prevent windblown litter entering the docks.

5 Habitat Creation

5.1 Bird Nesting/Roosting Features and Foraging Habitat

In accordance with the Sustainability Principles described in Section 1.9, developments should be striving towards biodiversity enhancement and net gain. Wherever possible, any opportunity to develop ecological connectivity within the neighbourhood and the wider Liverpool Waters scheme should be considered. To enhance the ecological value of the Central Docks Neighbourhood, buildings within the neighbourhood should incorporate features for the following bird species.

5.1.1 Black Redstart

During the breeding bird surveys undertaken in 2009 one singing black redstart was recorded singing south of Stanley Dock (WYG, 2009).[27] In 2015 and 2016, WYG undertook peregrine surveys close to Stanley Dock (north of Central Docks) and also recorded black redstart. To create a cohesive enhancement plan across the Liverpool Waters Scheme, as per the NEBS for Princes Dock, it is recommended buildings within the Central Docks Neighbourhood consider the inclusion of a green roof specifically designed for black redstart, where appropriate and viable.

Green Roof

Although the term green roof is used throughout this NEBS, roof habitat designed specifically for black redstart should contain a high proportion of sparsely vegetated areas which is more typical of brown roofs.

Green roofs should incorporate the following specification:

- relatively small areas of very sparsely vegetated rubble or rocky terrain incorporating hibernacula for invertebrates;
- still or slow-moving water; and
- nearby nest boxes.

An ornithologist should be involved in the design process to ensure specific ecological requirements for black redstart are met through the design process. Developments should also consider the compatibility of green roofs with the need to exclude gulls and pigeons as outlined in Section 3.2.

Detailed guidance on green roofs is provided by the greater London Authority (GLA) publication, Living Roofs and Roofs (GLA, 2008).[28] Guidance on creating

[27] WYG (2009). *Liverpool Waters Breeding Bird Survey Report*. Liverpool: WYG. Included as Appendix 7.6 of the Liverpool Waters ES.
[28] Greater London Authority (2008). Living Roofs and Walls Technical Report: Supporting London Plan Policy. GLA, London.

habitat specifically for black redstart is also detailed in the guidance produced by the Greater Manchester Biodiversity Project (GMBP, 2008).[29]

Nest Boxes

In addition to providing green roofs, nest boxes specifically designed for black redstart are also recommended. Suitable next boxes include:

- Schwegler 2HW (externally fixed); and
- Schwegler 1HE (integrated).

Due to the presence of peregrine falcon within the area, consideration should be required as to which plots will be most suitable for black redstart nest boxes. A suitably qualified ecologist should advise on the installation of nest boxes within each plot during production of the EBS.

5.1.2 Peregrine

Peregrine falcon thrive in urban environments due to their capacity to hunt a diverse range of species. It is not considered appropriate to incorporate nest boxes for black redstart (prey) and peregrine falcon (predator) in the same area. Consequently, consideration may be required as to which plots will be most suitable for peregrine nest boxes. A suitably qualified ecologist should advise on the installation of nest boxes within each plot during production of the EBS. Dixon & Drewitt (2012) provides further guidance on the provision of artificial nest sites for peregrine on built structures.[30]

5.1.3 Swallows and Swifts

The Central Docks Neighbourhood should also consider the inclusion of swallow and/or swift boxes in buildings to the north of the Kingsway Tunnel. Where provided, it is recommended that a minimum of three boxes should be considered to be installed per building, to replicate a colonial nesting situation. Any boxes installed should be sited at least 5m above ground, with clear adjacent airspace so birds can access them in high-speed direct flight. A suitably qualified ecologist should advise on the installation of nest boxes. It may be necessary to utilise a lure whereby calls of nesting swifts may be played to attract individuals and increase the likelihood of establishing a colony.

5.1.4 Replacement Roosting Habitat for Water Birds

As per the NEBS for Princes Dock, it is acknowledged that Condition 34 of the planning decision notice for the Liverpool Waters development specifies that replacement roosting sites are only required for Nelson Dock; due to the relatively high number of roosting cormorants, recorded by WYG in the Liverpool Waters

[29] Greater Manchester Biodiversity Project (GMBP) (2008). *Make Room for Black Redstarts: A species action plan for Greater Manchester*. GMBP: UK.
[30] Dixon, N and Drewitt, E. (2012). *A 15-year study of the diet of urban-nesting Peregrines.* Devon Birds.

Wintering and Passage Bird Report (WYG, 2011c).[31] Replacement habitat for roosting water birds was not proposed for the docks in the Central Docks Neighbourhood. However, due to the findings of more recent surveys which have recorded significant numbers of cormorant,[12] and the extension of Liverpool Bay SPA which now includes cormorant as a qualifying species, the requirement for mitigation will need to be revised.

The specification for suitable water bird habitat should be based on the results of the first annual passage and wintering bird survey and foraging common tern survey. Based on the information collected during the 2018/2019 wintering bird surveys, SPA species such as cormorant have been recorded within the site. Appropriate mitigation such as floating pontoons will therefore be required. The results of the surveys will be used alongside other data to produce a Liverpool Waters Strategic Ecological Mitigation Plan (SEMP) which will examine data in the context of extant and likely reserved matters applications across the entire Liverpool Waters Scheme, and identify areas where mitigation is needed.[26] The SEMP will be submitted to the LPA for approval. In line with the NEBS for Princes Dock, it is proposed that all of the mitigation features specified are delivered in areas managed by the landowner.

A cohesive approach across all neighbourhoods is required for this type of mitigation; reserved matters applications elsewhere within the Liverpool Waters scheme may result in significant impacts on water bird habitats, which cannot be mitigated for locally, therefore, mitigation may need to be implemented within adjacent neighbourhoods to maximise the overall effectiveness. However, mitigation measures should also be submitted as part of reserved matters applications and approved and discharged through Condition 34 of the outline consent for each detailed plot when additional surveys are undertaken to provide further information. Any mitigation proposed should be in accordance with Liverpool Waters SEMP.[26]

5.2 Bat Roosting Features

Although no bat roosts or buildings with bat roost suitability were identified within Central Docks during the surveys undertaken (WYG, 2009),[15] there is an opportunity to enhance the site for bats through the installation of artificial roosting features. Central Docks may be considered to be the neighbourhood with the most potential to be utilised by bats in the future due to the proposed Central Park which should provide suitable foraging habitat.

A total of nine bat boxes should therefore be installed on buildings in proximity to Central Park. Two bat boxes should be installed onto the southern facing aspect of the building on Plot C-10, where possible. It is recommended that the boxes are positioned on the southern face of the building, above 4m height. It is recommended that bat boxes are to be considered to be integrated into the walls for longevity, however they may also be fixed to the external walls.

[31] WYG (2011c). *Liverpool Waters Wintering and Spring Passage Bird Survey Report*. Liverpool: WYG.

The additional bat boxes should be positioned on the buildings on Plots C-05-A, C-05-B, C-09-A, C-09-B, C-07 and/or C-11, where possible. The boxes should be positioned south-west through to south-east where possible, however the western aspects of the buildings along the River Mersey should be avoided due to exposure to the prevailing weather.

The details of locations and types of boxes should be included within the plot-specific EBS to be provided as part of the reserved matters applications.

5.3 Landscape Planting

Public open space is proposed at Central Park along with additional areas of planting within the majority of development plots. Landscaping design should be detailed within the plot-specific reserved matters applications. Landscaping should include native species which attract invertebrates and therefore provide a food resource for bats. This includes native nectaring species; alternatively, suitable high nectaring non-native species may be considered to augment native species planting.

5.3.1 Tree Planting

Tree planting in areas of public open space should aim to create potential green corridors through the neighbourhood for bats and breeding birds, whilst avoiding funnelling birds towards reflective glass surfaces (Section 3.1). The landscaping within individual plots should tie in to corridors created in the public open space and develop a green network of potential wildlife corridors throughout the development. The habitats developed within each neighbourhood should also seek to link into adjacent neighbourhoods to maximise corridors and increase permeability throughout the entire Liverpool Waters scheme.

Where possible the planting interval for trees should be such that the canopies of adjacent trees are within at least 5m of one another when mature or the spaces between the trees should be bridged by suitable planting for bats. As stated in Princes Dock NEBS (WYG, 2018), it is recommended that the priority (broad) habitat ‘Broadleaved mixed and yew woodland’’ which is listed in the Natural Character Area (NCA) profile for Merseyside Conurbation (Natural England, 2013) is referenced as the basis of tree planting schemes. Suitable species include wild cherry *Prunus avium*, alder *Alnus glutinosa*, Blackthorn *Prunus spinosa*, elder *Sambucus nigra*, goat willow *Salix caprea*, hawthorn *Crataegus monogyna*, oak *Quercus* sp., field maple *Acer campestre*, silver birch *Betula pendula*, hazel *Coryllus avellana* and rowan *Sorbus aucuparia.*

5.3.2 Additional Shrub and Herbaceous Planting

The planting mix should attract a range of invertebrate species and provide an important foraging resource for breeding birds and bats. The formulated planting mix should encompass a range of sequential flowering and fruiting species which provide foraging resources for site fauna at different times of year.

Landscaping of public open space and within individual plots should include additional areas of shrub and herbaceous planting, including both annuals and herbaceous perennials. The planting mix should aim to attract a range of invertebrate species and support pollinator species.

Although native species are preferred, non-native plants, provided they are not invasive, can assist in providing nectar sources throughout the year. Examples of such species are listed in the Royal Horticultural Society (RHS) publication Plants for Pollinators – Garden Plants (RHS, 2011).[32]

[32] RHS (2011). Plants for Pollinators – Garden Plants. Available at https://www.rhs.org.uk/science/pdf/conservation-and-biodiversity/wildlife/plants-for-pollinators-garden-plants.pdf

6 Post-Construction Monitoring and Management

Details of post-construction monitoring and management should be specified within the EBS for each plot and submitted with the reserved matters application. An outline of what should be included within the Central Docks Neighbourhood is provided below.

6.1 Aquatic Monitoring

The results of the construction phase monitoring detailed in Sections 2.6 and 2.7 should be used by the applicant/developer to inform the monitoring programme required during the operational phase for aquatic species (including invasive non-native species) and water quality. The requirements of the ongoing monitoring should be discussed and agreed with Natural England, MEAS, the Environment Agency and Canal and Rivers Trust prior to completion of construction.

6.2 Ecological Mitigation

6.2.1 Bird Strike Mitigation

Routine Management

The bird strike prevention measures should be part of the fabric/fixtures/fittings of the building therefore should require little management outside of that covered by routine building maintenance. Management of any installed features should follow the manufacturer's recommendations.

Monitoring

Bird strike monitoring should be carried out in the first year after construction by owners/occupants of any buildings over five storeys high. This should take the form of monitoring surveys and occupant reports.

Monitoring of bird strike fatalities involves a systematic search for carcasses of birds which have collided with the building. Most bird strike collisions occur in the morning between 7am and 11am although they can happen at any time. Scavengers such as gulls, crows, cats and foxes learn where collisions happen frequently therefore it is important to survey regularly and as close as possible to peak collision time. It is proposed in the Princes Dock NEBS (WYG, 2018)[3] that monitoring surveys should be undertaken based on the methodology set out in the American Bird Conservancy (ABC) advice note (2015).[33] This is also proposed for Central Docks as set out below:

- Representatives should be chosen from each building to carry out the monitoring, for example a member of maintenance staff.

[33] ABC (2015). *Monitoring buildings for bird collisions*. Virginia: American Bird Conservancy.

- The monitoring period should be 12 months, where possible, to include one winter and one spring migration.
- Monitoring should take place on three days per week, between 8am and 10am.

Monitoring staff should initially be trained in conducting searches by a suitably qualified ecologist who may also be on hand to assist with subsequent identification of carcasses, e.g. by emailed photographs. The monitoring route should be devised during the training and should include every façade with windows, including along green roofs, and if possible, setbacks and other roof terraces. A map of the monitoring route should be created for reference, and the route should be subdivided into segments, with each change in façade structure and orientation assigned a segment number.

At the designated times, monitoring staff should conduct a careful search, looking within 10m of the building, with a special emphasis on landscape planting and other objects such as street furniture, as injured birds may seek shelter near those objects. After each segment, staff should record the date, time, number of birds found, their species and their status (dead, alive, or injured). If possible, photographs and specimens should be collected. It is important to record the search, even if no birds are found as this may be used as evidence for the effectiveness of installed mitigation.

All building occupants should be informed of the monitoring, so that their own efforts do no complicate the data e.g. maintenance staff should be instructed not to sweep up any carcasses when they are not engaged in monitoring.

The monitoring strategy and data collected should be continually reviewed in consultation with the ecologist to determine whether any adjustments to the methodology or mitigation are required. This should take place initially after 3 months and then quarterly until the end of the 12-month monitoring period. A monitoring report should be produced by the ecologist at the end of the monitoring period to summarise the findings and include any further enhancements of mitigation and monitoring, as required.

A system should also be set up whereby building occupants are encouraged to report any bird strikes. This should be included in the Welcome Pack for owners/tenants and supported by posters displayed on information boards to alert occupants to the risk of bird strike and the routine monitoring programme. Any occupant reports should be reviewed and included within the results of the monitoring report.

Remedial Management

The monitoring report should examine the locations of bird strikes in relation to mitigation features. Where relevant, areas of the building which may be more prone to bird strike should be highlighted and if appropriate further mitigation should be recommended. The monitoring report should be discussed with the building owner and additional monitoring undertaken if required. If additional mitigation is installed, then a further 12-month round of monitoring should take place to assess its effectiveness.

6.3 Control of Gulls and Pigeons

Routine Management

Ideally, issues with gulls/pigeons should be designed out without the need for additional control/dissuasion measures. However, if installed appropriately, little management should be required on control/dissuasion measures outside of that covered by routine building maintenance. Management of any installed features should follow the manufacturer's recommendations.

Monitoring

Monitoring for breeding is proposed where control/dissuasion measures are installed on buildings. A representative from the building should be chosen to carry out the monitoring following training by a suitably qualified ecologist. Searches should be undertaken at least twice per year, during May and June for the lifetime of the building. All potential nesting surfaces, such as ledges, flat roofs and roof terraces, should be inspected from the ground, with binoculars, and from within the buildings, where access allows. The locations of any gull or pigeon nests should be recorded on a map.

Remedial Management

Where significant numbers of nesting gulls and pigeons (more than two gull or five pigeon nests) are recorded, then the building owner should consult an appropriate contractor to identify suitable additional measures to dissuade/exclude birds during the following breeding season. Any additional exclusion measures should be installed by a suitably qualified contractor.

6.4 Habitat Creation

Where appropriate, buildings within the Central Docks Neighbourhood, should consider the incorporation of the following habitat creation measures:

- green roofs and black redstart nest boxes;
- swallow boxes;
- peregrine boxes;
- bat boxes; and
- landscape planting for bats and invertebrates.

As per the NEBS for Princes Dock,[3] routine management, appropriate monitoring and provisions for remedial management are set out below. Where mitigation for water birds is provided on the basis of the passage and wintering bird surveys, these should also be included within the monitoring programme. Monitoring and remedial management measures will be dependent on the type(s) of mitigation features implemented. Further details on the requirements of monitoring of mitigation measures should be provided with reserved matters applications and should be provided to the LPA for approval prior to installation. An Adaptive Management Plan should be produced with any SPA bird mitigation package developed. This is to ensure appropriate monitoring is undertaken and the mitigation is adapted if required to ensure the best success possible for SPA birds.

Any mitigation, management and monitoring proposed should be in accordance with the Liverpool Waters SEMP.[26]

6.4.1 Green/Brown Roofs and Black Redstart Boxes

Routine Management

Once fully established, green roofs designed specifically for black redstart require limited management. Occasional weeding may be required, should robust species establish.

Monitoring

Green roofs should be inspected twice per year to ensure they continue to meet the original specification. Inspections should be made by a suitably qualified landscape contractor and/or an ecologist. It should be ensured the roofs remain sparsely vegetated with an exposed substrate, e.g. rubble or rocky terrain.

The black redstart nest boxes should be inspected annually to ensure they remain fit for purpose. Inspections should be made from the ground using binoculars outside of the bird nesting season (September – February); where unable to ascertain the condition of nesting boxes, a closer inspection should be undertaken using an appropriate access system (September – February).

Following the completion of a green roof, two black redstart surveys should be undertaken in accordance with the survey methodology outlined in Section 2.2.2, in addition, a roof level survey should be undertaken (following the below methodology). To make efficiencies by avoiding the duplication of survey effort, the data collected during the biennial black redstart surveys should be used for monitoring; this is only possible where a full breeding season has passed between completion of the green roof and the survey. The second survey should be carried out five years after the completion of the green roof.

The roof level survey should comprise a two-hour vantage point survey, with the aim of observing whether black redstart are utilising the green roof for foraging and/or nesting. The roof level survey should be completed following the ground-level survey or independently, depending on whether data from the biennial surveys are used for the ground-level element.

Remedial Management

As per the NEBS for Princes Dock, remedial management of any created green roof features would be dependent on the system chosen; management would likely be limited to re-establishing flora which has failed. If required, maintenance of the green roof would be undertaken by a suitably experienced contractor. Any nest boxes which are deemed to have failed should be replaced between September and February (inclusive).

6.4.2 Swallow Boxes

Routine Management

Once erected, swallow boxes should not require any routine management.

Monitoring

The condition of swallow nest boxes should be inspected from the ground using binoculars, approximately every five years.

Remedial Management

Any nest boxes which are deemed to have failed structurally, should be replaced between September and February, using an appropriate access system.

6.4.3 Bat Boxes

Routine Management

Once erected, bat boxes should not require any routine management.

Monitoring

Bat boxes should be monitored by a suitably licensed bat worker in years two, five and ten post-installation. The monitoring survey may be done from a Mobile Elevation Work Platform (MEWP) or similar, where possible, in order to inspect the boxes for signs of use. Where this is not possible activity surveys (dusk emergence/dawn re-entry) may be required to assess presence/likely absence of bats.

Remedial Management

If any bat boxes are recorded to have failed, or require maintenance/cleaning, this should be undertaken under the supervision of a licensed bat worker between November and February (inclusive).

6.4.4 Landscape Planting

Routine Management

A Landscape Management Plan (LMP) should be produced for each plot-specific reserved matters application and should cross-reference the plot-specific EBS. Routine management will likely comprise weeding, pruning and replanting as appropriate to the species mix and layout/design.

Monitoring

Landscape planting should be assessed annually during maintenance visits to determine the success/establishment of planting and whether it meets the original specification.

Remedial Management

The overall aim should be as set out in Section 5.3, to provide a scheme that is beneficial to bats and invertebrates. The initial requirement for remedial management should be determined by the Landscape Architect and set out in the LMP. This should be reviewed by the landscape contractor during their annual inspections. If significant remedial management is required, an ecologist should be consulted to ensure that proposed replacement is appropriate.

7 Summary

7.1 Pre-Construction/Construction Phase Surveys and Impact Assessment – Condition 16: Parts i, ii and vi

7.1.1 Birds

- Annual surveys for breeding little ringed plover, breeding black redstart, passage/wintering birds and foraging common tern should be undertaken in the year prior to construction and during the subsequent four years of development at the Central Dock Neighbourhood. Following the first five years of monitoring, the requirement for continued surveys should be reviewed.
- The results of the bird surveys should be used to produce updated impact assessments for each reserved matters application, to be submitted to the LPA through an Ecological and Biodiversity Statement.

7.1.2 Bats

- Where a reserved matters application proposes demolition of any existing structures, a bat roost suitability assessment should be undertaken.
- Structures confirmed as roosts during the preliminary bat roost assessment, or those assessed as having low, moderate or high bat roost suitability may require further activity surveys to determine the presence/likely absence of bats and characterise roosts.
- Any reserved matters applications which affect structures with potential to be used by roosting bats should include an impact assessment within the plot-specific EBS. If any significant construction or operational impacts are considered likely, then appropriate mitigation should be developed.

7.1.3 Aquatic Species

- Initial baseline characterisation surveys should be undertaken for phytoplankton, fish, benthic macro-invertebrates and benthic invertebrates.
- Annual surveys (spring and autumn) should be undertaken to monitor benthic invertebrates, plus surveys for algae, phytoplankton and zooplankton species.
- If the baseline survey indicates a low fish population is present, surveys should be undertaken to monitor improvements.
- If the surveys identify marine INNS, methodologies should be developed to avoid them being spread because of works within the docks.

7.1.4 Water Quality

- Initial baseline characterisation survey of the dock system is to be undertaken prior to the start of construction to include water quality

sampling, sediment quality sampling and bathymetric survey for sediment depth.
- Ongoing monitoring to be undertaken during construction to monitor the above parameters including biochemical oxygen demand, ammonia and nutrients.
- Appropriate water quality management plan to be developed and implemented by the Principal Contractor during development.

7.2 Mitigation Through Scheme Design – Condition 16: Parts v, vii, viii & x

7.2.1 Bird Strike Mitigation

- The design of tall buildings within the Central Docks Neighbourhood, particularly those with significant quantities of reflective glass, should incorporate measures to mitigate the risk of bird strike.
- Plot-specific details of measures to reduce bird strike should be included within the EBS for each reserved matters application.

7.2.2 Control of Gulls and Pigeons

- All buildings must incorporate measures to dissuade nesting and roosting of gulls and feral pigeons, appropriate to the design and function of the building.
- Each reserved matters application should include details of consideration with designed-in measures to be prioritised over additional measures such as spikes, wires or netting. This should be detailed within the plot-specific EBS.

7.2.3 Control of Leisure Boat Activity

- Any development which has potential to result in increased boat traffic should consider the impact of the increased boat traffic on features of designated sites.
- Bird populations at Central Docks should be monitored on an annual basis. The surveys should be used to develop a leisure boat activity mitigation strategy, where required.

7.2.4 Recreational Distrubance

- All reserved matters applications should include HRA information for all Natura 2000 sites which may be impacted by the proposed scheme, including through recreational disturbance.
- All developments should include a commitment to adhere to the objectives of relevant Visitor Management Strategies (VMS).
- Reserved matters applications which come forward prior to the adoption of the VMS should consider how recreational pressure will be assessed (and potentially mitigated for) for the development.

7.3 Construction Phase Mitigation – Condition 16: Part iii

7.3.1 Removal of Existing Buildings and Vegetation

- The removal of existing buildings, structures, hardstanding and ephemeral vegetation should be undertaken outside of the breeding bird season, where practicable.
- Where this is not practicable, a suitably qualified ECoW should conduct a check for nesting birds prior to commencement of works.

7.3.2 Construction Vehicles, Routes and Speed Limits

- Construction vehicle routing and speed limits should take account of nesting birds (advised by ECoW) and SPA birds.
- A speed limit should be implemented on vehicles travelling adjacent to West Waterloo Dock due to the potential for roosting redshank and oystercatcher.

7.3.3 Roost Sites of Wintering Birds and Passage

- Any development which has the potential to result in increased disturbance of water bird roosting sites should consider the impacts on features of all designated sites.
- Bird populations should be monitored on an annual basis; a scheme-wide mitigation strategy should be developed.
- For each development where piling is required, appropriate mitigation should be identified and implemented, where appropriate.
- Measures to reduce the impacts of noise disturbance during construction should be included within a CEMP.
- Visual disturbance mitigation should be installed for the developments around West Waterloo and Half Princes Dock.

7.4 Habitat Creation – Condition 16: Part iv

7.4.1 Black Redstart

- Buildings within Central Docks should consider the inclusion of a green roof designed for black redstart.
- Where green roofs are provided, black redstart nest boxes should also be included on the same building.
- Additional mitigation options for black redstart should also be considered to include brown walls and a mosaic of green/brown roofs and walls.

7.4.2 Peregrine

- Due to the potential for conflict between black redstart and peregrine, consideration may be required as to which plots will be most suitable for peregrine nest boxes.

7.4.3 Swallows and Swifts

- The inclusion of swallow and/or swift nest boxes should be considered on buildings, where appropriate. Where provided, a minimum of three boxes should be installed per building.

7.4.4 Replacement Roosting Habitat for Water Birds

- Due to the findings of more recent surveys which recorded 12 cormorant in Princes Half Tide Dock and the extension of Liverpool Bay SPA which now includes cormorant as a qualifying species, the requirement for mitigation may need to be revised within Central Docks.
- The specification for suitable water bird habitat should be based on the results of all surveys undertaken to date across Liverpool waters including standalone applications.
- The results of the surveys will be used alongside other data to produce a Liverpool Waters Strategic Ecological Mitigation Plan (SEMP). A cohesive approach across all neighbourhoods is required for this type of mitigation.

7.4.5 Bat Roosting Features

- A total of nine bat boxes are to be installed on buildings in proximity to Central Park. Two bat boxes should be installed on the southern-facing aspect of the building on Plot C-10.
- The additional bat boxes should be positioned on the buildings on Plots C-05-A, C-05-B, C-09-A, C-09-B, C-07 and/or C-11.
- The specific details of locations and types of boxes should be included within the plot-specific EBS to be provided as part of the reserved matters applications.

7.4.6 Landscape Planting

- Landscaping design should be detailed within the plot-specific reserved matters applications.
- Landscaping should include native species which attract invertebrates and therefore provide a foraging resource for bats. This includes native nectaring species; alternatively, suitable non-native species may be considered to augment native species planting.
- Tree planting in areas of public open space should aim to create potential green corridors through the neighbourhood for bats and breeding birds, whilst avoiding funnelling birds towards reflective glass surfaces.

- Habitats to be developed within individual plots should link to the wider neighbourhood which in turn should seek to link into the other neighbourhoods of Liverpool Waters.

7.5 Post-Construction Monitoring and Management – Condition 16: Part ix

7.5.1 Aquatic Monitoring

- The results of the construction phase monitoring should inform the monitoring programme required during the operational phase.

7.5.2 Bird Strike Mitigation

- Bird strike prevention measures should be integrated into buildings where possible, consequently this should form part of routine building maintenance.
- Bird strike monitoring should be carried out in the first year after construction by owners/occupants of any buildings over five storeys high. This should take the form of monitoring surveys and occupant reports.
- The monitoring strategy and data collected should be continually reviewed in consultation with the ecologist to determine whether any adjustments to the methodology or mitigation are required.

7.5.3 Control of Gulls and Pigeons

- Issues with gulls/pigeons should ideally be designed out without the need for additional control/dissuasion measures. However, if installed appropriately, little management should be required outside of routine building maintenance.
- Monitoring is proposed where control/dissuasion measures are installed: at least twice per year during the lifetime of the building.
- Any additional exclusion measures required as a result of the monitoring should be installed by a suitably qualified contractor.

7.5.4 Green/Brown Roofs and Black Redstart Boxes

- Where provided, green roofs should be inspected at least twice per year to determine whether they continue to meet their original specification.
- Black redstart nest boxes should be inspected annually between September and February (inclusive). Any nest boxes that have failed structurally should be replaced.
- Two black redstart surveys should be undertaken on the completion of the green roof. The surveys should comprise a ground level survey and a roof level survey.
- In order to maximise efficiencies by avoiding the duplication of survey effort, the data collected during the biennial black redstart surveys should

be used for monitoring. However this is only possible where a full breeding season has passed between completion of the green roof and the survey. The second survey should be carried out five years after the completion of the green roof.

7.5.5 Swallow and Swift Boxes

- Where provided, swallow and swift boxes should be inspected every five years.
- Any nest boxes that have failed structurally should be replaced between September and February.

7.5.6 Bat Boxes

- No routine management should be required.
- Bat boxes should be monitored by a suitably licensed bat worker in years two, five and ten post-installation.
- If any bat boxes are recorded to have failed, or require maintenance/cleaning, this should be undertaken under the supervision of a licensed bat worker between November and February.

7.5.7 Landscape Planting

- Landscape Management Plan (LMP) to be produced for each reserved matters application, cross-referencing to the plot-specific EBS.
- Landscape planting should be assessed annually during maintenance visits.
- If significant remedial management is required, an ecologist should be consulted to ensure that proposed replacement is appropriate.

This document provides guidance to be used in relation to ecology and biodiversity for all reserved matters applications within the Central Docks Neighbourhood. The document addresses all parts of Condition 16 and therefore should discharge this condition.

Appendix B: Approval correspondence

From:	Yeomans, Amanda <Amanda.Yeomans@naturalengland.org.uk>
Sent:	20 October 2019 12:37
To:	Gaskell-Burnup, Melissa
Cc:	Jones, Peter; Lara Russo; Gavin Spowage; Leigh, Angela
Subject:	IoM discharge of Conditions- NE final advice
Attachments:	294701 MMO IoM discharge of conditions 18102019.pdf; RE: Isle of Man Ferry Terminal (9/DIS1988).

Dear Melissa,

cc. Peter Jones for awareness- NE will provide you a separate letter for completeness.

Please see attached Natural England's final advice in respect to the AMP for the Isle of Man Ferry Terminal. We have advised one minor amendment to the trigger point for further investigation and this has been accepted by the consultants (email chain attached for info). We provide the advice attached on the basis that the amendment will be completed and a final version of the AMP circulated. Please let me know if I need to upload this onto MCMS, however I can only see a consultation for the VR and not the discharge of conditions now.

We welcome all the work and commitment shown by the consultants on the AMP and ensuring that appropriate measures are in place and look forward to seeing the outcome of the mitigation and monitoring.

Apologies for the time taken in providing you this final advice, this has been due to time out of the office over the past week. If you need anything further please don't hesitate to get in touch.

Kind regards, Amanda

Amanda Yeomans

Senior Specialist, Ports, Estuaries & Tidal Lagoons / Senior Adviser Cheshire to Lancashire Coast & Marine

Strategy Implementation

Strategy to Delivery Team

Natural England

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Jabber/Office: 020 802 68311

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Please note my week is split between two roles with my usual working pattern as follows:

Monday to Wednesday *- Senior Specialist, Ports, Estuaries*

Thursday, Friday*- Senior Adviser Cheshire to Lancashire*

www.gov.uk/natural-england

We are here to secure a healthy natural environment for people to enjoy, where wildlife is protected and England's traditional landscapes are safeguarded for future generations.

In an effort to reduce Natural England's carbon footprint, I will, wherever possible, avoid travelling to meetings and attend via audio, video or web conferencing.

Date: 18 October 2019
Our ref: 294701
Your ref: MLA/2018/00536/1

Customer Services
Hornbeam House
Crewe Business Park
Electra Way
Crewe
Cheshire
CW1 6GJ

T 0300 060 3900

Melissa Gaskell-Burnup
Marine Management Organisation (MMO)

BY WESBITE ONLY

Dear Melissa,

Consultation: *Consultation 5*. Isle of Man Ferry Terminal - Discharge of Condition 5.2.10- *Revised documents*
Location: Princes Half Tide Dock, Liverpool Waters, Liverpool

Thank you for your consultation on the discharge of condition 5.2.10 under Marine Licence reference L/2019/00239/2 for the development of the Isle of Man Ferry Terminal. The advice contained within this letter refers to the updated Adaptive Management Plan (AMP) (version 5 dated October 2019). Natural England received this document via email direct from Waterman Infrastructure & Environment Limited on 10 October 2019.

Natural England previously provided advice to the MMO and additional comments direct to Waterman Infrastructure & Environment Limited ('Watermans') to assist with the production of a revised version of the AMP. The updated version of the AMP has taken into consideration Natural England's most recent comments and advice dated 7 October 2019 (provided to MMO and LPA via email on 10 October 2019).

We would firstly like to welcome and acknowledge the additional work and time commitment that the applicants have undertaken to update the AMP in ensuring that appropriate detail has been provided.

In our opinion the document clearly demonstrates a commitment to undertake monitoring for the mitigation measures through the first year of the development, in the absence of an agreed wider strategic mitigation plan. Further review and monitoring will then be picked up through a future agreed strategic approach as part of the Liverpool Waters Strategic Ecological Management Plan. Natural England will provide further advice to the Local Planning Authority (LPA) and the landowners on the SEMP in due course.

The AMP provides set trigger points at which an action will be required. These resulting actions are presented so that there is a clear mechanism for further investigation and potential re-design/movement considerations. Natural England further advise that for simplicity the trigger point for initial action of further investigation should be if no cormorants are using the pontoon in any one month, this is a simple measure that can be quickly identified. We have provided this comment directly to Watermans via email on 18 October and received confirmation that this approach would be adopted. Therefore, the advice within this letter is based on a further amendment to section 2.8 being completed and a final version of the AMP circulated to the regulators (and Natural England).

We appreciate that the purpose of the AMP is to set out adaptive measures and therefore will rely on the outcome of the monitoring undertaken to determine the particular actions required and this is recognised within the document. We advise that if a trigger point is encountered during the monitoring, that the relevant authorities are notified (i.e. MMO/LPA) and Natural England can offer further advice.

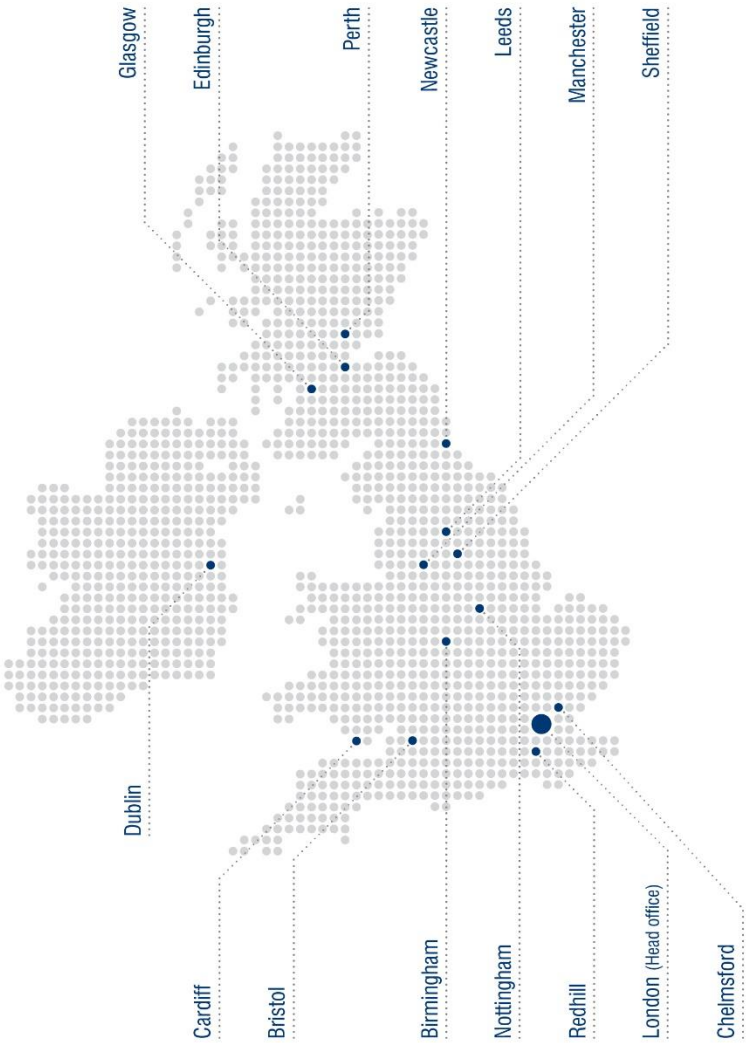
Overall the document provides a clear framework for monitoring the mitigation measures implemented at the Isle of Man Ferry development, in our opinion the document provides the level of detail required at this time, therefore we are content should the MMO discharge condition 5.2.10 on the Marine Licence.

If you have any queries relating to the advice in this letter please contact me on the details below.

Yours sincerely

Amanda Yeomans
Senior Specialist / Senior Adviser Coast and Marine
Cheshire to Lancashire Area Team
Amanda.Yeomans@naturalengland.org.uk

UK and Ireland Office Locations



Appendix 8.4a: Demolition & Construction Noise Assessment

Appendix 8.4a: Demolition and Construction Assessment Methodology and Assessment Results

Demolition and Construction Noise Assessment

The significance criteria for the construction noise assessment are based on 'The ABC Method' from BS 5228-1:2009+A1:2014 and the requirements of LCC. An extract describing this method is provided below.

Example Method 1 – The ABC Method

Table E.1 shows an example of the threshold of likely significant effect at dwellings when the Site noise level rounded to the nearest decibel, exceeds the listed value. The table can be used as follows: for the appropriate period (night, evening / weekends or day), the ambient noise level is determined and rounded to the nearest 5 dB. This is then compared with the site noise level. If the site noise level exceeds the appropriate category value, then a significance effect is deemed to occur.

Table E.1 **Example threshold of significant effect at dwellings**

Assessment category and threshold value period (L_{Aeq})	**Threshold value, in decibels (dB)**		
	Category A[A)]	**Category B[B)]**	**Category C[C)]**
Night-time (23.00-07.00)	45	50	55
Evenings and weekends[D)]	55	60	65
Daytime (07.00-19.00) and Saturdays (07.00-13.00)	65	70	75

NOTE1 A likely significant effect is indicated if the site L_{AeqT} noise level, exceeds the threshold level for the Category appropriate to the ambient noise level.

NOTE 2 If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a likely significant effect is indicated if the total L_{Aeq} noise level for the period increases by more than 3 dB due to site noise.

NOTE 3 Applied to residential receptors only.

[A)] Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

[B)] Category B: threshold values to use when the ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.

[C)] Category C: threshold values to use when the ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

[D)] 19.00-23.00 weekdays, 13.00-23.00 Saturdays and 07.00-23.00 Sundays.

(Source: BS 5228-1:2009+A1:2014, Page119)

In this case, the threshold of significance has been determined using the ABC method of BS5228-1:2009+A1:2014 with a maximum limit value of 75dB $L_{Aeq,10h}$ Monday to Friday 5 hours Saturday (as specified by Planning Condition 45 of 10O/2424) above which major construction noise effects are deemed to have occurred. Given some of the works are tide dependent works will typically take place between 0700-1900 Monday to Saturday but require the flexibility to undertake Sunday daytime and evening works. In this respect assessment has been undertaken as follows based on the following:

- Day (0700-1900) Monday to Saturday using ABC method with a maximum limit value of 75dB $L_{Aeq,T}$. Saturday 1300-1900;
- Evening (1900-2300) Monday to Saturday including Sunday 0700-2300), and
- Night-time (2300-0700) Monday to Sunday

Table 8.4.1a presents the ABC BS5228 construction threshold daytime, evening and night-time noise levels based on the measured prevailing noise levels.

Table 8.4.1a: Construction Threshold Noise Levels

SR Ref	SR Description	Measured Noise Level dB $L_{Aeq,T}$	BS5228 ABC Threshold Noise Level dB $L_{Aeq,T}$	Distance from Dismantling of Jetty (approx. m)	Distance from Site Boundary (approx. m)
Day					
A	Alexandra Towers	55	65	15	<5
B	Liverpool City Lofts	62	65	125	10
D	Malmaison	64	65[1]	170	130
E	No. 12 Princes Parade Dock Offices	62	65	25	<5
Eve					
A	Alexandra Towers	58	65	15	<5
B	Liverpool City Lofts	57	65	125	10
D	Malmaison	57	65	170	130
E	No. 12 Princes Parade Dock Offices	59	65	25	<5
Night				**Assumed distance from Barge/Tug (m)**	
A	Alexandra Towers	54	55	20	
B	Liverpool City Lofts	51	55	125	
D	Malmaison	55	55	170	
E	No. 12 Princes Parade Dock Offices	53	55	n/a	n/a

Note: [1]Daytime noise measurement covered rush-hour period therefore construction threshold noise limit of 65dB $L_{Aeq,T}$ used rather than the ABC method derived level of 70dB $L_{Aeq,T}$. n/a as outside office hours

Table 8.4.2a presents the significance criteria used in the assessment of predicted daytime, evening and night-time construction noise levels. At all locations the BS5228 ABC construction daytime and evening threshold level of 65dB $L_{Aeq,T}$ has been used based on the measured prevailing noise levels. During the daytime period the maximum construction noise limit required by LCC is 75dB $L_{Aeq,T}$, where T is the total number of construction hours. During the night-time period where 'low noise' works are planned the noise limit is 55dB $L_{Aeq,T}$.

Table 8.4.2a: Construction Noise Level Significance Criteria

Significance	Level Above Threshold Value dB(A)	Definition
Negligible	≤ 0 to 2.9	The effect is not of concern
Adverse effect of minor significance	3.0 to 4.9	The effect is undesirable but of limited concern
Adverse effect of moderate significance	5.0 to 10.0 Maximum construction noise value of 75dB $L_{Aeq,T}$ daytime	The effect gives rise to some concern but is likely to be tolerable depending on scale and duration
Adverse effect of major significance	>10	The effect gives rise to serious concern and it should be considered unacceptable

Where T is the total number of construction hours for the relevant assessment period.

Calculations have been undertaken using the data contained within the following documentation:

- Method Statement LCT/MS/001 'Existing Jetty Demolition (30/10/18) by Mc Laughlin Harvey;
- Method Statement LCT/MS/005 'Construction of New Jetty Structure and Terminal Building' by Mc Laughlin Harvey;
- Noise and Vibration Impact Assessment of Piling Work at the New Liverpool Cruise Terminal by C Hobbs Associates Ltd;
- Liverpool Cruise Terminal – Review of Plant Requirements;
- Noise Monitoring Report BMB Tideway West (April 2017) detailing noise level emissions from Solimec SR-75 Piling Rig (auger type) in inform extent of hearing protection zone; and
- Review of Marine Pile Options (Sept 2018) by Mc Laughlin and Harvey.

Where specific detail on plant is not provided within the above documentation then appropriate noise data has been extracted from BS 5228-1:2009+A1:2014. Where appropriate noise data was unavailable within BS5228-1:2009+A1:2014 then manufacturer's source data was used together with that extracted from Hong Kong Environmental Protection Department website. The highest noise levels tend to be associated with plant associated with, demolition, piling, construction of the substructure and superstructure. During the fit-out, construction noise would be significantly lower. The calculations assume that plant would be operating at the closest point to the SR, and do not take into account any existing or proposed screening.

The noise source data together with the calculation methodology of BS5228-1:2009+A1:2014 has been used to derive indicative noise levels at the nearest selected sensitive receptors (SRs). The noisiest construction phases and associated noise levels are considered to be as follows:

- Dismantling Princes Jetty — 87 dB $L_{Aeq,1h}$ at 10m
- Land Based Rotary Piling — 84 dB $L_{Aeq,1h}$ at 10m
- Marine Based Rotary Piling — 86 dB $L_{Aeq,1h}$ at 10m
- Precast Installation and Insitu Concrete Deck — 85 dB $L_{Aeq,1h}$ at 10m
- Concreting — 86 dB $L_{Aeq,1h}$ at 10m
- Terminal Building Steel Erection — 82 dB $L_{Aeq,1h}$ at 10m
- Terminal Building Roof & Cladding Work — 82 dB $L_{Aeq,1h}$ at 10m
- Moving of Barge to Required Location — 76 dB $L_{Aeq,1h}$ at 10m
- Set Up of Temporary Pile Gate — 76 dB $L_{Aeq,1h}$ at 10m
- Moving of Barge for Removal of Debris — 75 dB $L_{Aeq,1h}$ at 10m

Table 8.4.3a presents the generic plant and on-time used in the calculation of the demolition, dismantling and construction noise levels. A maximum worst case noise level over a one-hour period was calculated, assuming that plant would be operating at the closest point to the nearest SRs in the absence of mitigation. In practice, noise levels would tend to be lower owing to greater separation distance as the works progress. They would also tend to reduce over a full working day owing to periods of plant inactivity and change in working location of plant.

The closest SRs to the proposed Development are identified Figure 8.1a.

The results of the assessment are presented in Table 8.4.4a.

Table 8.4.3a: Generic Construction Noise Levels

Phase / Plant	Source	LAeq @10m	Kh	(t/T)*100	Partial Exposure	Barrier Attenuation	Noise Level @ NSR LAeq,1h (dB)	Overall LAeq,1h (dB)
Dismantling Princes Jetty								**87**
Crane Barge	CNP 048 (L_{AW} 112dB)	84	0	0.5	-3.0	0	81	
Tug Boat	CNP 221 (L_{AW} 110dB)	82	0	0.5	-3.0	0	79	
Hand held saw	BS5228 Table C4 ref 73	84	0	0.25	-6.0	0	78	
Mobile Telescopic Crane (100t)	BS5228 Table D7 ref 41	71	0	0.5	-3.0	0	68	
Liebherr LR 1160 Crawler Crane	Liebherr Specification Brochure	77	0	0.5	-3.0	0	74	
Jackup Barge (assumed on deck generator 120kW)	BS5228 Table C6 ref 39	65	0	1	0.0	0	65	
Jackup Barge (assumed on deck generator 120kW)	BS5228 Table C6 ref 39	65	0	1	0.0	0	65	
Pulveriser mounted on excavator	BS5228 Table C1 ref 4	76	0	0.25	-6.0	0	70	
CAT 345C Hydraulic Excavator	CAT Specification Brochure	78	0	0.5	-3.0	0	75	
Core drilling concrete (electric)	BS5228 Table C4 ref 69	85	0	0.5	-3.0	0	82	
Land Based Piling								**84**
Liebherr LB28 Rotary Piling Rig	Liebherr LB28 (L_{AW} 112dB)	84	0	0.75	-1.2	0	83	
Liebherr LR 1160 Crawler Crane	Liebherr Specification Brochure (L_{AW} 105dB)	77	0	0.5	-3.0	0	74	
Generator for welding	BS5228 Table C3 ref 32	73	0	0.25	-6.0	0	67	
Generator for welding	BS5228 Table C3 ref 32	73	0	0.25	-6.0	0	67	
Tracked Excavator	BS5228 Table C2 ref 3	78	0	0.5	-6.0	0	67	
Husqvarna Pw 450 Power Wash	Manufacturer's Data	61	0	0.25	-6.0	0	67	
Husqvarna Pw 450 Power Wash	Manufacturer's Data	61	0	0.25	-6.0	0	67	
Tracked mobile crane - lifting piles	BS5228 Table C3 ref 30	70	0	1	0.0	0	70	
Marine Based Piling								**86**
Crane Barge	CNP 048 (L_{AW} 112dB)	84	0	0.5	-3.0	0	81	
Tug Boat	CNP 221 (L_{AW} 110dB)	82		0.25	-6.0	0	76	

Phase / Plant	Source	LAeq @10m	Kh	(t/T)*100	Partial Exposure	Barrier Attenuation	Noise Level @ NSR LAeq,1h (dB)	Overall LAeq,1h (dB)
Liebherr LB28 Rotary Piling Rig	Liebherr LB28 (LAW 112dB)	84	0	0.75	-1.2	0	83	
Liebherr LR 1160 Crawler Crane	Liebherr Specification Brochure (LAW 105dB)	77	0	0.5	-3.0	0	74	
Husqvarna Pw 450 Power Wash	Manufacturer's Data (LAW 89dB)	61	0	0.25	-6.0	0	67	
Husqvarna Pw 450 Power Wash	Manufacturer's Data (LAW 89dB)	61	0	0.25	-6.0	0	67	
Jackup Barge (assumed on deck generator 120kW)	BS5228 Table C6 ref 39	65	0	1	0.0	0	65	
Generator for welding	BS5228 Table C3 ref 32	73	0	0.25	-6.0	0	67	
Generator for welding	BS5228 Table C3 ref 32	73	0	0.25	-6.0	0	67	
Tracked mobile crane - lifting piles	BS5228 Table C3 ref 30	70	0	1	0.0	0	70	
Precast Installation & Insitu Concrete Desk								**85**
Liebherr LR1200 Crawler Crane	Liebherr Specification Brochure (LAW 107dB)	79	0	0.5	-3	0	76	
Liebherr LR11300 Crawler Crane	Liebherr Specification Brochure (LAW 105dB)	77	0	0.5	-3	0	74	
Jackup Barge (assumed on deck generator 120kW)	BS5228 Table C6 ref 39	65	0	0.5	-3	0	62	
Tug Boat	CNP 221 (LAW 110dB)	82	0	0.5	-3	0	79	
Liebherr LR 1160 Crawler Crane	Liebherr Specification Brochure (LAW 105dB)	77	0	0.5	-3	0	74	
Jackup Barge (assumed on deck generator 120kW)	BS5228 Table C6 ref 39	65	0	0.5	-3	0	62	
Tug Boat	CNP 221 (LAW 110dB)	82	0	0.5	-3	0	79	
Generator for welding	BS5228 Table C3 ref 32	73	0	0.25	-6	0	67	
Generator for welding	BS5228 Table C3 ref 32	73	0	0.25	-6	0	67	
Husqvarna Pw 450 Power Wash	Manufacturer's Data (LAW 89dB)	61	0	0.25	-6	0	67	
Husqvarna Pw 450 Power Wash	Manufacturer's Data (LAW 89dB)	61	0	0.25	-6	0	67	
Tracked mobile crane - lifting	BS5228 Table C3 ref 30	70	0	1	0	0	70	

Phase / Plant	Source	LAeq @10m	Kh	(t/T)*100	Partial Exposure	Barrier Attenuation	Noise Level @ NSR LAeq,1h (dB)	Overall LAeq,1h (dB)
Tracked mobile crane - lifting	BS5228 Table C3 ref 30	70	0	0.25	0	0	70	
Concreting								**86**
Truck Mounted Concrete Pump + Boom Arm	BS5228 Table C4 ref 29	80	0	1	0	0	80	
Concrete Mixer Truck	BS5228 Table C4 Ref 20	80	0	1	0	0	80	
Pump Boom + Vibrating Poker	BS5228 Table C4 ref 36	71	0	1	0	0	71	
CM60 Concrete Batching Plant (LAW 111 dB)	Manufacturer's Data	83	0	1	0	0	83	
Terminal Building Steel Erection								**82**
Mobile Telescopic Crane 100t	BS5228 Table C4 ref 41	71	0	1	0	0	71	
Telescopic Handler	BS5228 Table C4 ref 54	79	0	1	0	0	79	
Diesel scissor lift	BS5228 Table C4 ref 59	78	0	0.25	-6	0	72	
Diesel scissor lift	BS5228 Table C4 ref 59	78	0	0.25	-6	0	72	
Power for welder diesel	BS5228 Table C4 ref 85	77	0	0.5	-3	0	74	
Power for welder diesel	BS5228 Table C4 ref 85	77	0	0.5	-3	0	74	
Terminal Building Roof & Cladding								**82**
Mobile Telescopic Crane 100t	BS5228 Table C4 ref 41	71	0	1	0	0	71	
Telescopic Handler	BS5228 Table C4 ref 54	79	0	1	0	0	79	
Diesel scissor lift	BS5228 Table C4 ref 59	78	0	0.25	-6	0	72	
Diesel scissor lift	BS5228 Table C4 ref 59	78	0	0.25	-6	0	72	
Power for welder diesel	BS5228 Table C4 ref 85	77	0	0.5	-3	0	74	
Power for welder diesel	BS5228 Table C4 ref 85	77	0	0.5	-3	0	74	
Moving of barge to required location and jack up								**76**
Tug Boat	CNP 221 (LAW 110dB)	82	0	0.2	-7	0	75	
Jackup Barge (assumed on deck generator 120kW)	BS5228 Table C6 ref 39	65	0	0.5	-3	0	62	
Derrick Barge	CNP 061 (LAW 104dB)	76	0	0.2	-7	0	69	

Phase / Plant	Source	LAeq @10m	Kh	(t/T)*100	Partial Exposure	Barrier Attenuation	Noise Level @ NSR LAeq,1h (dB)	Overall LAeq,1h (dB)
Set Up of Temporary Pile Gate								**76**
Tug Boat	CNP 221 (LAW 110dB)	82	0	0.15	-8	0	74	
Jackup Barge (assumed on deck generator 120kW)	BS5228 Table C6 ref 39	65	0	0.5	-3	0	62	
Liebherr LR 1160 Crawler Crane	Liebherr Specification Brochure (LAW 105dB)	77	0	0.15	-8	0	69	
Mobile Telescopic Crane (100t)	BS5228 Table C4 ref 41	71	0	0.15	-8	0	63	
Derrick Barge	CNP 061 (LAW 104dB)	76	0	0.15	-8	0	68	
Moving of service barges for removal of debris								**75**
Tug Boat	CNP 221 (LAW 110dB)	82	0	0.15	-8	0	74	
Jackup Barge (assumed on deck generator 120kW)	BS5228 Table C6 ref 39	65	0	0.15	-8	0	57	
Derrick Barge	CNP 061 (LAW 104dB)	76	0	0.15	-8	0	68	

Table 8.4.4a: Demolition and Construction Predicted Noise Levels

SR	Demolition / Construction Activity	Threshold Limit (dB(A))	Predicted Site Noise Level (dB(A))	Significance of Effect	Predicted Site Noise Level With Mitigation (dB(A))	Significance of Residual Effect
SR A	Dismantling Princes Jetty	LCC 75 Day 65 Eve	84	Major	74	Moderate
	Land Based Piling	LCC 75 Day 65 Eve	80	Major	70	Moderate
	Marine Based Piling	LCC 75 Day 65 Eve	83	Major	73	Moderate
	Precast Installation & Insitu Concrete Deck	LCC 75 Day 65 Eve	81	Major	71	Moderate
	Concreting	LCC 75 Day 65 Eve	82	Major	72	Moderate
	Terminal Building Steel Erection	LCC 75 Day 65 Eve	76	Major	66	Negligible
	Terminal Building Roof & Cladding Work	LCC 75 Day 65 Eve	79	Major	69	Negligible (Day) Minor (Eve)
	Moving of barge to required location and jack up	55 Night	62	Moderate	<55	Negligible
	Set Up of Temporary Pile Gate	55 Night	62	Moderate	<55	Negligible
	Moving of service barges for removal of debris	55 Night	61	Moderate	<55	Negligible
SR B	Dismantling Princes Jetty	LCC 75 Day 65 Eve	65	Negligible	55	Negligible
	Land Based Piling	LCC 75 Day 65 Eve	62	Negligible	<55	Negligible
	Marine Based Piling	LCC 75 Day 65 Eve	64	Moderate	<55	Negligible
	Precast Installation & Insitu Concrete Deck	LCC 75 Day 65 Eve	63	Negligible	<55	Negligible
	Concreting	LCC 75 Day 65 Eve	64	Negligible	<55	Negligible
	Terminal Building Steel Erection	LCC 75 Day 65 Eve	60	Negligible	<55	Negligible
	Terminal Building Roof & Cladding Work	LCC 75 Day 65 Eve	60	Negligible	<55	Negligible
	Moving of barge to required location and jack up	55 Night	54	Negligible	<55	Negligible
	Set Up of Temporary Pile Gate	55 Night	54	Negligible	<55	Negligible
	Moving of service barges for removal of debris	55 Night	53	Negligible	<55	Negligible
SR D	Dismantling Princes Jetty	LCC 75 Day 65 Eve	62	Negligible	<55	Negligible
	Land Based Piling	LCC 75 Day 65 Eve	60	Negligible	<55	Negligible
	Marine Based Piling	LCC 75 Day 65 Eve	62	Moderate	<55	Negligible
	Precast Installation & Insitu Concrete Deck	LCC 75 Day 65 Eve	60	Negligible	<55	Negligible
	Concreting	LCC 75 Day 65 Eve	62	Negligible	<55	Negligible
	Terminal Building Steel Erection	LCC 75 Day 65 Eve	58	Negligible	<55	Negligible
	Terminal Building Roof & Cladding Work	LCC 75 Day 65 Eve	58	Negligible	<55	Negligible
	Moving of barge to required location and jack up	55 Night	52	Negligible	<55	Negligible
	Set Up of Temporary Pile Gate	55 Night	51	Negligible	<55	Negligible

SR	Demolition / Construction Activity	Threshold Limit (dB(A))	Predicted Site Noise Level (dB(A))	Significance of Effect	Predicted Site Noise Level With Mitigation (dB(A))	Significance of Residual Effect
	Moving of service barges for removal of debris	55 Night	50	Negligible	<55	Negligible
SR E	Dismantling Princes Jetty	LCC 75 Day	79	Major	69	Minor
	Land Based Piling	LCC 75 Day	80	Major	70	Moderate
	Marine Based Piling	LCC 75 Day	83	Major	73	Moderate
	Precast Installation & Insitu Concrete Deck	LCC 75 Day	81	Major	71	Moderate
	Concreting	LCC 75 Day	82	Major	72	Moderate
	Terminal Building Steel Erection	LCC 75 Day	79	Major	69	Minor
	Terminal Building Roof & Cladding Work	LCC 75 Day	79	Major	69	Minor

Appendix 13.1a: Marine Ecology Benthic Survey Report

Liverpool Cruise Terminal EIA – Appendix 13.1

Marine Ecology Survey Report

Waterman Group on behalf of Liverpool City Council

APEM Ref: P00001343

October 2017

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Revision and Amendment Register

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1.0	21.10.17	All	All	Document creation	MH
1.0	25.10.17	All	All	Review & minor text edits	DH

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1. Introduction

APEM was commissioned by Waterman Group on behalf of Liverpool City Council to undertake a marine ecology survey at Princes Jetty, located within North Liverpool Docks on the north bank of the Mersey Estuary. The survey was to provide site characterisation data to inform the marine ecology assessment for an Environment Impact Assessment for the proposed Liverpool Cruise Terminal development. This report provides the results of the survey which consisted of collection of grab sampling of benthic sediment and collection of wall scrape samples from man-made structures.

2. Methodology

2.1 Survey area

The proposed development area lies on the north bank close to the mouth of the Mersey Estuary (Figure 1). The site falls within the Water Framework Directive (WFD) Mersey Transitional Water Body (WDF ID GB531206908100) and the methods proposed below are consistent with WFD methods for monitoring transitional waters.

2.2 Survey

2.2.1 Survey design

The survey was conducted in the vicinity of Princes Jetty during spring tides on 27th June 2017 which is within the benthic survey window recommended by WFD guidance (February to June, inclusive) (WFD-UKTAG 2014).

The sampling array consisted of nine stations to provide broad spatial coverage of the proposed area of development (Figure 2) with four stations locations within the red line boundary for the Development in the vicinity of Princes Jetty (G3, G5, G7 and G8), and five stations a short distance to the north of the red line boundary (G1, G2, G6, G9, G10) but within the potential zone of influence of the Development. The intention had been to sample an additional stations within the Development red line boundary a short distance west of the jetty (to be G4), but it was found at each of the three locations at which sampling was attempted there was hard substrate beneath a very thin layer of sediment and a grab sample could not be obtained (Figure 2). Co-ordinates for the stations sampled are provided in Appendix 1.

Figure 1: Location of Princes Jetty and the survey area within the lower Mersey Estuary.

Two wall scrape sampling location were located within the red line boundary of the Development (WS3 and 4), (Figure 2). The intention had been to collected further wall scrapes from the jetty legs and another location within the red line boundary, however, once on site it was clear that for Health and Safety reasons and vessel access considerations scrapes could not be obtained at these locations (Figure 2).

2.2.2 Benthic grabs

A 0.1 m^2 Day grab was deployed to collect one macrobiota sample, one sample for Particle Size Analysis (PSA) and samples for chemical analysis at each station. Grab samples were collected in accordance with guidance in Ware & Kenny (2011).

A single grab was collected in line with UKTAG guidance (WFD-UKTAG 2014) and there was limited value in obtaining site-specific replicates as the stations themselves were located so close to each other. All samples were assessed on retrieval for suitability. Those showing obvious evidence of the grab not operating correctly or having low sample volumes (<5 litres; Davies *et al*. 2001, Ware & Kenny 2011) were rejected and another sampling attempt made. At each station up to five attempts were made to collect a valid sample. If a valid sample could not be collected after five attempts then a decision was made as to whether to relocate or abandon the station.

The grab sample was photographed prior to processing. Biological samples were then processed in the field in accordance with the guidance provided in Cooper & Mason (2014). Samples were sieved using a 0.5 mm sieve to remove any larger material. All material retained on the sieves was fixed with 4% buffered formaldehyde solution in seawater and placed in sample containers (labelled inside and outside) following guidance in Ware & Kenny (2011) and Davies *et al*. (2001). Once the sieved samples were labelled and preserved all apparatus and sieves were thoroughly cleaned to prevent cross-contamination before moving to the next station. The sample was securely stored prior to the deployment of the grab at the next sampling station to ensure a clear working area and prevent potential damage or contamination of the samples.

From a second grab sample at each station a subsample of 500-1,000 ml was taken for PSA and transferred to a suitable container (labelled both internally and externally). For contaminant analysis, a total of 1 kg of sediment was collected; 500 g was placed in glass containers for analysis of metals, PAHs and PCBs and 500 g was placed in plastic containers for analysis of organic compounds. A plastic scoop was used to collect the samples for analysis of metals, PAHs and PCBs whereas samples for organics were collected using a metal scoop. The physicochemical samples were kept cool and frozen as soon as practicable. Once the subsamples were securely stored the remainder of the sample was discarded.

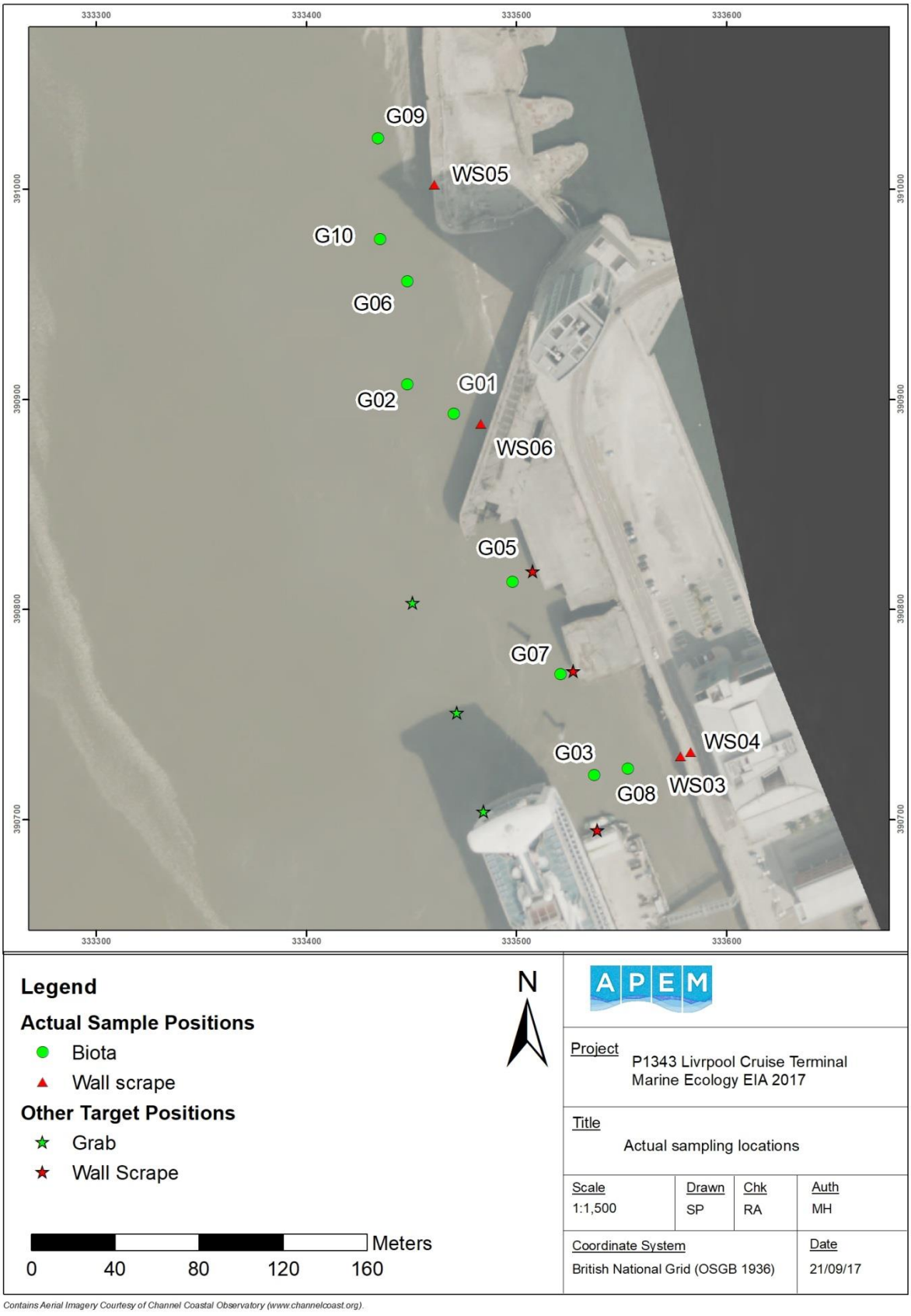

Figure 2: Location of planned and successfully sample survey stations by survey.

2.2.3 Wall scrapes

The term wall scrape is applicable to sampling of all types of man-made vertical structures within the survey area as well as the concrete or brick walls themselves.

At each wall scrape sampling station, a 0.01 m^2 sample was obtained of the biotic community at approximately the mid tide level, in accordance with the methodologies described by Worsfold (1998). Qualitative samples for taxon identification were also collected of any larger fouling organisms or areas of particularly dense fouling. The general community on the wall or jetty leg was also noted and large, easily identified animals and algae were recorded.

Using a 0.01 m^2 sampling device, marine growth was scraped into a bag. Samples were not sieved on board but instead were transferred to an appropriate container and fixed with 4% buffered formaldehyde solution in seawater. Samples were sieved on return to the laboratory over a 0.5 mm sieve.

Where dense epibiotic growth, difficult to identify specimens or species of interest were encountered, qualitative samples were taken for subsequent laboratory analysis. These qualitative samples were manually removed from the substrate.

Figure 3: Wall scrape sampling device.

2.3 Laboratory processing

2.3.1 Benthic grab and wall scrape macrobiota analysis

Sample analysis was conducted according to APEM's standard operating procedure for marine benthic sample analysis which is fully compliant with the North-east Atlantic Marine Biological Analytical Quality Control (NMBAQC) Scheme's Processing Requirement Protocol (Worsfold & Hall 2010).

Benthic grab and wall scrape samples were sieved over a 0.5 mm mesh in accordance with WFD guidance for benthic sampling in transitional waters (WFD-UKTAG 2014).

Taxa were identified to the lowest possible practicable taxonomic level, usually species, using the appropriate taxonomic literature. For certain taxonomic groups (e.g. nemerteans, nematodes, and certain oligochaetes), higher taxonomic levels were used due to the widely acknowledged lack of appropriate identification tools for these groups. The NMBAQC Scheme's Taxonomic Discrimination Protocol (TDP) (Worsfold & Hall, 2010), which gives guidance on the most appropriate level to which different marine taxa should be identified, was adhered to for the laboratory analysis. Where required, specimens were also compared with material maintained within the laboratory reference collection. Nomenclature followed the World Register of Marine Species (WoRMS), except where more recent revisions were known to supersede WoRMS.

All samples were subject to internal quality assurance procedures and, following analysis, 10% of samples were subject to formal Analytical Quality Control (AQC). For archiving purposes, all samples were stored in 70% industrial denatured alcohol (IDA) solution.

2.3.2 Particle size analysis

PSA was performed in accordance with NMBAQC Scheme Best Practice Guidance (Mason 2016). A combination of dry sieving and laser diffraction was used depending upon the characteristics of the sediment. The particle size data were entered into GRADISTAT (Blott & Pye 2001) to produce sediment classifications in accordance with Folk (1954), (Figure 4). Summary statistics were also calculated including mean particle size and sorting classification.

2.3.3 Contaminant analysis

The suite of contaminant analyses conducted was determined and agreed following consultations with the statutory authorities and their advisors (Appendix 2). Contaminant analyses were conducted according to UKAS accredited methods where appropriate.

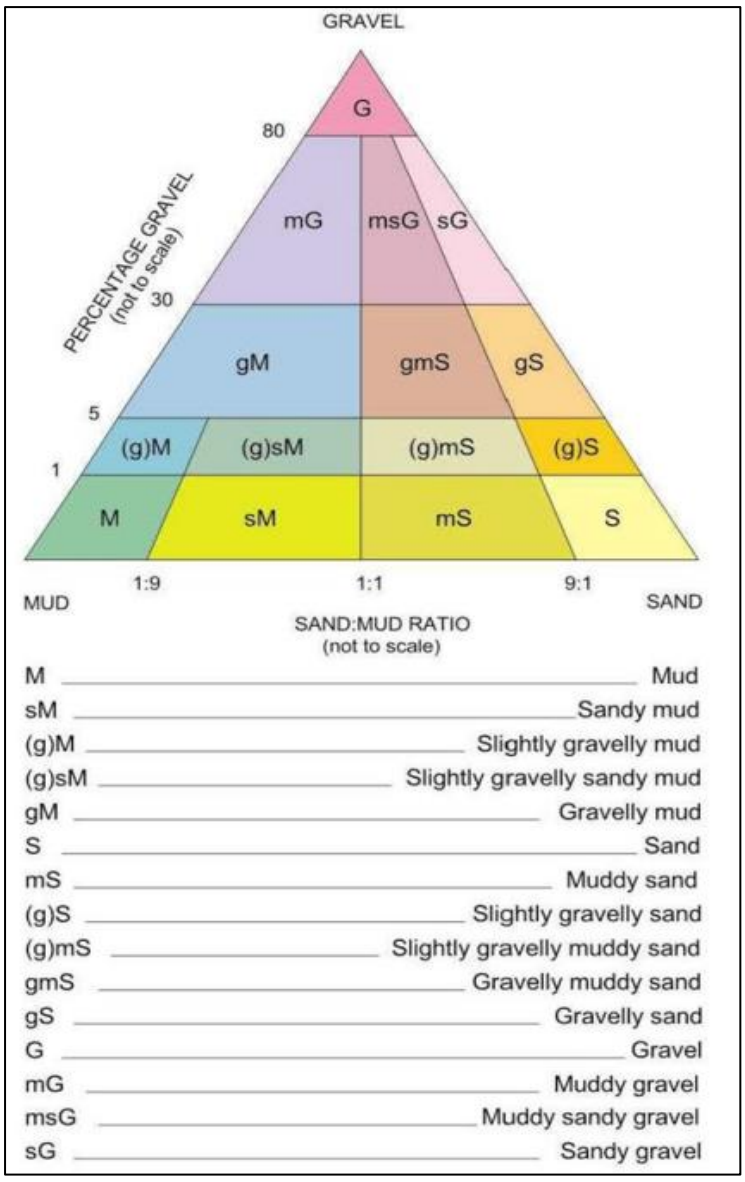

Figure 4: Folk sediment classification pyramid (Folk, 1954).

2.4 Data analysis

2.4.1 Truncation and data consolidation

Truncation of the macrobiota data were undertaken before calculation of univariate and multivariate statistics. Any records of pupa and juveniles were combined within the same taxon name. Additionally, there was one record of the common starfish *Asterias rubens* which was recorded as a fragment within one of the grabs. This record was removed prior to statistical analysis but was included in the number of taxa recorded for that station.

2.4.2 Univariate analysis

Univariate community analyses were undertaken using the PRIMER software package. Biological diversity within a community was assessed based on taxon richness (total number of taxa present) and diversity/evenness (based on relative abundances of different taxa). The following metrics were calculated:

- **Taxon richness:** The total number of taxa in a sample.
- **Abundance:** The number of individuals recorded in a sample.
- **Density:** The number of individuals per unit area (e.g. per square metre).
- **Shannon-Wiener Diversity Index (*H'*(log$_e$)):** Measure of diversity accounting for both the number of taxa present and the evenness of distribution of the taxa (Clarke & Warwick 2006).
- **Margalef's species richness (*d*):** Measure of the number of species present for a given number of individuals.
- **Pielou's Evenness Index (*J'*):** Represents the uniformity in distribution of individuals spread between species in a sample. The output range is from 0 to 1 with higher values indicating more evenness or more uniform distribution of individuals.
- **Simpson's Dominance Index (1-λ):** A dominance index derived from the probability of picking two individuals of the same species from a community at random. Simpson's dominance index ranges from 0 to 1 with higher values representing a more diverse community without dominant taxa.

2.4.3 Multivariate analysis

Multivariate analyses were conducted using resemblance (similarity) matrices. The particle size data resemblance matrix was calculated using Euclidean Distance following data normalisation. For the macrofaunal data set, the Bray-Curtis measure of similarity was used following a square root transformation of the data to reduce the influence of dominant species in the assemblage characterisation.

CLUSTER analysis was utilised to provide a visual representation of sample similarity in the form of a dendrogram. CLUSTER analysis was conducted in conjunction with a SIMPROF (similarity profile) test to determine whether groups of samples were statistically indistinguishable at the 5% significance level, or whether any trends in groupings were apparent.

Where differences between groups of samples were found, SIMPER can be used to determine which taxa are principally responsible for the differences between the statistically distinct groups of stations.

2.4.4 Biotope allocation

The invertebrate count data and PSA results, and outputs of the cluster analysis, SIMPROF and SIMPER analysis, were interpreted to allocate biotopes to each benthic grab station. Biotopes were allocated following JNCC's National Marine Habitat Classification for Britain

and Ireland: Version 04.05 (Connor *et al*. 2004) and EUNIS codes corresponding to each biotope have also been provided (JNCC 2010, Parry 2015).

2.4.5 Chemical analyses

The concentration of chemicals recorded at each station was compared against different environmental standards. Where possible chemicals were assessed against Cefas Guideline Action Level concentrations (MMO 2015). This guidance was primarily derived for consideration of dredged sediments, however, these action levels can be considered for all activities that disturb bottom sediments. The guidance defines Cefas Guideline Action Level 1 (cAL1) and Action Level 2 (cAL2) concentrations. Concentrations below cAL1 are of no concern, chemical levels between cAL1 and cAL2 generally would indicate further consideration would be required for disposal at sea, while dredged material with chemical levels above cAL2 is generally considered unsuitable for sea disposal (MMO 2015).

It should be noted that action level concentrations (cAL1/cAL2) are only available in the UK for a sub-set of the chemicals on the EQSD list for WFD assessment (EA 2016a). Where action levels were not available alternative standards for chemical concentrations are provided as part of the OSPAR Coordinated Environmental Monitoring Programme (CEMP) (OSPAR 2012). Ecological Assessment Criteria (EACs) were developed by OSPAR and the International Council for the Exploration of the Sea for assessing the ecological significance of sediment chemical concentrations. Concentrations below the EAC should not cause any chronic effects in marine species[1].

Where no criteria were available under the Cefas Action Levels or OSPAR standards, then chemical concentrations were compared to the Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (CCME 1999 & 2002). The Canadian Sediment Quality guidelines provide a Threshold Effect Level (TEL) which is equivalent to the Interim Sediment Quality Guideline (ISQG) stated in the guidance and a Probable Effect Level (PEL) which are chemical concentrations relating to potential biological effects as follows:

- Below the ISQG; is the minimal effect range within which adverse effects rarely occur.
- Between the ISQG and PEL; is the possible effect range within which adverse effects occasionally occur.
- Above the PEL; is the probable effect range within which adverse effects frequently occur.

For some chemicals target concentrations were available under more than one of these standards but in the assessment table including in this report only the standards used for the assessment have been indicated.

[1] For some chemicals an Effects Range Low (ERL) concentration is considered instead of an EAC. ERLs were developed by the United States Environmental Protection Agency for assessing the ecological significance of sediment concentrations. Concentrations below the ERL rarely cause adverse effects in marine organisms while concentrations above the ERL will often cause adverse effects in some marine organisms.

3. Results

3.1 Benthic grabs

3.1.1 Particle Size Analysis

Sediment type varied across the stations indicating habitat heterogeneity across a small area with a clear difference between sediments within the Development red line boundary in the vicinity of the jetty structure and those to the north of the red line boundary. Mean particle size ranged from 14.7 µm at Station G8 to 1,365 µm at Station G1 (Table 1). Sediment varied from extremely poorly sorted at Station G5 to well sorted at Stations G6 and G9. Gravel was absent from six stations (G3, G6-10) but comprised almost half of the sediment at Station G1 (48.7%) and this station was classified as Muddy Sandy Gravel (Folk 1954), (Table 1, Figure 5). Sediment was predominantly sandy (greater than 93% sediment composition) at Stations G2, G6, G9 and G10 (all located to the north of the Development red line boundary) and was classified as Slightly Gravelly Sand or Sand at these stations (Table 1, Figure 5). Mud comprised 70-75% of the sediment at Stations G3, G7 and G8 which were classified as Sandy Mud (these stations were near the southern end of the existing jetty structure). Station G5 comprised 46.7% sand, 29.5% mud and 23.8% gravel and was classified as Gravelly Muddy Sand (located near the middle of the existing jetty structure), (Table 1, Figure 5). Detailed PSA data are provided in Appendix 3.

Table 1: Particle Size Analysis data recorded at each sample station.

Station	Mean particle diameter (µm)	Gravel (%)	Sand (%)	Mud (%)	Folk (1954)	Sorting
G1	1,365	48.7	39.8	11.5	Muddy Sandy Gravel	Very Poorly Sorted
G2	277	2.0	93.8	4.2	Slightly Gravelly Sand	Poorly Sorted
G3	15	0.0	25.9	74.1	Sandy Mud	Very Poorly Sorted
G5	287	23.8	46.7	29.5	Gravelly Muddy Sand	Extremely Poorly Sorted
G6	132	0.0	95.8	4.2	Sand	Well Sorted
G7	17	0.0	29.1	70.9	Sandy Mud	Very Poorly Sorted
G8	15	0.0	26.3	73.7	Sandy Mud	Very Poorly Sorted
G9	132	0.0	96.0	4.0	Sand	Well Sorted
G10	161	0.0	96.8	3.2	Sand	Moderately Well Sorted

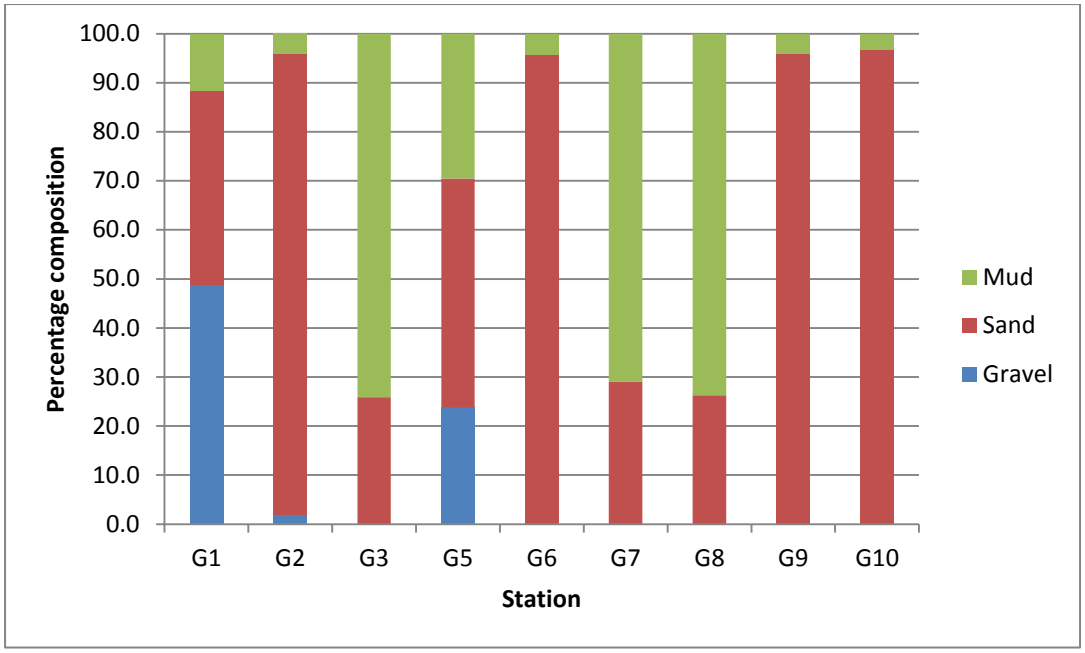

Figure 5: Percentage composition of mud, sand and gravel at each station.

3.1.2 Macrobiota

3.1.2.1 Community summary statistics for subtidal macrobenthic assemblages

A total of 69 taxa were identified across all benthic grab stations and *Mytilus edulis* was the most frequently recorded taxon which was recorded at all nine stations. Twenty-two of the taxa were non-countable epibiota (e.g. hydroids, bryozoans, and algae). Numerically, Mollusca dominated the samples. The most abundant taxon was also *M. edulis* with 738 juveniles and 13 adults recorded (the next most abundant taxa was *Amphibalanus improvisus* with 162 individuals). The raw data set is provided in Appendix 4.

Overall, there was no clear trend across stations in terms of taxon richness or invertebrate density which was also the case when comparing stations within and outside the Development red line boundary (Figures 6 & 7) . Station G9 had the lowest number of taxa (5) and Station G2 had the highest number of taxa (30) (Figure 6, Table 2). Margalef's Species Richness varied from 1.12 at Station G9 to 4.23 at Station G2 reflecting the number of taxa at these stations. Invertebrate density was greatest at Station G8 with 68,100 individuals per m^2 while densities were lowest at Stations G9 and G7 with 600 and 700 individuals per m^2, respectively (Figure 7). Pielou's Evenness varied from 0.29 at Station G8 (this was a low evenness as 117 individuals of *A. improvisus* were recorded, with very low numbers of all other taxa) to 0.98 at Station G7 (very high evenness as only one or two individuals of each species were recorded). The Shannon Wiener Diversity also indicated low diversity at Station G8 with a value of 0.83 with the highest value at Station G2 (2.17) due to the relatively high number of taxa (30) and the evenness of the distribution of taxa. Simpson Diversity was low at Stations G1 (0.35) and G8 (0.39) which was due to the dominance of *M. edulis* and *A. improvisus* respectively, while the highest value of 0.95 was recorded at Station G7.

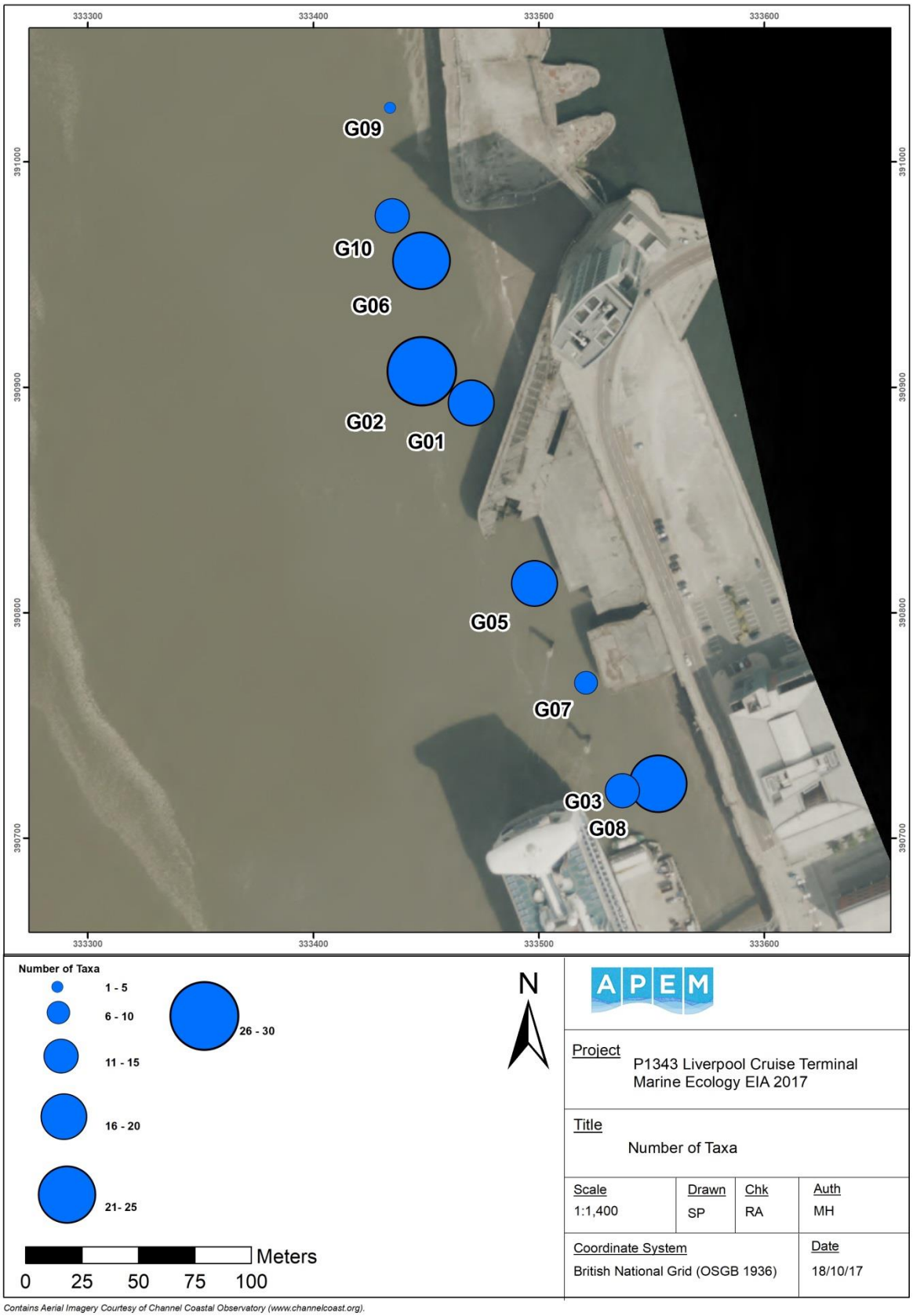

Figure 6: Number of taxa recorded at each station.

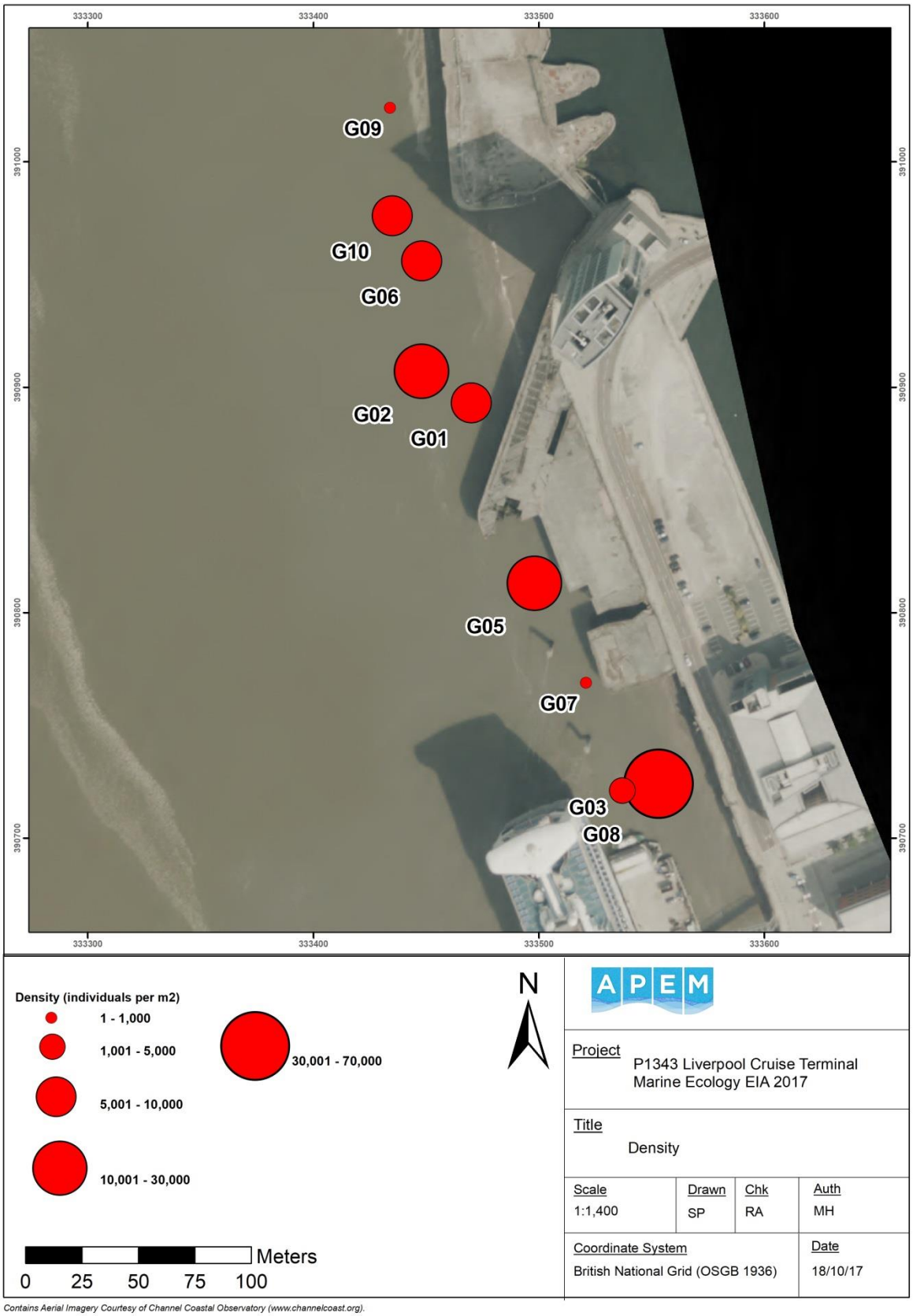

Figure 7: Density of fauna recorded at each station (individuals per m^2).

Table 2: Community summary statistics for each grab sample station.

Station	Total No. Taxa	Total No. Individuals per m^2*	Margalef's Species Richness (D)	Pielou's Evenness (J')	Shannon Wiener Diversity (H') loge	Simpson Diversity (1 λ')
G01	20	6,200	2.42	0.39	0.93	0.35
G02	30	29,100	4.23	0.67	2.17	0.83
G03	12	2,500	1.86	0.89	1.73	0.83
G05	18	11,400	2.11	0.54	1.29	0.58
G06	22	5,800	3.45	0.61	1.66	0.70
G07	8	700	2.57	0.98	1.75	0.95
G08	22	68,100	2.45	0.29	0.83	0.39
G09	5	600	1.12	0.92	1.01	0.73
G10	13	5,900	2.21	0.49	1.14	0.47

* This is based on the total number of countable species. Colonial species are included in the total number of taxa but cannot be counted.

3.1.2.2 Multivariate analysis of subtidal macrobenthic assemblages

Following Hierarchical Cluster Analysis using Bray-Curtis similarity, SIMPROF did not identify any distinct biological community groups indicating the benthic community was similar across all nine sampling stations (Figure 8). This is likely due to small number of numerically dominant taxa (*M. edulis*, *A. improvisus* and *Nephtys* juveniles) being present at the majority of the sites, whilst other taxa were recorded in low abundances at just one or two sites.

As a result of this SIMPER analysis could only be used to examine the taxa contributing to similarity across all of the samples rather than between different community groupings. The SIMPER results (Appendix 5) reinforce the results of the cluster analysis, with one species (*M. edulis*) contributing almost 40% of the similarity between samples and the average similarity between the samples for other taxa was very low.

3.1.2.3 Biotope assignment

Consequently, SIMPER could not be used to inform biotope allocation and the assignment of biotopes was carried out by examining the species composition of each grab sample individually. It was found that none of the samples had characterising species that fit described biotope types (Connor et al., 2007) and as such each station was assigned to the broad 'Sublittoral mixed sediment in variable salinity' biotope complex (SS.SMx.SMxVS; EUNIS Code A5.42). Mixed sediment habitats incorporate a broad range of sediment types that can include varying proportions of mud, sand and gravel and cross-referencing the PSA data with the biotic data indicated that the more gravelly samples did not have any obvious distinction from the muddy or sandy samples in terms of their taxon composition.

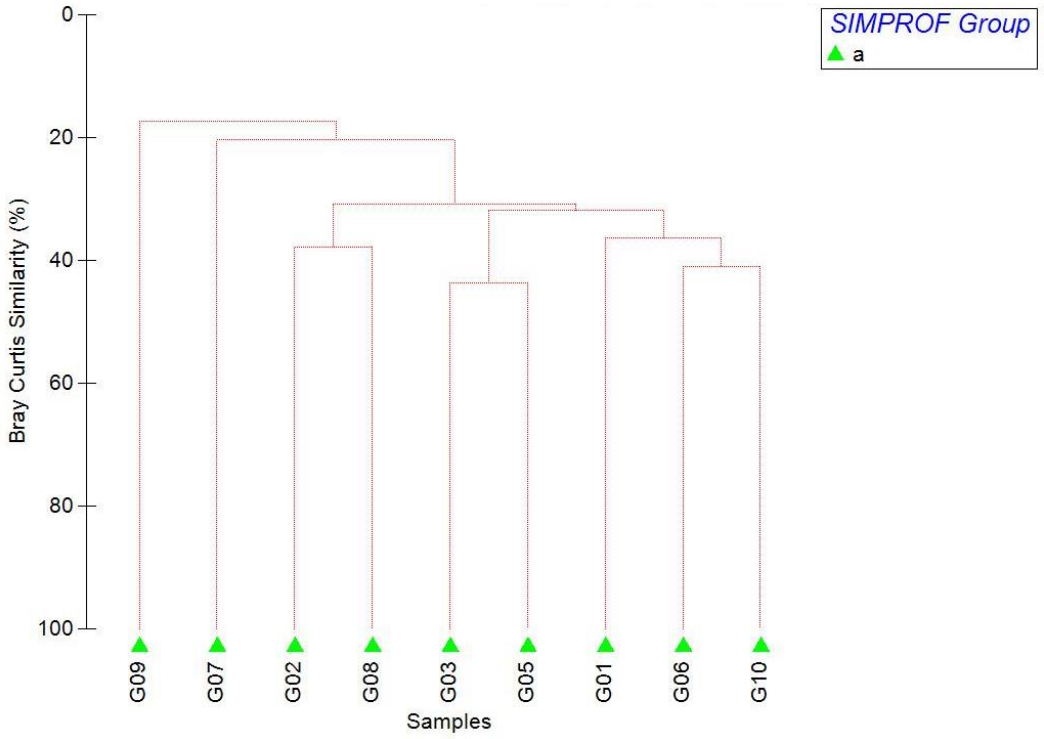

Figure 8: SIMPROF cluster dendrogram based on the Bray–Curtis dissimilarity index applied to square root transformed abundance data for each station.

3.1.3 Chemical Analysis

A comparison of chemical concentrations against Cefas Action Levels (MMO 2015), OSPAR standards (OSPAR Commission 2013) or Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (Canadian Council of Ministers of the Environment 2002) is provided in Appendix 6. Not all chemicals have guidelines indicating thresholds for potential biological effects and the results for other chemical analyses are provided in Appendix 7.

The cAL2 guideline concentrations were not exceeded at any of the stations. Overall, the station with the greatest exceedance of chemical concentration guidelines was Station G07 located near the south of the current jetty (Appendix 6). At station G07 there was an exceedance of guideline concentrations for 21 out of 39 tested chemicals.

The stations with the most instances of exceedance of guideline chemical concentrations (mainly for PAHs) were Stations G03, G05, G07 and G08 (all within the Development red line boundary). G01 immediately to the north of the red line boundary only exceeded concentrations for three PAHs, while at the remaining stations which were all outside the red line boundary (G02, G06, G09 and G10) there were no exceedances of chemical guideline concentrations for any chemicals.

3.2 Wall scrapes

Stations WS03, WS04 and WS05 were taken from a stone dock wall. Station WS06 was taken from the metal leg of a pontoon.

3.2.1 Macrobiota

A total of seven taxa were identified across all wall scrape stations. *Ulva* sp. was the most frequently recorded taxon, present at all four stations. Three of the taxa were algae and therefore not countable (*Ulva* spp., *Fucus spiralis* and *Porphyra* spp.). The invasive non-native barnacle *A. modestus* was the most abundant taxon with a total of 583 individuals recorded. Other taxa recorded were *Sessilia* spp. Chironomidae larvae and *Littorina saxatilis.* The raw data set is provided in Appendix 4.

Although it was not possible to get very close to the legs of the existing wooden jetty it was observed that they were encrusted with barnacles, expected to primarily be *A. modestus*, but no macroalgae was observed.

The number of taxa was similar at each station with 3-4 taxa recorded. Stations WS03 and WS04 had the lowest density of invertebrate individuals with one and two individuals per sample, respectively. Station WS06 had the highest density with 570 individuals recorded of which *A. modestus* constituted 433 individuals.

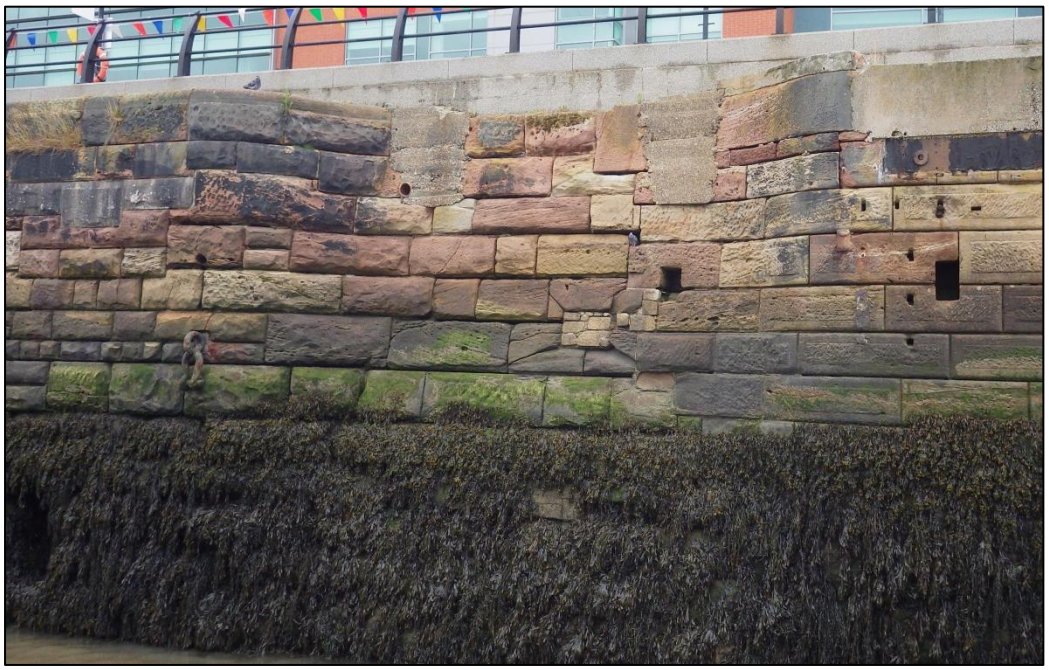

Figure 9: Dock wall at Stations WS03 and WS04. Indicating zone of light green *Ulva* spp. with dense canopy of *F. spiralis* below.

Figure 10: Metal pontoon leg at Station WS06 with encrusting *A. modestus*.

3.3 Notable macrobenthic taxa and non-native species

A single *Sabellaria alveolata* worm was found at grab station G08. This species can form dense reefs which are an Annex I protected habitat under the EC Habitats Directive (92/43/EEC), however, it is expected this individual would have reached the area via tidal movements and there are no areas of *Sabellaria* reef close to the Development site.

The acorn barnacle *A. improvisus* is considered by some sources to be a non-native species in Europe, introduced from east U.S.A. but conclusive evidence for this is lacking and historical records from Europe suggest that it could be native to Europe. Consequently, it can be considered to be cryptogenic (i.e. a species that is neither demonstrably native, nor introduced), (Carlton 1996).

The following non-native species were recorded:

- The Australasian barnacle *A. modestus* was found in three of the sediment grab samples and three of the wall scrape samples. This species was first reported in Britain in 1946.

- The American piddock *P. pholadiformis* was unintentionally introduced with the American oyster *Crassostrea virginica* by 1890. A single juvenile was recorded in one of the grab samples.

- Three specimens from this survey have been tentatively identified as the starlet sea anemone *Nematostella vectensis*. The starlet sea anemone is a non-native species that was introduced to the UK from the eastern U.S.A (Reitzel *et al*. 2008, Barfield

2016), however, it is protected under a range of legislation (see Summary section). Identification of anemones from preserved benthic samples is very difficult, since they contract, hiding most of the useful identification features, and lose colour patterns. The specimens from these samples, however, resembled in overall appearance confirmed specimens from our reference collection and they are considered to be this species. The records were made at two grab stations (two individuals at G02, and one at G10), both of which lie outside the red line boundary a short distance to the north of the Site.

For some taxa it was not possible to identify individuals to species level but they could potentially include non-native species e.g. *Streblospio*, *Sessilia*, *Jassa*, *Ensis* and *Amathia*.

4. Summary

4.1 Benthic grabs

The PSA results indicated that the subtidal sediments were quite heterogeneous overall with five different sediment classifications across the nine grab sampling stations. Sediments at the majority of sampling locations outside the Development red line boundary, however, were sandy in nature, and those within the red line boundary were generally muddy. Stations G01 just outside and adjacent to the red line boundary, and to a lesser extent G05 (adjacent to the existing jetty) differed from the other stations due to the high percentage of gravel in the samples.

A total of 69 taxa were identified across all benthic grab stations and *M. edulis* was the most frequently recorded taxon which was recorded at all nine stations. Density was generally low (<10,000 individuals m^{-2}) at benthic grab stations with the exception of Stations G02, G05 and G08 which were dominated by one or two taxa. Diversity and taxon richness were also generally low. All of the grab stations were assigned to the high level biotope A5.43 Sublittoral mixed sediment in variable salinity (estuaries) (SS.SMx.SMxVS) as there were no characterising species to assign a more specific biotope to any of the stations.

Walls scrapes samples and observations of man-made structures within the survey area indicated that the main encrusting species present was the non-native species *A. modestus*, with *Ulva* spp. and dense areas of macroalgae such as *F. spiralis* on the dock walls.

Non-native species recorded within samples were Australasian barnacle *A. modestus* American piddock *P. pholadiformis* and starlet sea anemone *N. vectensis*.

The presence of *N. vectensis* at two non-adjacent stations indicate that this species is likely more widespread in the Mersey Estuary with a potentially patchy distribution. *N. vectensis* has been previously recorded from the south-east of England and, to our knowledge, the records in this survey are the first from the north-west of England. Although the starlet sea anemone is a non-native species that was introduced to the UK from the eastern U.S.A (Reitzel *et al*. 2008, Barfield 2016) this species also remains classified as Vulnerable on the IUCN Red List, is protected under the Wildlife and Countryside Act, and is a Species of

Principal Importance in England under Section 41 list of the NERC Act. The protected status of the species, was based on the then known distribution of the species being limited to a small number of lagoons in the south-east of England, a potentially vulnerable habitat itself. This protected status and its occurrence on the IUCN Red List both pre-date the recognition of the species as a widespread and widely introduced species. Furthermore, the Red List assessment was conducted in 1996 and bares a caveat that the species requires reassessment. Due to the potentially conflicting non-native and protected classifications, there has been discussion about whether the protected status for the species in England should be reconsidered (Reitzel *et al*. 2008, Barfield 2016). Should the protection remain, it is understood that the primary aim of this protected status, in English populations at least, should be more to protect potentially vulnerable habitats (e.g. saline lagoons) in which it is a specialist rather than the species *per se* (Reitzel *et al*. 2008, Barfield 2016).

In general chemical concentrations within sediments were found to exceed guideline standards within the Development red line boundary, but not outside the boundary. Station G07 at which the greatest number of chemicals exceeded guideline concentrations, also had the second lowest taxon richness and density values across the survey. It is unclear how closely this is linked, however, as the lowest taxon richness and density values were recorded at Station G09 at which all chemicals were below guideline concentration standards.

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Appendix 1 Sampling station coordinates

Table 1.1: Benthic grab survey.

Station	Latitude	Longitude
G01	53.41064	-3.00232
G02	53.41076	-3.00266
G03	53.40910	-3.00128
G05	53.40992	-3.00188
G06	53.41120	-3.00267
G07	53.40952	-3.00153
G08	53.40913	-3.00104
G09	53.41181	-3.00290
G10	53.41137	-3.00287

Table 1.2: Wall scrape survey.

Station	Latitude	Longitude
WS03	53.40918	-3.00067
WS04	53.40920	-3.00059
WS05	53.41161	-3.00248
WS06	53.41059	-3.00214

Appendix 2 Suite of Contaminants for Sediment Analysis

Test	Method Reporting Limit, ppm unless stated otherwise
Moisture content	0.2%
Ti(6) expressed as TiO2	Detection Limits in brackets
Dry Matter	0.2%
Metals Suite: *As(0.5), Cd(0.04), Cr(0.5), Cu(0.5), Pb(0.5), Hg(0.015), Ni(0.5), Zn(2)*	Detection Limits in brackets (mg/kg)
PAHs: 2 to 6 ring aromatics and + 16 US EPA Suite	0.001
PCBs, ICES 7 Congeners (PCB: 28, 52, 101, 118, 138, 153, 180)	0.08µg/kg
Speciated organotin: DBT (5 µg/kg), TBT (2 µg/kg) ,MBT (2 µg/kg)	Detection Limits in brackets
CEFAS MMO PBDE Suite	0.001 - 0.1mg/kg
Diuron	0.1 mg/kg
Total Oil Content plus Saturates	0.001

Appendix 3 Particle size analysis data

Sample	Date collected	Visual description of sediment	Folk (1954) classification	Statistics calculated using Folk and Ward (1957) formulae							
				Mean		Sorting		Skewness		Kurtosis	
				(µm)	(description)	(µm)	(description)	(µm)	(description)	(µm)	(description)
G 01	2017	Sandy mud containing mussels	Muddy Sandy Gravel	1365.4	Very Coarse Sand	12.782	Very Poorly Sorted	-0.211	Fine Skewed	0.691	Platykurtic
G 02	2017	Sand with a little gravel	Slightly Gravelly Sand	277.4	Medium Sand	2.851	Poorly Sorted	0.471	Very Coarse Skewed	1.110	Leptokurtic
G 03	2017	Sandy mud, no gravel	Sandy Mud	15.3	Medium Silt	5.851	Very Poorly Sorted	0.005	Symmetrical	0.896	Platykurtic
G 05	2017	Muddy sand with some shells	Gravelly Muddy Sand	287.2	Medium Sand	32.680	Extremely Poorly Sorted	0.244	Coarse Skewed	1.289	Leptokurtic
G 06	2017	Clean sand, no gravel	Sand	131.7	Fine Sand	1.401	Well Sorted	-0.169	Fine Skewed	1.152	Leptokurtic
G 07	2017	Sandy mud, no gravel	Sandy Mud	17.1	Coarse Silt	5.972	Very Poorly Sorted	0.006	Symmetrical	0.883	Platykurtic
G 08	2017	Sandy mud, no gravel	Sandy Mud	14.7	Medium Silt	6.160	Very Poorly Sorted	0.013	Symmetrical	0.881	Platykurtic
G 09	2017	Clean sand, no gravel	Sand	131.7	Fine Sand	1.404	Well Sorted	-0.161	Fine Skewed	1.131	Leptokurtic
G 10	2017	Clean sand, no gravel	Sand	160.8	Fine Sand	1.554	Moderately Well Sorted	-0.007	Symmetrical	1.178	Leptokurtic

Sample	Primary Mode (µm)	d10 (µm)	d50 (µm)	d90 (µm)	Gravel (>2 mm) (%)	Sand (63-2000 µm) (%)	Mud (<63 µm) (%)	V Coarse Gravel (32-64 mm) (%)	Coarse Gravel (16-32 mm) (%)	Medium Gravel (8-16 mm) (%)	Fine Gravel (4-8 mm) (%)	V Fine Gravel (2-4 mm) (%)	V Coarse Sand (1-2 mm) (%)	Coarse Sand (500-1000 µm) (%)	Medium Sand (250-500 µm) (%)
G 01	19200.0	35.1	1532.5	19526.4	48.7	39.8	11.5	0.0	23.9	19.1	2.7	3.0	3.1	1.5	2.0
G 02	150.9	95.7	184.7	1422.6	2.0	93.8	4.2	0.0	0.0	0.0	0.2	1.8	14.7	6.9	9.5
G 03	106.7	1.3	13.0	123.0	0.0	25.9	74.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9
G 05	106.7	4.5	119.7	29960.3	23.8	46.7	29.5	8.3	13.7	0.8	0.6	0.5	0.4	1.4	2.7
G 06	150.9	89.2	135.9	199.5	0.0	95.8	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
G 07	106.7	1.6	14.8	143.5	0.0	29.1	70.9	0.0	0.0	0.0	0.0	0.0	0.0	0.9	2.7
G 08	106.7	1.2	12.3	128.0	0.0	26.3	73.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5
G 09	150.9	88.8	135.8	201.4	0.0	96.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
G 10	150.9	94.2	161.3	287.7	0.0	96.8	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.9	12.7

Sample	Fine Sand (125-250 µm) (%)	V Fine Sand (63-125 µm) (%)	V Coarse Silt (31-63 µm) (%)	Coarse Silt (16-31 µm) (%)	Medium Silt (8-16 µm) (%)	Fine Silt (4-8 µm) (%)	V Fine Silt (2-4 µm) (%)	Clay (<2 µm) (%)	Percentages of the distribution in each 'half-phi' size interval, expressed in µm							
									>63000	45000 to 63000	31500 to 45000	22400 to 31500	16000 to 22400	11200 to 16000	8000 to 11200	5600 to 8000
G 01	19.9	13.3	1.7	1.5	2.4	2.4	1.4	2.1	0.0	0.0	0.0	0.4	23.4	16.1	3.0	1.3
G 02	46.3	16.5	1.2	0.6	0.6	0.5	0.3	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
G 03	8.6	16.3	8.1	11.3	18.1	15.7	8.4	12.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
G 05	19.6	22.5	3.9	3.9	6.5	6.5	3.7	5.2	0.0	0.0	8.7	8.7	4.6	0.2	0.6	0.4
G 06	60.9	34.7	1.3	0.5	0.4	0.5	0.3	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
G 07	9.3	16.2	8.5	11.1	17.1	14.8	8.0	11.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
G 08	9.0	15.8	7.9	10.4	16.8	16.1	9.0	13.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
G 09	60.5	35.2	1.5	0.4	0.3	0.3	0.2	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
G 10	62.3	20.8	1.1	0.3	0.3	0.3	0.2	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Sample	Percentages of the distribution in each 'half-phi' size interval, expressed in µm															
	4000 to 5600	2800 to 4000	2000 to 2800	1400 to 2000	1000 to 1400	710 to 1000	500 to 710	355 to 500	250 to 355	180 to 250	125 to 180	90 to 125	63 to 90	44.19 to 63	31.25 to 44.19	22.097 to 31.25
G 01	1.4	1.4	1.6	1.7	1.4	0.8	0.7	0.9	1.0	6.1	13.8	10.2	3.1	1.0	0.7	0.7
G 02	0.2	0.7	1.1	8.3	6.3	3.9	3.0	3.5	6.0	19.3	26.9	13.8	2.7	0.7	0.4	0.3
G 03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.8	1.8	6.8	10.1	6.3	3.9	4.2	4.8
G 05	0.1	0.2	0.3	0.0	0.4	0.5	0.9	1.7	1.0	4.1	15.6	16.4	6.1	2.1	1.7	1.7
G 06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	15.1	45.8	29.7	4.9	1.0	0.4	0.3
G 07	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.7	1.0	2.1	7.2	10.0	6.2	4.1	4.4	4.7
G 08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.3	2.3	6.6	9.7	6.1	3.9	4.1	4.5
G 09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	15.6	44.9	29.7	5.5	1.1	0.4	0.2
G 10	0.0	0.0	0.0	0.0	0.0	0.0	0.9	3.7	9.0	27.0	35.3	17.3	3.6	0.8	0.3	0.2

Sample	Percentages of the distribution in each 'half-phi' size interval, expressed in µm															
	31.25 to 44.19	22.097 to 31.25	15.625 to 22.097	11.049 to 15.625	7.813 to 11.049	5.524 to 7.813	3.906 to 5.524	2.762 to 3.906	1.953 to 2.762	1.381 to 1.953	0.977 to 1.381	0.691 to 0.977	0.488 to 0.691	0.345 to 0.488	0.244 to 0.345	0.173 to 0.244
G 01	0.7	0.7	0.8	1.1	1.3	1.3	1.1	0.8	0.6	0.4	0.4	0.3	0.3	0.2	0.2	0.1
G 02	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1
G 03	4.2	4.8	6.5	8.7	9.3	8.6	7.0	5.0	3.4	2.4	2.0	1.7	1.6	1.5	1.3	0.9
G 05	1.7	1.7	2.2	3.0	3.5	3.5	3.0	2.2	1.5	1.1	0.9	0.7	0.6	0.6	0.5	0.4
G 06	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1
G 07	4.4	4.7	6.4	8.3	8.8	8.1	6.7	4.8	3.2	2.3	1.8	1.6	1.5	1.4	1.1	0.8
G 08	4.1	4.5	5.9	7.9	8.9	8.7	7.4	5.3	3.6	2.7	2.1	1.8	1.8	1.7	1.4	1.0
G 09	0.4	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.1
G 10	0.3	0.2	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1

Sample	Percentages of the distribution in each 'half-phi' size interval, expressed in µm				
	0.122 to 0.173	0.086 to 0.122	0.061 to 0.086	0.043 to 0.061	0.01 to 0.043
G 01	0.1	0.1	0.0	0.0	0.0
G 02	0.0	0.0	0.0	0.0	0.0
G 03	0.6	0.4	0.1	0.0	0.0
G 05	0.3	0.2	0.1	0.0	0.0
G 06	0.1	0.0	0.0	0.0	0.0
G 07	0.6	0.3	0.1	0.0	0.0
G 08	0.6	0.3	0.1	0.0	0.0
G 09	0.1	0.0	0.0	0.0	0.0
G 10	0.1	0.0	0.0	0.0	0.0

Appendix 4 Grab and wall scrape biotic data

	Sample Number		59182	59183	59184	59185	59186	59187	59188	59189	59190	59191	59192	59193	59194
	Sample Method		Day Grab	Day Grab	Day Grab	Day Grab	Day Grab	Day Grab	Day Grab	Day Grab	Day Grab	Wall Scrape	Wall Scrape	Wall Scrape	Wall Scrape
	Site Description		G01	G02	G03	G05	G06	G07	G08	G09	G10	WS03	WS04	WS05	WS06
Code	Taxa ID	Qualifier	59182	59183	59184	59185	59186	59187	59188	59189	59190	59191	59192	59193	59194
-	Animalia	eggs	-	-	-	P	-	-	-	-	-	-	-	-	-
D0158	Tubulariidae		-	-	-	P	-	-	-	-	-	-	-	-	-
D0348	Calycella syringa		P	-	-	-	-	-	-	-	-	-	-	-	-
D0424	Hydrallmania falcata		-	-	-	-	-	-	-	-	P	-	-	-	-
D0443	Thuiaria articulata		-	-	-	-	P	-	-	-	-	-	-	-	-
D0491	Campanulariidae		P	-	-	P	P	-	8	P	-	-	-	-	-
D0503	Clytia hemisphaerica		-	-	-	P	-	-	-	-	-	-	-	-	-
D0662	Actiniaria		-	13	2	3	-	-	1	-	-	-	-	-	-
D0761	Nematostella vectensis	?	-	2	-	-	-	-	-	-	1	-	-	-	-
F0002	Fecampia erythrocephala	eggs	-	-	-	P	-	-	-	-	-	-	-	-	-
G0001	Nemertea		-	-	-	-	2	-	-	-	-	-	-	-	-
HD0001	Nematoda		-	1	-	-	1	-	6	-	1	-	-	-	-
P0094	Pholoe inornata (sensu Petersen)		-	1	1	-	-	-	1	-	-	-	-	-	-
P0118	Eteone longa	aggregate	1	8	-	-	-	1	-	-	-	-	-	-	-
P0145	Phyllodoce mucosa		-	13	-	-	1	-	-	-	-	-	-	-	-
P0265	Glycera tridactyla		-	3	-	-	-	-	-	-	-	-	-	-	-
P0494	Nephtys	juvenile	-	11	6	-	28	2	7	-	2	-	-	-	-
P0496	Nephtys caeca		-	1	-	-	-	-	-	-	-	-	-	-	-

	Sample Number		59182	59183	59184	59185	59186	59187	59188	59189	59190	59191	59192	59193	59194
	Sample Method		Day Grab	Day Grab	Day Grab	Day Grab	Day Grab	Day Grab	Day Grab	Day Grab	Day Grab	Wall Scrape	Wall Scrape	Wall Scrape	Wall Scrape
	Site Description		G01	G02	G03	G05	G06	G07	G08	G09	G10	WS03	WS04	WS05	WS06
Code	Taxa ID	Qualifier	59182	59183	59184	59185	59186	59187	59188	59189	59190	59191	59192	59193	59194
P0499	Nephtys hombergii		-	-	1	1	-	1	1	-	-	-	-	-	-
P0502	Nephtys kersivalensis		-	-	-	-	-	-	1	-	-	-	-	-	-
P0722	Aonides oxycephala		-	1	-	-	-	-	-	-	-	-	-	-	-
P0723	Aonides paucibranchiata		-	1	-	-	-	-	-	-	-	-	-	-	-
P0752	Polydora ciliata	aggregate	-	1	-	-	-	-	-	-	-	-	-	-	-
P0753	Polydora cornuta		-	1	-	-	-	-	-	-	-	-	-	-	-
P0788	Spio armata		-	-	-	-	-	-	-	-	3	-	-	-	-
P0791	Spio martinensis		-	-	-	-	1	-	-	-	-	-	-	-	-
P0798	Streblospio		-	-	-	4	-	1	-	-	-	-	-	-	-
P0906	Capitella		2	1	-	-	-	-	-	-	2	-	-	-	-
P0919	Mediomastus fragilis		-	2	-	-	-	-	-	-	-	-	-	-	-
P1107	Lagis koreni		2	2	-	-	-	-	-	-	-	-	-	-	-
P1116	Sabellaria alveolata		-	-	-	-	-	-	1	-	-	-	-	-	-
P1195	Lanice conchilega		1	1	-	-	1	-	3	-	-	-	-	-	-
P1402	Oligochaeta	eggs	P	P	P	-	-	-	-	-	-	-	-	-	-
P1490	Tubificoides benedii		-	-	5	70	1	-	5	-	1	-	-	-	-
P1494	Tubificoides diazi	aggregate	1	3	-	2	-	1	10	-	-	-	-	-	-
P1501	Enchytraeidae		-	-	-	-	1	-	-	-	-	-	-	-	-
Q0054	Acari		1	-	-	-	1	-	-	-	-	-	-	-	-
R0015	Sessilia		-	-	-	-	-	-	-	-	-	-	-	17	68
R0015	Sessilia	juvenile	1	51	-	-	-	-	-	-	-	-	-	5	34

	Sample Number		59182	59183	59184	59185	59186	59187	59188	59189	59190	59191	59192	59193	59194
	Sample Method		Day Grab	Day Grab	Day Grab	Day Grab	Day Grab	Day Grab	Day Grab	Day Grab	Day Grab	Wall Scrape	Wall Scrape	Wall Scrape	Wall Scrape
	Site Description		G01	G02	G03	G05	G06	G07	G08	G09	G10	WS03	WS04	WS05	WS06
Code	Taxa ID	Qualifier	59182	59183	59184	59185	59186	59187	59188	59189	59190	59191	59192	59193	59194
R0068	Austrominius modestus		-	51	-	2	-	-	-	3	-	-	2	24	433
R0078	Amphibalanus improvisus		1	31	3	5	1	-	117	-	4	-	-	-	-
S0554	Photis pollex		-	-	-	-	-	-	3	-	-	-	-	-	-
S0568	Jassa		-	-	-	-	1	-	-	-	-	-	-	-	-
S0616	Corophium volutator		1	-	-	1	-	-	1	1	-	-	-	-	-
S0651	Pariambus typicus		-	-	-	-	-	-	1	-	-	-	-	-	-
S1385	Crangon crangon		-	-	-	-	-	-	-	-	1	-	-	-	-
S1594	Carcinus maenas	juvenile	-	-	-	1	-	-	1	-	-	-	-	-	-
T0003	Chironomidae	larva	-	-	-	-	-	-	-	-	-	1	-	-	-
T0003	Psychodidae	larva	-	1	-	-	-	-	-	-	-	-	-	-	-
W0305	Littorina saxatilis		-	-	-	-	-	-	-	-	-	-	-	-	35
W0385	Peringia ulvae		-	1	-	-	-	-	-	-	-	-	-	-	-
W1696	Mytilus edulis		-	12	1	-	-	-	-	-	-	-	-	-	-
W1696	Mytilus edulis	juvenile	50	75	6	24	16	1	521	2	43	-	-	-	-
W1906	Kurtiella bidentata		1	-	-	1	-	-	-	-	-	-	-	-	-
W1996	Ensis	juvenile	-	-	-	-	1	-	-	-	-	-	-	-	-
W2137	Petricolaria pholadiformis	juvenile	-	-	-	-	-	-	1	-	-	-	-	-	-
Y0008	Crisidia cornuta		-	-	-	-	P	P	-	-	-	-	-	-	-
Y0080	Alcyonidioides mytili		-	P	-	-	-	-	-	-	-	-	-	-	-
Y0086	Arachnidium		P	-	-	-	-	-	-	-	-	-	-	-	-
Y0122	Farrella repens		-	P	P	P	P	-	P	P	-	-	-	-	-

	Sample Number		59182	59183	59184	59185	59186	59187	59188	59189	59190	59191	59192	59193	59194
	Sample Method		Day Grab	Day Grab	Day Grab	Day Grab	Day Grab	Day Grab	Day Grab	Day Grab	Day Grab	Wall Scrape	Wall Scrape	Wall Scrape	Wall Scrape
	Site Description		G01	G02	G03	G05	G06	G07	G08	G09	G10	WS03	WS04	WS05	WS06
Code	Taxa ID	Qualifier	59182	59183	59184	59185	59186	59187	59188	59189	59190	59191	59192	59193	59194
Y0137	Amathia		P	-	-	-	-	-	-	-	-	-	-	-	-
Y0165	Eucratea loricata		P	-	P	-	P	P	P	-	-	-	-	-	-
Y0172	Conopeum reticulum		-	P	-	-	-	-	-	-	-	-	-	-	-
Y0176	Einhornia crustulenta		-	P	-	-	-	-	-	-	-	-	-	-	-
Y0177	Electra monostachys		P	-	-	-	-	-	-	-	-	-	-	-	-
Y0178	Electra pilosa		-	-	P	P	-	-	-	-	-	-	-	-	-
ZB0100	Asterias rubens		-	-	-	-	-	-	Frag.	-	-	-	-	-	-
ZB0165	Ophiuridae	juvenile	-	3	-	-	1	-	-	-	1	-	-	-	-
ZG0001	Actinopteri	eggs	-	-	-	-	1	-	-	-	-	-	-	-	-
ZM	Bryophyta		-	-	-	-	-	-	-	-	P	-	-	-	-
ZM0053	Porphyra		-	-	-	-	-	-	-	-	-	-	-	P	-
ZR	Folliculinidae		P	-	P	-	-	-	-	-	-	-	-	-	-
ZR0383	Fucus spiralis		-	-	-	-	-	-	-	-	-	P	P	-	-
ZS0174	Ulva		-	-	-	-	P	-	-	-	P	P	P	P	P
ZS0195	Cladophora		P	-	-	-	P	-	P	-	-	-	-	-	-

Appendix 5 SIMPER output

Table 5.1: Results of the SIMPER analysis indicating which taxa had the greatest contribution to the community. Average similarity for the community was 27.11.

Taxa	Average Abundance	Average Similarity	Similarity/ Standard Deviation	Percentage Contribution	Cumulative Percentage Contribution
Mytilus edulis	6.64	10.6	2.05	39.1	39.1
Amphibalanus improvisus	2.71	2.62	0.97	9.68	48.79
Nephtys juvenile	1.84	2.62	0.75	9.67	58.46
Farrella repens	0.67	1.42	0.69	5.23	63.69
Tubificoides benedii	1.65	1.23	0.55	4.53	68.22
Eucratea loricata	0.56	1.14	0.55	4.19	72.41
Campanulariidae	0.56	1.01	0.56	3.73	76.14
Tubificoides diazi aggregate	0.92	0.9	0.57	3.3	79.45
Nephtys hombergii	0.44	0.67	0.39	2.47	81.91
Corophium volutator	0.44	0.61	0.4	2.24	84.16
Actiniaria	0.86	0.52	0.4	1.9	86.06
Austrominius modestus	1.14	0.41	0.28	1.5	87.57
Nematoda	0.61	0.4	0.42	1.48	89.05
Lanice conchilega	0.53	0.38	0.42	1.41	90.46

Appendix 6 Thresholds for Sediment Contaminant Analysis

Table 6.1: Exceedance of thresholds for chemical in sediment. Cefas Action Levels are cAL1 and cAL2. If Cefas Guidelines are not available for a particular contaminant the OSPAR Guidelines have been used which are Effects Range Low (ERL) and Environmental Assessment Criteria (EAC). If neither guideline is available for a contaminant, the Canadian Guidelines have been used which are the interim sediment quality guidelines (ISQG) and probable effect level (PEL).

Sediment Chemical Threshold exceedance	Colour Coding
cAL1	
cAL2	
ERL/ EAC*	
ISQG	
PEL	

Sample							G01	G02	G03	G05	G06	G07	G08	G09	G10
Sediment depth (m)							8.3	16.8	13.9	15.1	13.7	14.2	9.8	8.1	8.3
	cAL1	cAL2	ERL/ EAC*	ISQG	PEL	Detection Limit									
Metals (mg/kg)															
Arsenic	20	100				0.5	3.9	4.2	5.9	5.2	4	9.5	7	4.1	4.6
Cadmium	0.4	5				0.04	0.17	0.13	0.32	0.26	0.19	0.65	0.39	0.21	0.13
Chromium	40	400				0.5	7.6	6.8	18.6	12.8	11.2	25.6	21.3	9.2	8
Copper	40	400				0.5	9.7	9.5	17.7	14.3	8.4	23.9	19.2	7.8	7.6
Lead	50	500				0.5	13.8	10.6	46.5	30	12	78	56.1	11.5	15.7
Mercury	0.3	3				0.015	0.16	0.11	0.57	0.35	0.12	1.14	0.71	0.1	0.1
Nickel	20	200				0.5	7.1	4.6	11.5	8.3	5.2	13.4	12.8	5.2	4.9
Zinc	130	800				2	50.2	47	94.5	82.4	50.5	136.6	108.7	48.5	43.4

Sample							G01	G02	G03	G05	G06	G07	G08	G09	G10
Sediment depth (m)							8.3	16.8	13.9	15.1	13.7	14.2	9.8	8.1	8.3
	cAL1	cAL2	ERL/ EAC*	ISQG	PEL	Detection Limit									
DBT (µg/kg)															
Dibutyltin	100	1,000				5	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
PAH (µg/kg)															
Naphthalene			160			0.001	16.4	5.7	76.5	67.0	2.1	94.0	66.6	2.4	1.1
Acenaphthylene				5.87	128	0.001	6.4	2.4	39.3	17.9	<1	60.2	42.6	<1	<1
Acenaphthene				6.71	88.9	0.001	15.1	1.9	31.4	47.1	<1	43.8	32.3	2.9	<1
Fluorene				21.2	144	0.001	14.9	2.6	43.4	45.3	<1	59.3	43.5	2.0	<1
Phenanthrene			240			0.001	104.3	16.6	183.7	291.6	3.3	269.9	177.6	15.2	1.7
Dibenzothiophene *			190			0.001	7.6	1.9	21.0	25.0	<1	28.9	20.7	1.2	<1
Anthracene			85			0.001	27.9	5.8	60.5	89.6	1.3	91.8	57.9	3.4	<1
Fluoranthene			600			0.001	165.0	30.8	289.5	429.0	4.0	492.5	250.9	21.7	3.3
Pyrene			665			0.001	160.1	32.5	301.9	410.2	5.1	524.9	264.2	20.7	3.9
Benzo[a]anthracene			261			0.001	78.4	19.0	171.1	224.7	2.0	276.1	144.4	9.3	1.9
Chrysene			384			0.001	95.9	22.4	216.5	268.7	3.1	328.2	193.1	10.7	2.6
Benzo[b]fluoranthene	100	NA				0.001	82.9	22.6	304.4	256.3	5.4	470.7	291.1	10.3	6.9
Benzo[a]pyrene	100	NA				0.001	96.8	25.4	273.1	274.8	4.8	448.2	256.3	10.4	6.6
Indeno[123,cd]pyrene	100	NA				0.001	74.3	19.0	257.2	203.0	6.1	395.1	244.1	8.6	8.2
Dibenzo[a,h]anthracene				6.22	135	0.001	13.1	4.0	43.7	38.9	<1	65.5	42.2	1.4	<1
Benzo[ghi]perylene	100	NA				0.001	73.0	18.8	252.9	211.6	5.5	394.9	254.0	7.6	6.4
PAH Fractions (µg/kg)															
Naphthalene			160			0.001	16.4	5.7	76.5	67.0	2.1	94.0	66.6	2.4	1.1
C1 Naphthalenes *			155			0.001	29.4	8.8	132.3	108.9	3.6	157.3	132.9	3.8	1.6
C2 Naphthalenes *			150			0.001	35.4	10.2	147.0	130.8	3.7	188.9	143.4	3.8	1.9
Phenanthrene / Anthracene															
C1 178 *			170			0.001	80.9	15.7	174.0	212.5	4.3	240.2	160.3	9.1	1.9
C2 178 *			200			0.001	60.1	17.6	168.4	183.8	3.8	224.8	157.0	7.1	2.2
Dibenzothiophene *			190			0.001	7.6	1.9	21.0	25.0	<1	28.9	20.7	1.2	<1

Sample							G01	G02	G03	G05	G06	G07	G08	G09	G10
Sediment depth (m)							8.3	16.8	13.9	15.1	13.7	14.2	9.8	8.1	8.3
	cAL1	cAL2	ERL/ EAC*	ISQG	PEL	Detection Limit									
C1 Dibenzothiophenes *			85			0.001	10.8	2.8	34.3	31.1	<1	48.0	33.1	1.4	<1
PCBs (µg/kg)															
PCB28			1.7			0.08	0.2	<0.08	1.0	0.6	<0.08	1.7	0.7	<0.08	<0.08
PCB52			2.7			0.08	0.1	<0.08	0.5	0.3	<0.08	0.9	0.4	<0.08	<0.08
PCB101			3			0.08	0.1	<0.08	0.6	0.3	<0.08	1.0	0.5	<0.08	<0.08
PCB118			0.6			0.08	<0.08	<0.08	0.6	0.4	<0.08	0.9	0.3	<0.08	<0.08
PCB153			40			0.08	0.1	<0.08	<0.08	<0.08	<0.08	1.1	0.5	<0.08	<0.08
PCB138			7.9			0.08	<0.08	<0.08	1.0	0.2	<0.08	1.4	0.5	<0.08	<0.08
PCB180			12			0.08	<0.08	<0.08	0.3	0.1	<0.08	0.6	0.2	<0.08	<0.08

* Effects Range Low (ERL) apply to all contaminants listed below except for the PCBs which have Environmental Assessment Criteria (EAC).

Appendix 7 Additional Sediment Contaminant Analysis results

Analysis results additional to those provided in Appendix 6 are provided here.

Sample		G01	G02	G03	G05	G06	G07	G08	G09	G10
Sediment depth (m)		8.3	16.8	13.9	15.1	13.7	14.2	9.8	8.1	8.3
	Detection Limit									
mg/kg										
Titanium	6	67.5	86.9	175	141	210	180	169	236	213
Diuron	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PBDEs	NA	Results provided below								
µg/kg										
Tributyl tin	2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Monobutyl tin	2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Other										
Total moisture @105C (%)		24.4	24.3	50.7	35.2	23	45.3	51	22.3	20.5
Dry matter (%)		75.6	75.7	49.3	64.8	77	54.7	49	77.7	79.5

n-Alkanes & total oil (ng/g):

Sample ID : / Station :	QC Blank	Reference Material (% Recovery)	G01	G02	G03	G05	G06	G07	G08	G09	G10
Alkane											
nC10	<1	106.9	<1	<1	<1	34.2	<1	<1	<1	<1	<1
nC11	<1	<0.08	<1	1.2	<1	<1	<1	<1	<1	<1	<1
nC12	<1	107.5	<1	<1	<1	<1	<1	<1	<1	<1	<1
nC13	<1	<0.08	1.3	<1	6.8	6.5	<1	12.6	7.1	<1	<1
nC14	<1	85.3	9.2	<1	29.1	36.7	<1	44.1	33.7	<1	<1
nC15	<1	<0.08	38.8	4.9	99.1	128.1	<1	139.8	81.5	<1	<1
nC16	<1	83.7	18.8	5.2	61.4	63.0	2.4	69.1	60.0	1.3	1.5
nC17	<1	<0.08	69.4	28.4	232.8	230.4	10.1	336.2	236.1	7.3	5.9
pristane	<1	<0.08	34.5	18.2	156.5	125.9	5.7	237.9	165.2	5.2	3.6
nC18	<1	94.0	16.9	8.6	81.8	47.0	3.3	83.2	86.3	3.2	2.1
phytane	<1	<0.08	93.2	15.8	178.1	264.3	4.6	245.2	228.0	15.2	1.8
nC19	<1	<0.08	15.2	13.0	86.6	83.5	4.3	92.5	78.8	2.8	1.9
nC20	<1	104.1	34.0	12.8	81.8	98.3	3.0	155.6	96.1	4.3	1.3
nC21	<1	<0.08	<1	11.6	4.8	14.7	3.6	14.7	172.7	8.1	1.7
nC22	<1	101.7	14.8	6.3	68.9	63.2	2.0	76.1	89.4	2.6	1.6
nC23	<1	<0.08	31.4	9.4	154.7	113.1	2.0	167.1	146.4	2.3	<1
nC24	<1	102.7	14.0	7.9	84.3	70.3	2.9	107.8	84.8	2.6	2.1
nC25	<1	<0.08	35.9	11.7	224.0	185.4	5.3	232.1	224.5	3.7	3.0
nC26	<1	113.6	24.0	11.6	123.8	86.2	3.6	209.6	165.8	2.9	2.3
nC27	<1	<0.08	59.7	27.6	446.1	273.6	7.9	474.0	466.9	7.0	5.8
nC28	<1	102.7	20.7	6.3	149.8	108.2	3.1	249.6	173.9	4.3	1.7
nC29	<1	<0.08	106.6	31.9	770.6	530.9	15.0	876.2	844.0	17.5	10.9
nC30	<1	109.3	51.8	13.4	287.2	196.8	8.0	336.8	290.7	5.1	6.9
nC31	<1	<0.08	123.7	25.5	836.1	538.7	17.7	947.1	941.9	18.3	14.4
nC32	<1	108.9	15.0	5.3	132.0	92.4	1.5	153.0	85.0	3.2	1.6
nC33	<1	<0.08	91.3	13.1	564.3	330.8	7.4	593.0	420.0	7.4	5.6
nC34	<1	107.9	11.3	<1	32.0	45.3	1.3	194.6	153.7	1.0	1.1
nC35	<1	<0.08	13.3	1.1	45.2	67.7	1.0	97.1	82.8	1.5	1.5
nC36	<1	120.1	2.1	<1	47.5	51.9	<1	41.1	38.8	<1	<1
nC37	<1	<0.08	1.5	<1	34.1	44.5	1.0	25.3	71.3	<1	<1
Total Oil (ug/kg)	56.7	0.0	40,732.2	13,588.1	230,980.4	151,766.1	8,987.3	306,844.3	271,469.7	8,183.0	5,769.0
Total n alkanes (ng/g)	0	1,448	821	257	4,685	3,542	106	5,728	5,132	106	73
Carbon Preference Index	#DIV/0!	0.00	2.53	2.32	2.97	2.56	2.42	2.33	2.78	2.49	2.27
Pristane	<1	<0.08	34	18	157	126	6	238	165	5	4
Phytane	<1	<0.08	93	16	178	264	5	245	228	15	2
Pristane / phytane ratio			0.4	1.1	0.9	0.5	1.3	1.0	0.7	0.3	2.0

PBDEs:

					Customer Sample No	S1771885	S1771886	S1771887	S1771888	S1771889	S1771890	S1771891	S1771892	S1771893
					Customer Sample ID	G01	G02	G03	G05	G06	G07	G08	G09	G10
					Sample No	338461	338462	338463	338464	338465	338466	338467	338468	338469
					Sample Type	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
					Sample Depth (m)	8.30m	16.80m	13.90m	15.10m	13.70m	14.20m	9.80m	8.10m	8.30m
					Sampling Date	27/06/2017	27/06/2017	27/06/2017	27/06/2017	27/06/2017	27/06/2017	27/06/2017	27/06/2017	27/06/2017
Determinand	CAS No	Codes	SOP	Units	RL									
2,2',4,4',6-pentabromodiphenyl ether (BDE-100)	189084-64-8	N	in house	ug/kg	0.1	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100
2,2',3,4,4',5'-hexabromodiphenyl ether (BDE-138)	182677-30-1	N	in house	ug/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2,2',4,4',5,5'-hexabromodiphenyl ether (BDE-153)	68631-49-2	N	in house	ug/kg	0.001	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	0.100	< 0.100	< 0.100	< 0.100
2,2',4,4',5,6'-hexabromodiphenyl ether (BDE-154)	207122-15-4	N	in house	ug/kg	0.001	< 0.100	< 0.100	0.100	< 0.100	< 0.100	< 0.100	0.100	< 0.100	< 0.100
2,2',4-tribromodiphenyl ether (BDE-17)	147217-75-2	N	in house	ug/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2,2',3,4,4',5',6-heptabromodiphenyl ether (BDE-183	207122-16-5	N	in house	ug/kg	0.001	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	0.200	0.100	< 0.100	< 0.100
decabromodiphenylether (BDE-209)	1163-19-5	N	in house	ug/kg	0.001	22.00	2.800	131.0	65.00	1.600	126.0	121.0	0.500	8.300
2,4,4'-tribromodiphenyl ether (BDE-28)	41318-75-6	N	in house	ug/kg	0.001	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100
2,2',4,4'-tetrabromodiphenyl ether (BDE-47)	5436-43-1	N	in house	ug/kg	0.001	< 0.100	< 0.100	0.200	< 0.100	< 0.100	0.200	0.200	< 0.100	< 0.100
2,3',4,4'-tetrabromodiphenyl ether (BDE-66)	187084-61-5	N	in house	ug/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2,2',3,4,4'-pentabromodiphenyl ether (BDE-85)	182346-21-0	N	in house	ug/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2,2',4,4',5-pentabromodiphenyl ether (BDE-99)	60348-60-9	N	in house	ug/kg	0.001	< 0.100	< 0.100	0.100	< 0.100	< 0.100	< 0.100	0.200	< 0.100	< 0.100
dibutyltin (DBT)	1002-53-5	U	395	ug/kg as cation	5	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
diuron	330-54-1	N	in house	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
monobutyltin (MBT)	78763-54-9	N	395	ug/kg as cation	2	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
tributyltin (TBT)	56573-85-4	U	395	ug/kg as cation	2	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00

Appendix 13.2a: Ornithology Desk Study & EIA Screening

Celebrating 30 years in environmental consultancy

Ornithology Desk Study & EIA Screening for

New Cruise Terminal – Princes Jetty, Liverpool

Waterman Infrastructure & Environment Ltd

APEM Ref: P00001343

September 2017

Sean Sweeney & Dr Roger Buisson

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Revision and Amendment Register

Version Number	Date	Section(s)	Page(s)	Summary of Changes	Approved by
1.0	10/07/17	All	All	Creation of draft from source information	RB
1.1	21/07/17	All	All	Reviewed first draft	RB
1.2	27/07/2017	All	All	Final amends prior to client issue	SS
2.0	19/09/2017	All	All	Revised Final issue post Scoping Opinion responses	SS / RB

Contents

List of Tables

1. Introduction

1.1 The proposed development

The proposed development (the Project) is of a permanent Cruise Terminal Facility at the former Princes Jetty, off Princes Parade, Liverpool. It includes a new terminal building built on reclaimed land within the River Mersey and a vehicle link (bridge) to connect to Princes Parade.

1.2 The proposed development as a potential source of adverse effects on birds

A number of potential sources of adverse effects on birds arising from the proposed development have been identified for the screening process. These are separated in to the two key phases of construction and operation. Birds can be adversely affected by such potential sources either directly or indirectly through the food chain. Both types of effects are identified below.

1.2.1 Construction

The potential indirect effects:

- Displacement / disruption / removal / smothering of species that are prey (food) items for birds and / or the habitats supporting such prey species. Such effects can arise from a number of activities involved in the construction process including the placing of materials, excavation, piling, changes to water quality etc.

The potential direct effects:

- Displacement of birds from feeding, roosting or nesting locations due to loss of land and / or water under the footprint of the construction works.
- Displacement of birds from feeding, roosting or nesting locations due to noise and / or vibration. Such effects can arise from a number of activities involved in the construction process including vehicle movements, piling etc.
- Displacement of birds from feeding, roosting or nesting locations due to the presence of human activity i.e. visual disturbance. Such effects can arise from a number of activities involved in the construction process including lighting, vessel movements, vehicle activity and the presence of people outside of vehicles.
- Death or injury to birds thorough contamination with chemical substances i.e. pollution. Such effects can include spills or leaks of fuel, oil and chemicals and / or the reworking and translocation of previously contaminated sediments into the water environment.

1.2.2 Operation

The potential indirect effects:

- Loss of species that are prey (food) items for birds and / or the habitats supporting such prey species. Such effects can result from the loss of land and / or water under the footprint of the development or in a buffer around it.

The potential direct effects:

- Displacement of birds from feeding, roosting or nesting locations due to loss of land and / or water under the footprint of the development.
- Displacement of birds from feeding, roosting or nesting locations due to noise and / or vibration. Such effects can arise from a number of activities involved in the operation of the built development including vehicle movements.
- Displacement of birds from feeding, roosting or nesting locations due to the presence of human activity i.e. visual disturbance. Such effects can arise from a number of activities involved in the operation of the built development including lighting, vessel movements, vehicle activity and the presence of people outside of vehicles.
- Death or injury to birds thorough contamination with chemical substances i.e. pollution. Such effects can include spills or leaks of fuel, oil and chemicals.

1.3 The aim of this report

The aim of this report is to provide a number of specific sets of information relating to birds, to the habitats that they depend on, and to the screening process that overall will inform the Environmental Impact Assessment (EIA) for the proposed development. This report will also carry out the screening required for the EIA.

Accordingly this report contains the following:

- A review of legislation and policy relevant to a proposed development on the Liverpool waterfront and ornithology receptors.
- A desk based data review of bird populations and protected sites with bird interest features.
- A summary of the key findings of the desk based data review.
- Application of the information gathered in to an EIA Screening Matrix.

2. Relevant legislation and policy

2.1 Legislation

2.1.1 International Legislation

The Ramsar Convention of Wetlands of International Importance 1971

The Ramsar Convention on Wetlands of International Importance provides the framework for national action and international co-operation for the conservation and wise use of wetlands and their resources. Suitable wetlands are identified for inclusion in the List of Wetlands of International Importance (referred to as Ramsar sites in this report). Criteria for the identification of a Ramsar site relevant to birds includes that the site regularly supports 20,000 or more waterbirds or if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.

The designation, protection and management of Ramsar sites in the UK is underpinned by the notification of sites as SSSIs (see below). Many Ramsar sites are also Special Protection Areas (SPAs) classified under the Birds Directive (see below).

2.1.2 European Legislation

European Commission (EC) Directive on the Conservation of Wild Birds (2009/147 EC)

The EC Directive on the Conservation of Wild Birds (referred to as the Birds Directive in this report) provides a framework for the conservation and management of wild birds in EU member states. The most relevant provisions of the Directive are the identification and classification of Special Protection Areas (SPAs) for rare or vulnerable species listed in Annex I of the Directive and for all regularly occurring migratory species (required by Article 4). The Directive requires national Governments to establish SPAs and to have in place mechanisms to protect and manage them. The SPA protection procedures originally set out in Article 4 of the Birds Directive have been replaced by the Article 6 provisions of the Habitats Directive (see below). The Birds Directive also establishes a general scheme of protection for all wild birds (required by Article 5).

In England and Wales the Birds Directive is implemented primarily through the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2010 (see below). The intertidal and subtidal parts of SPAs are included within the definition of a European Marine Site (EMS).

EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC)

The EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (referred to as the Habitats Directive in this report) provides a framework for the conservation and management of natural habitats, wild fauna (except birds) and flora in EU member states. The provisions of the Directive relevant to birds are the procedures for the protection of Special Areas of Conservation (SACs) and SPAs (Article 6). The procedures require an appropriate assessment of any plan or project likely to affect a SAC or SPA and to not approve any plan

or project that would have an adverse effect on a SAC or SPA except under very tightly constrained conditions.

In England and Wales the Habitats Directive is implemented primarily through the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2010 (see below).

2.1.3 UK Legislation

The Wildlife and Countryside Act 1981

The Wildlife and Countryside Act 1981 (as amended) is the principal mechanism for the legislative protection of wildlife in Great Britain. It provides protection for all wild birds with the few exceptions being provided by a licencing system. The act establishes the system of site protection for species and habitats through the notification of a suite of Site of Special Scientific Interest (SSSI). The SSSI designation underpins the protection provided for SPAs, SACs and Ramsar Sites on land and down to medium low water springs (MLWS).

Natural Environment and Rural Communities (NERC) Act 2006

This Act imposes a duty on public bodies to conserve biodiversity, including a requirement to compile a list of habitats and species of principal importance for the purpose of conserving biodiversity. It also requires the Secretary of State to publish a list of living organisms and habitat types that are considered to be of principal importance in conserving biodiversity (the Section 41 list).

The Conservation of Habitats and Species Regulations (2010)

The Conservation of Habitats and Species Regulations 2010 (referred to as the Habitats Regulations in this report) consolidate and update the Conservation (Natural Habitats, &c.) Regulations 1994. The Habitats Regulations transpose the Birds Directive and the Habitats Directive into national law in the terrestrial, coastal and inshore (out to 12 nm) environment, operating in conjunction with the Wildlife and Countryside Act 1981. The Habitats Regulations place an obligation on 'competent authorities' to carry out an appropriate assessment of any proposal likely to affect a SAC or SPA, to seek advice from Natural England and / or JNCC, and not to approve an application that would have an adverse effect on a SAC or SPA except under very tightly constrained conditions that involve decisions by the Secretary of State.

2.2 Policy

2.2.1 National policy

National Planning Policy Framework (NPPF)

The NPPF sets out the Government's planning policies for England and how these are expected to be applied. The document establishes a number of core land-use planning principles that should underpin both plan-making and decision-taking, including contributing to conserving and enhancing the natural environment. Paragraph 109 states that the planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity where possible and

contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures. Paragraph 118 identifies that potential SPAs (pSPA) and listed and proposed Ramsar sites are given the same protection as is provided in statute and policy for classified SPAs.

Biodiversity 2020: A strategy for England's wildlife and ecosystem services

Biodiversity 2020 sets out the strategic direction for biodiversity policy in England for the next decade on land and at sea. Its mission is "*to halt overall biodiversity loss, support healthy well-functioning ecosystems and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people*." In the marine environment it seeks to establish a well managed, ecologically coherent network of Marine Protected Areas.

2.2.2 Local Policy

In addition to the national framework, there are pertinent local planning policies relating to the protection and enhancement of biodiversity.

The Liverpool Unitary Development Plan (UDP)

The Liverpool UDP was adopted in 2002 and it contains saved policies until the time that the Liverpool Local Plan is adopted. The specific policies toward wildlife and habitats in general and protected sites in particular are in Policy *OE5 Protection of Nature Conservation Sites and Features* and include policies relation to SPAs, Ramsar sites and SSSIs (OE5-1.i) and Sites of Nature Conservation Value (OE5-1.ii).

The Liverpool Local Plan

The Draft Liverpool Local Plan (consultation copy September 2016) has specific policies toward wildlife and habitats in general and protected sites in particular within Section 12 Green Infrastructure. Policy *GI 5 – Protection of Biodiversity and Geodiversity* includes policies relating to international sites (GI 5.1) and national sites and local sites (GI 5.2). There are also policies that relate to the location of mitigation measures (GI 5.3), reasons why planning permission will be refused (GI 5.4) and assessment of development proposals (GI 5.5). Once adopted these policies will replace those in the Liverpool UDP.

3. Desk based data review

3.1 Sources of information

A number of sources of information are used within this document to define the current baseline ornithology within, and surrounding the vicinity of, the Project, including site-specific survey reports and a desk based literature review, as outlined below. Information was sourced relating to a Study Area that extended 5 km from the proposed development.

3.1.1 Site specific surveys

A programme of surveys was commissioned by Merseyside Environmental Advisory Service in August 2013 to carry out non-breeding bird surveys of the active and inactive dock systems in Liverpool and Birkenhead to aid in updating the Environmental Baseline for the suite of Natura 2000 sites that are found in the Liverpool region. These surveys were undertaken by TEP and reported on in 2015 (TEP, 2015).

The project has been carried out to fill crucial gaps in knowledge regarding use of the dock systems as supporting habitat by birds that are qualifying features in their own right, and / or as part of the waterbird assemblage for nearby Natura 2000 sites. These sites include the Mersey Narrows and North Wirral Foreshore SPA and Ramsar, the Mersey Estuary SPA and Ramsar and the Dee Estuary SPA and Ramsar sites.

The project was undertaken to compile and assess data in order to provide knowledge on the use of the dock systems for supporting habitat by birds that are qualifying features in their own right, and / or as part of the waterbird assemblage for nearby Natura 2000 sites. These sites include the Mersey Narrows and North Wirral Foreshore SPA and Ramsar, the Mersey Estuary SPA and Ramsar and the Dee Estuary SPA and Ramsar sites.

The methods deployed to gather bird data were through a combination of transect routes and point counts to record all birds on the docks and flying over the docks. A count of all docks was undertaken at both high and low tide each month. Six one hour long vantage point surveys were also undertaken at both high tide and low tide to record any bird movements.

3.1.2 Desk study

An initial desk study was carried out to collate available bird data for species of conservation interest and on the habitats and protected sites on which they depend. Data was sourced and/or requested from, and / or provided by, the following organisations / individuals:

- Wetland Bird Survey (WeBS) data from the British Trust for Ornithology (BTO);
- Lancashire and Cheshire Fauna Society (LCFS);
- Cheshire and Wirral Ornithological Society (CAWOS); and
- The County Bird Recorder for Lancashire & North Merseyside.

Published and ‘grey’ literature and online resources were searched for information on bird species of conservation interest and on the habitats and protected sites on which they depend. Of particular relevance are the following publications:

- Assessment of Supporting Habitat (Docks) for Use by Qualifying Features of Natura 2000 Sites in the Liverpool City Region Ornithology Report (TEP, 2015)
- Arup RIBA Stage 2 Environmental Advisory Note (Ove Arup & Partners Ltd, 2016)

The Defra website 'MAGIC' (http://magic.defra.gov.uk) was used to identify the location of sites protected by statute and a specific part of the Natural England website (https://designatedsites.naturalengland.org.uk/) used to identify the interest features of protected sites.

The evidence underpinning the Draft Liverpool Local Plan (http://liverpool.gov.uk/council/strategies-plans-and-policies/environment-and-planning/plan-making-in-liverpool/evidence-monitoring-and-information/evidence-and-information/) was examined for information on sites of local nature conservation value.

A search was also carried out of published information and internet sources for relevant ornithological records, for example The State of Lancashire's Birds 2007-11 (White *et al*., 2013) which scrutinised all data from the BTO surveys undertaken for the National Atlas which holds records of species found at resolutions including 10km grid squares down to six-figure point records for some species / groups. White *et al*. (2013) undertook additional surveys to gather data at a finer scale in order to produce a more relevant dataset focussing on the County level.

Information was also reviewed from Environmental Statements of other development proposals in the vicinity of the Liverpool Dock and Mersey Estuary:

The results of the desk study are provided below, separated in to information related to sites that are designated on the basis of bird interest features and information related to individual species of birds.

3.2 Protected sites with bird interest features

The sites of nature conservation interest with bird interest features (whether protected by statute or in local policies) that have been identified in the desk study are described below, classified by their conservation status. Sites that are of international and national nature conservation value have been identified out to a radius of 5 km from the proposed development. Sites that are of local nature conservation value have been identified out to a radius of 1 km from the proposed development. The sites identified through this screening process are presented in Figure 1 except for the Liverpool Bay proposed SPA extension (the boundaries for this extension are not yet confirmed but a copy of the map published for consultation is provided in Appendix 1).

The sites, their nature conservation value the bird interest features and the distance to the proposed development are summarised in Table 1.

Since this desk study is focused on birds as site interest features, sites such as Special Area of Conservation (SAC) are not included in the list below or in Table 1 as their interest features are non-bird species and habitats. The scientific names of the birds considered in this assessment are in Appendix 2.

3.2.1 International and European sites

Mersey Narrows & North Wirral Foreshore Ramsar site is 2,079 ha in extent and within 1 km of the proposed development. It is a marine / coastal wetland with a mixture of intertidal sands / mudflats and saltmarsh as well as manmade coastal brackish / saline lagoons, coastal freshwater lagoons and intertidal marshes. Its bird interest features are non-breeding little gull, common tern, knot and bar-tailed godwit, which occur at levels of European importance. In addition the site regularly supports 20,000 or more waterbirds, including cormorant, oystercatcher, grey plover, sanderling, dunlin and redshank at nationally important levels during the non-breeding season.

Mersey Estuary Ramsar site is 5,023 ha in extent and 3.3 km from the proposed development. It is a marine / coastal wetland with large areas of saltmarsh and extensive intertidal sands / mudflats. Its bird interest features are shelduck and redshank during spring and autumn migration periods, teal, pintail and dunlin during the non-breeding season, which occur at levels of international importance. In addition the site regularly supports nationally important numbers of ringed plover, curlew, spotted redshank and greenshank during the spring / autumn migration and wigeon during the non-breeding (winter) season.

Liverpool Bay SPA is 170,291 ha in extent and 4.6 km from the proposed development. It is a marine site best described as a sea inlet spanning the coastline from the north west of England and north Wales out into the Irish Sea. Its bird interest features are red-throated diver and common scoter during the non-breeding season. It is also recognised for its internationally important assemblage of birds, which are made up mostly of the same two species, red-throated diver and common scoter.

Liverpool Bay proposed SPA extension is 82,481 ha in extent (the large majority being further in to the Irish Sea) and one part of it that is proposed as an extension for feeding terns is adjacent to the proposed development. It is primarily marine waters of the Irish Sea but that part proposed as an extension for feeding terns is of coastal waters in the Mersey Estuary and intertidal waters in the Dee Estuary. Its bird interest features, in addition to those for the classified SPA, are little gull, common tern and little tern with red-breasted merganser and cormorant added to the waterbird assemblage main components.

Mersey Narrows & North Wirral Foreshore SPA is 2,079 ha in extent and within 1 km of the proposed development. It is a marine / coastal wetland with a mixture of intertidal sands / mudflats and saltmarsh as well as manmade coastal brackish / saline lagoons, coastal freshwater lagoons and intertidal marshes. Its bird interest features are redshank and turnstone during the non-breeding season (winter). It is also recognised as a wetland of international importance due to regularly supporting at least 20,000 waterfowl, including dunlin, knot, grey plover, oystercatcher, cormorant, turnstone and redshank.

Mersey Estuary SPA is 5,023 ha in extent and 3.3 km from the proposed development. It is a marine / coastal wetland with large areas of saltmarsh and extensive intertidal sands / mudflats. Its bird interest features golden plover, dunlin, pintail, redshank, shelduck during the non-breeding (winter) season and redshank and ringed plover during passage periods (spring / autumn seasons). It is also recognised as a wetland of international importance, by regularly supporting at least 20,000 waterfowl, including curlew, black-tailed godwit, lapwing, grey plover, wigeon, great crested grebe, redshank, dunlin, pintail, teal, shelduck and golden plover.

3.2.2 National sites

Mersey Estuary SSSI is 6,715 ha in extent and 4.3 km from the proposed development. It is a large area of intertidal sand and mudflats, reclaimed marshland, sea-marshes, brackish marshes and boulder clay cliffs. Its bird interest features are pintail, shelduck, wigeon, teal, dunlin, curlew, redshank and golden plover.

Mersey Narrows SSSI is 116 ha in extent and within 1 km of the proposed development. It is notified for its large areas of intertidal sand and mudflats. Its bird interest features are internationally important non-breeding populations of turnstone and redshank and nationally important non-breeding population of cormorant. It also supports, but not as notified features, regionally important breeding populations of ringed plover and common tern, migratory (non-breeding) populations of the latter species and little gull and non-breeding populations of teal, ringed plover, oystercatcher, dunlin and curlew.

New Ferry SSSI is 73 ha in extent and 3.3 km from the proposed development. It is notified for its large areas of intertidal sand, mudflats and other habitats. Its bird interest features are nationally important numbers of wintering pintail and black-tailed godwit. The site also supports, but not as notified features, other species of note, including shelduck, ringed plover, knot, dunlin and turnstone.

North Wirral Foreshore SSSI is 1,962 ha in extent and 4.2 km from the proposed development. It is located between the Dee and Mersey Estuaries and is an area of intertidal sand and mudflats with embryonic saltmarsh. Its bird interest features are wintering populations of knot, bar-tailed godwit, turnstone and dunlin. The site also supports, but not as notified features, other species of note, including redshank curlew, grey plover and black-tailed godwit.

3.2.3 Local sites

The Draft Liverpool Local Plan (consultation copy September 2016) identifies in Schedule 12.1 a total of 29 sites of 'Local Nature Importance' consisting of Local Nature Reserves, Local Wildlife Sites and potential Local Wildlife Sites for future designation. That list includes the Mersey Estuary SPA and SSSI identified above. None of the sites identified is within 1 km of the proposed development.

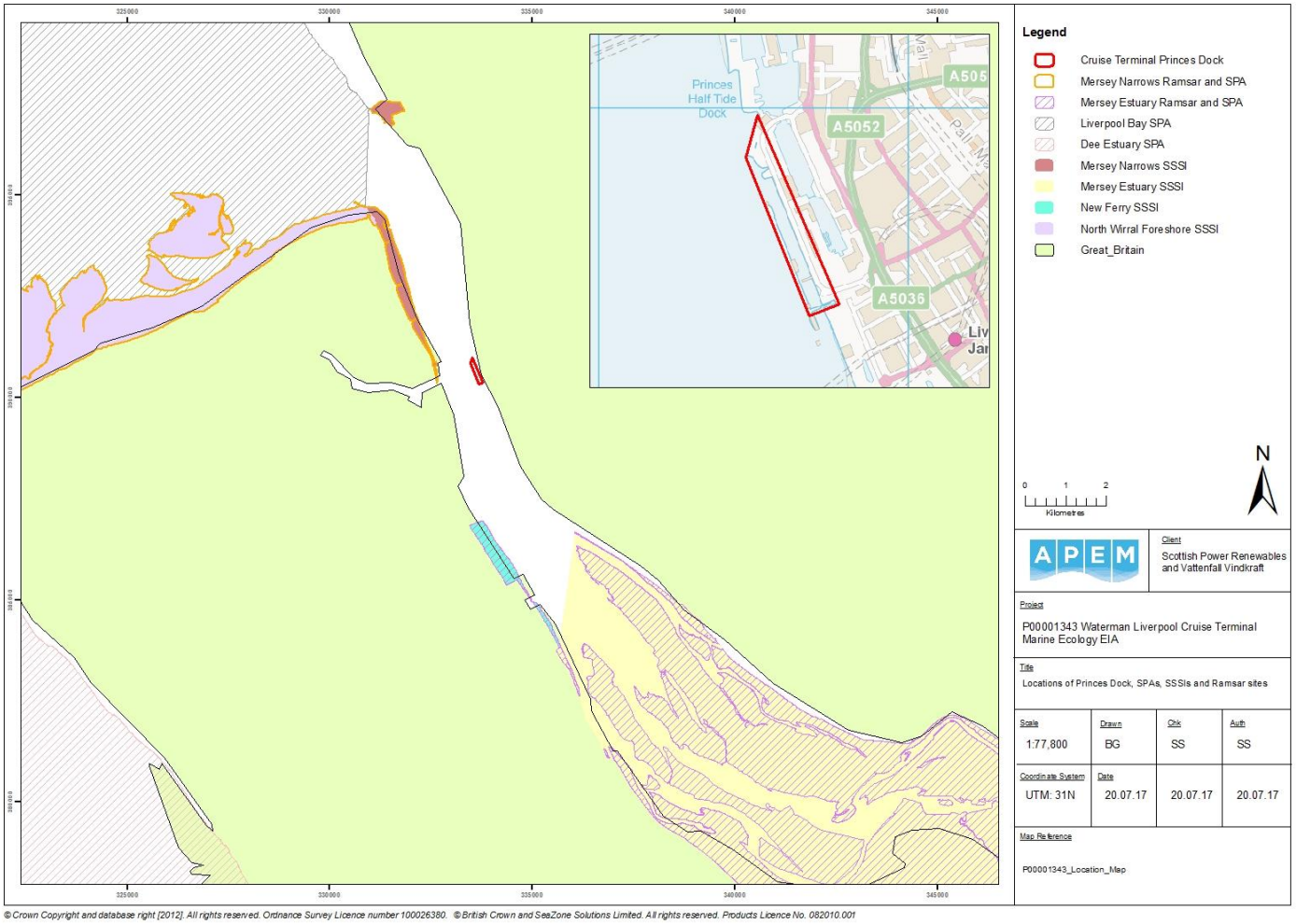

Figure 1 Location of Princes Dock in relation to European, Ramsar and National sites of conservation importance.

Table 1 Protected sites, interest features and distance to the proposed development

Site	Nature conservation value	Interest features	Distance to development (km)
Mersey Narrows & North Wirral Foreshore Ramsar site	International	Little gull, common tern, knot and bar-tailed godwit. Waterbird assemblage: cormorant, oystercatcher, grey plover, sanderling, dunlin and redshank.	0.8
Mersey Estuary Ramsar site	International	Shelduck, redshank, teal, pintail and dunlin. Waterbird assemblage: ringed plover, curlew, spotted redshank, greenshank and wigeon.	3.3
Liverpool Bay SPA	European	Red-throated diver and common scoter.	4.6
Liverpool Bay proposed SPA extension	European	Little gull, common tern and little tern. Waterbird assemblage: red-breasted merganser and cormorant.	0
Mersey Narrows & North Wirral Foreshore SPA.	European	Redshank and turnstone. Waterbird assemblage: dunlin, knot, grey plover, oystercatcher and cormorant.	0.8

Site	Nature conservation value	Interest features	Distance to development (km)
Mersey Estuary SPA	European	Golden plover, dunlin, pintail, redshank, shelduck and ringed plover. Waterbird assemblage: curlew, black-tailed godwit, lapwing, grey plover, wigeon, great crested grebe and teal.	3.3
Mersey Estuary SSSI	National	Pintail, shelduck, wigeon, teal, dunlin, curlew, redshank and golden plover.	4.3
Mersey Narrows SSSI	National	Turnstone, redshank and cormorant.	0.8
New Ferry SSSI	National	Pintail and black-tailed godwit.	3.3
North Wirral Foreshore SSSI	National	Knot, bar-tailed godwit, turnstone and dunlin.	4.2

3.3 Bird species – occurrence and ecology

Princes Dock is located in the Mersey Estuary, which is one of the UK's most important sites for non-breeding (wintering) birds, especially waders and wildfowl. These birds feed and roost on the saltmarshes and mudflats. It is also host to a large colony of breeding terns during the breeding season (summer) and a small colony of kittiwakes. However, the majority of the birds associated with the Mersey Estuary are located outside of the city of Liverpool's boundaries. In addition to the non-breeding and breeding waterbirds two other protected bird species are known to have bred within close proximity to the site; peregrine falcon and black redstart.

The coastal strip of Liverpool, is almost entirely built up with docklands, industrial units, residential flats and other urban / industrial infrastructure, extending alongside the estuary and coastline from between the Festival Gardens to the south (the first non-built-up environment to the south) and to Crosby to the north (the first natural habitat and beach to the north of Liverpool). These areas are frequented by people and machinery on the land and by small and large vessels on the water for both recreational and industrial use throughout the year. The concrete coastal environment that extends along the entire coastline to the north and south of the Project site at Princes Dock is described as being of little value to birds by White e*t al.* (2013). Due to the high incidence of disturbance and low incidence of suitable habitat being available throughout the tidal cycle within and in close proximity to the Princes Dock

very few waders and wildfowl utilise the area during either the non-breeding or breeding periods.

In order to place in to context and inform the assessment of any potential impacts and effects from the construction and operation of the proposed development, that may reach beyond the Project site itself, a brief account of the key ornithological receptors and designated sites is provided below. This is based on information collated from the desk study. That information is also used to define the value of each species with regards to the Study Area, a factor that is used within the assessment.

Designated sites are evaluated based on the underpinning legislation with SPA and Ramsar sites being of greater importance than those arising from national legislation such as SSSIs (Table 1).

To determine the value of the baseline bird populations within the Study Area the following criteria have been used to identify species that may be potentially sensitive to the Project-specific impacts. The Study Area focuses mainly on the species that reside with 750m of the proposed development site, the Princes Dock, the species that are features of designated sites (SPAs and Ramsar sites) within up to 5 km and other designated sites (SSSIs) within up to 1 km.

- Waterbird species cited as an interest feature of the SPAs listed in Table 1 during winter and passage periods;
- Waterbird species cited as an interest feature for the Ramsar sites listed in Table 1, as recognised as being present in internationally or nationally important numbers outside of the breeding season;
- Waterbird species cited as an interest feature of SSSIs listed in Table 1 during the winter and passage periods;
- Waterbird species recorded in surveys during winter and passage periods occurring in numbers considered to be of regional importance;
- Waterbird species recorded in surveys during winter and passage periods occurring in numbers considered to be of local importance; and
- Other protected species that are known to breed on the site or within close proximity to it.

The above criteria have been used, in conjunction with the Birds of Conservation Concern (BOCC) status (Eaton *et al*., 2015) of each species, to identify the importance value of the Study Area for each species for the forthcoming EIA. The results are presented in the species accounts below and summarised in Section 3.3.1 to 3.3.20. Not all species recorded in WeBS Counts and the TEP surveys (TEP, 2015) are considered within this EIA Screening, as some were recorded in very low numbers on a limited number of occasions.

3.3.1 Shelduck

Shelduck are a common winter visitor to Lancashire (White *et al*., 2008) and the Wirral coastline (Norman, 2008). The species is a cited species within the Mersey Estuary SPA and Ramsar site designations. It is also on the BoCC Amber list (Eaton *et* al., 2015), due to the

UK hosting 20-30% of the European breeding and wintering population, being of European conservation concern and showing a decline of over 25% in their breeding population. Regionally, Lancashire supports a wintering population of approximately 7,700 birds, mostly in Morecambe Bay and the Ribble Estuary (White *et al*., 2013). The Mersey and Dee estuaries support the highest and second highest populations in the UK of approximately 6,700 and 8,700 birds during the winter (Frost *et al*, 2017), respectively, with these both being greater than both the 1% GB winter threshold of 610 for national importance and the 1% international importance threshold of 3,000 individuals.

The number of shelduck residing within the Mersey Narrows is consistently low (Ross-Smith *et al*, 2015), which is also reflected in the last five years of WeBS count data collected over the wintering periods between 2011/12 to 2015/16, where maximum counts were of five in April 2015 and 11 in May 2014 in the Mersey Narrows count sector. Shelduck were not recorded in the count sectors within or in close proximity to the Princes Dock during the wintering bird surveys (TEP, 2015). They were recorded regularly to the north of the site, but beyond 750 m and mostly associated with areas of exposed sands and mudflats at low tide. Up to two birds were recorded at three count locations within close proximity to Princes Dock during the spring surveys, but none were recorded at all during the autumn surveys. Although this species is cited as an assemblage species of a nearby designated site due to this species only being recorded in very low numbers within close proximity to the Princes Dock site it is considered to be of only **local importance**.

3.3.2 Cormorant

Cormorant are a common winter visitor to Lancashire (White *et al*., 2008) and the Wirral coastline (Norman, 2008), with Liverpool Bay likely to be the most important winter site for this species in the UK (White *et al*., 2013). The species is a cited as an assemblage species within the Mersey Narrows and North Wirral Foreshore SPA designation. It is also categorised as Amber listed in BoCC 4 (Eaton *et al*, 2015), due to the UK holding at least 20% of the European breeding population and of that population 50% or more breed in ten or fewer sites. Regionally, Lancashire supports a wintering population of approximately 2,000 birds, mostly in coastal waters off the Sefton and Fylde coasts (White *et al*., 2013). The Mersey and Dee estuaries support approximately 200 and 1,600 birds during the winter (Frost *et al*, 2017), respectively, with the latter being greater than both the 1% GB winter threshold for national importance of 350 and the 1% international importance threshold of 1,200 individuals.

The number of cormorants residing within the Mersey Narrows and North Wirral Foreshore has increased from almost no birds to over 450 over the last ten years (Ross-Smith *et al*, 2015). However, in the last five years of WeBS count data collected over the wintering periods between 2011/12 to 2015/16 the number of birds in the Mersey Narrows count sector is still relatively low, with maximum counts of 18 in October 2013 and seven in April 2016. Cormorants were recorded in 10 out of 12 of the count sectors within or in close proximity to the Princes Dock during the wintering bird surveys (TEP, 2015). They were recorded mostly as individuals within each of the count sectors with a notable maximum count of 12 in Princes Half Tide Dock over the high water period. Cormorants were less frequently recorded in the spring surveys with birds recorded at three sites within close proximity to Princes Dock and a maximum of three birds at one of those locations. They were also recorded in five count sectors in the autumn surveys, with a maximum of three birds in one location. Although this species is a cited interest feature of a nearby designated site it is only found in low numbers within close proximity to the Princes Dock site so is reasonably considered to be of only **local importance**.

3.3.3 Peregrine falcon

Peregrine falcons (peregrines) are a scarce breeder and fairly common winter visitor to Lancashire (White *et al*., 2008) and the Wirral coastline (Norman, 2008), with Liverpool city centre and docklands offering suitable nesting locations and wintering perches on high rise buildings (White *et al*., 2013). The species is protected under the Wildlife and Countryside Act 1891 (as amended) and given additional protection from disturbance by being listed in Schedule 1 of the Act. Peregrine is a non-qualifying species of interest of the Mersey Estuary SPA. It is categorised as Green listed in BoCC 4 (Eaton *et al*, 2015) as it is not a scarce species and its population has expanded in recent years after a period of historic decline. Regionally, Lancashire supports a breeding population of approximately 50 pairs, mostly in north of the county (White *et al*., 2013), with four pairs known to breed within Liverpool city centre and the surrounding docklands.

Peregrine are not known to breed on any of the structures within the proposed development site (*pers comm* County Bird Recorder). A pair was recorded nesting on the Tobacco Warehouse in 2009, which is approximately 500m to the north of the Princes Dock (TEP, 2015). Although this is a Schedule 1 species, it is not known to be nesting in the Princes Dock site and the Liverpool population is only a small proportion of the national population (1,505 pairs https://www.bto.org/volunteer-surveys/peregrine-survey/results), so is reasonably considered to be of only **local importance**.

3.3.4 Great crested grebe

Great crested grebes are a fairly common wintering bird in Lancashire (White *et al*., 2008), with highest numbers and densities within Morecambe Bay. They are also a common wintering visitor to the waters surrounding the Wirral coastline (Norman, 2008), favouring deeper channels and particularly off the northwest coast of the Wirral in the Dee Estuary. The species does not qualify for amber or red list status and is categorised as Green listed in BoCC 4 (Eaton *et al*, 2015), meaning that its population is stable or of least concern. They are not a cited feature in any designated sites within close proximity to Princes Dock, but do form part of the wintering bird assemblage for the Mersey Estuary SPA. Regionally, Lancashire supports a wintering population of approximately 400 birds mostly within the Morecambe Bay SPA (White *et al*., 2013). The species does not regularly occur in Cheshire in numbers of national importance (Norman, 2008), with peaks of 40 birds in the Mersey estuary (Frost *et al*, 2017), which is considerably lower than the 1% GB winter threshold for national importance of 190 and 1% international importance threshold of 3,500 individuals.

The number of great crested grebes residing within the Mersey Narrows is consistently low (Ross-Smith *et al*, 2015), which is also reflected in the last five years of WeBS count data collected over the wintering periods between 2011/12 to 2015/16, where single birds were recorded on just two occasions in the Mersey Narrows count sector. Very few were recorded in the wintering bird surveys (TEP, 2015) with one individual recorded during the winter surveys and four birds during the spring surveys within close proximity to the Princes Dock. Although this species is cited as an assemblage species of a nearby designated site due to this species only being recorded in very low numbers within close proximity to the Princes Dock site it is considered to be of only **local importance**.

3.3.5 Oystercatcher

Oystercatchers are an abundant winter visitor to the Lancashire (White *et al*., 2008) and Wirral coastlines (Norman, 2008), with the Dee Estuary being of international importance (CAWOS,

2014 & 2015). The species is cited as an assemblage species within the Mersey Narrows and North Wirral Foreshore SPA designation. They are on the BOCC Amber list (Eaton *et al*., 2015), as a vulnerable species, as at least 50% of the GB wintering population is found in ten or fewer sites and due to over 20% of the European population over-wintering in GB. Regionally, Lancashire supports a wintering population of approximately 47,000 birds mostly within the Morecambe Bay SPA and Ribble & Alt SPA, which are not within close proximity to Princes Dock (White *et al*., 2013). The two closest estuaries to the Princes Dock (the Mersey and the Dee) support approximately 750 and 25,000 birds during the winter (Frost *et al*, 2017), respectively, with the Mersey being considerably lower than the 1% GB winter threshold for national importance of of 3,200 and 1% international importance threshold of 8,200 individuals.

The number of oystercatchers residing within the Mersey Narrows and North Wirral Foreshore are mostly confined to the north Wirral coastline, with only relatively low numbers within the Mersey Narrows (Ross-Smith *et al*, 2015). WeBS count data collected over five wintering periods between 2011/12 to 2015/16 also provide evidence that only low numbers of birds utilise the Mersey Narrows, with a maximum count of 400 birds recorded in this count sector in April 2015, which must also be noted as being on the opposite side of the River Mersey to that of the Project. Few birds were recorded in the wintering bird surveys (TEP, 2015) with birds recorded in three count sectors in the winter surveys with a maximum count of 14 in West Waterloo Dock immediately to the north of Princes Dock. Records of one to two birds were recorded at three different count sectors in the spring, whilst none were recorded in the autumn within close proximity to Princes Dock. Due to this species being cited as an assemblage species of nearby designated sites, but only being found in low numbers within close proximity to the Princes Dock site it is reasonably considered to be of only **regional importance**.

3.3.6 Lapwing

Lapwing are an abundant winter visitor to the Lancashire (White *et al*., 2008) and Wirral coastlines (Norman, 2008), though are absent from the coastline in the Mersey Narrows and are not a species cited species within the designation of SPAs within close proximity to Princes Dock. They are on the BOCC Red list (Eaton *et* al., 2015), as a vulnerable species and declining breeding bird in the UK. Regionally, Lancashire supports a wintering population of approximately 35,000 birds mostly within the Morecambe Bay SPA and Ribble & Alt SPA, which are not within close proximity to Princes Dock (White *et al*., 2013). The two closest estuaries to the Princes Dock (the Mersey and Dee) support approximately 7,900 and 7,000 birds during the winter (Frost *et al*, 2017), respectively, with both sites being considerably higher than the 1% GB winter threshold for national; importance of 6,200, but lower than the 1% international importance threshold of 20,000 individuals.

The number of lapwing residing within the Mersey Narrows and North Wirral Foreshore has increased in recent years, but still remains low at less than 150 birds (Ross-Smith *et al*, 2015), with most of these located on the North Wirral Foreshore. This is reflected in the last five years of WeBS count data collected over the wintering periods between 2011/12 to 2015/16, where no birds were recorded in the Mersey Narrows count sector. No lapwings were recorded in the winter and spring bird surveys (TEP, 2015), whilst the only birds recorded in the autumn surveys were not within close proximity to the Princes Dock. Due to this species not being a cited interest feature of the nearby designated sites and not being recorded within close proximity to the Princes Dock site it is reasonable to propose that this receptor does not qualify for any level of importance value, but should it occur it would be considered to be of l**ocal importance**.

3.3.7 Curlew

Curlews are an abundant winter visitor to the Lancashire (White *et al*., 2008) and Wirral coastlines, with the Mersey and Dee Estuaries being of national importance (Norman, 2008). The species is cited as an assemblage species in the Mersey Estuary Ramsar site designation and is on the BOCC Red list (Eaton *et* al., 2015), as a vulnerable species and declining breeding bird in the UK. Regionally, Lancashire supports a wintering population of approximately 3,000 birds, mostly within the Morecambe Bay SPA and Ribble & Alt SPA, which are not within close proximity to Princes Dock (White *et al*., 2013). The two closest estuaries to the Princes Dock (the Mersey and Dee) support approximately 2,000 and 4,000 birds during the winter (Frost *et al*, 2017), respectively, both being higher than the 1% GB winter threshold for national importance of 1,400, but not the 1% international importance threshold of 8,400 individuals.

The number of curlew residing within the Mersey Narrows and North Wirral Foreshore, fewer than 100 birds, are mostly confined to the north Wirral coastline, with only relatively low numbers within the Mersey Narrows (Ross-Smith *et al*, 2015). WeBS count data collected over five wintering periods between 2011/12 to 2015/16 also provide evidence that only low numbers of birds utilise the Mersey Narrows, with a maximum count of 18 in July 2013 and a maximum winter count of 11 birds in October 2014, though there birds were on the Wirral side of the River Mersey. No curlews were recorded in the winter and spring bird surveys (TEP, 2015), whilst the only birds recorded in the autumn surveys were not within close proximity to the Princes Dock. Although this species is cited as an assemblage species of a nearby designated site due to this species only being recorded in very low numbers within close proximity to the Princes Dock site it is considered to be of only **local importance**.

3.3.8 Turnstone

Turnstone are a common passage migrant and winter visitor to Lancashire (White *et al*., 2008) and the Wirral coastline, with the Mersey and Dee Estuaries being of national importance (Norman, 2008). The species is a cited species within the Mersey Narrows and North Wirral Foreshore SPA designation and is categorised as on the BOCC Amber list (Eaton *et* al., 2015), due to showing a decline of over 20% in their non-breeding population. Regionally, Lancashire supports a wintering population of approximately 900 birds, mostly on the Fylde and Morecambe Bay coasts (White *et al*., 2013). The Mersey and Dee estuaries support approximately 250 and 300 birds during the winter (Frost *et al*, 2017), respectively, with this being lower than the 1% GB winter threshold for national importance of 480 and the 1% international importance threshold of 1,400 individuals. However, Norman (2008) notes that turnstone counts in excess of 1,000 birds are regularly recorded between the New Brighton and Egremont within the Mersey Narrows, suggesting that numbers do reach that of national importance within close proximity to Princes Dock, albeit on the opposite side of the River Mersey.

The number of turnstone residing within the Mersey Narrows and North Wirral Foreshore are mostly confined to the north Wirral coastline, particularly at Leasowe, with only relatively low numbers within the Mersey Narrows (Ross-Smith *et al*, 2015). However, the last five years of WeBS count data collected over the wintering periods between 2011/12 to 2015/16 provide maximum winter counts of between 12 and 164 birds in the Mersey Narrows count sector. Turnstone were recorded in two count sectors within or in close proximity to the Princes Dock during the wintering bird surveys (TEP, 2015), with a maximum of 11 birds in West Waterloo Dock and 20 at Canning Hall Tide Dock. No birds were recorded within close proximity to

Princes Dock during the spring and autumn surveys. Due to this species being a cited interest feature of the nearest designated site and only found in numbers of regional significance within close proximity to the Princes Dock site it is more reasonably considered to be of only **regional importance**.

3.3.9 Knot

Knot are an abundant winter visitor to the Lancashire (White *et al*., 2008) and Wirral coastlines, with the Mersey Estuary, Dee Estuary, Ribble Estuary, Alt Estuary and Morecambe Bay all being of international importance (White *et al*., 2013 and Norman, 2008). The species is a cited species within the Mersey Narrows and North Wirral Foreshore Ramsar site designation and is on the BoCC Amber list (Eaton *et* al., 2015), due to a historical downward trend in its non-breeding population. Regionally, Lancashire supports a wintering population of approximately 85,000 birds, mostly on the Fylde and Morecambe Bay coasts (White *et al*., 2013). The Mersey and Dee estuaries support approximately 900 and 24,000 birds during the winter (Frost *et al*, 2017), respectively, with the former being greater than both the 1% GB winter threshold for national importance of 3,200 and the 1% international importance threshold of 4,500 individuals.

The number of knot residing within the Mersey Narrows and North Wirral Foreshore are mostly confined to the north Wirral coastline, with only relatively low numbers within the Mersey Narrows (Ross-Smith *et al*, 2015). WeBS count data collected over five wintering periods between 2011/12 to 2015/16 also provide evidence that this species rarely occurs in the Mersey Narrows, with only three records and a maximum count of 10 back in October 2011 on the opposite side of the River Mersey to Princes Dock. No knot were recorded in the winter¸ spring or autumn bird surveys (TEP, 2015). Although this species is a cited interest feature of a number of nearby designated sites it is not regularly found within close proximity to the Princes Dock site so is reasonably considered to be of only **local importance**.

3.3.10 Dunlin

Dunlin are an abundant passage migrant and abundant winter visitor to the Lancashire (White *et al*., 2008) and Wirral coastlines, with the Mersey Estuary, Dee Estuary, Ribble Estuary and Morecambe Bay all being of international importance (White *et al*., 2013 and Norman, 2008). The species is cited as an assemblage species within the Mersey Narrows and North Wirral Foreshore SPA and a designated feature of the Mersey Estuary SPA. It is on the BoCC Amber list (Eaton *et* al., 2015), due to a historical downward trend in its breeding range and non-breeding population. Regionally, Lancashire supports a wintering population of approximately 39,000 birds, mostly on the Fylde and Morecambe Bay coasts (White *et al*., 2013). The Mersey and Dee estuaries support approximately 50,000 and 16,500 birds during the winter (Frost *et al*, 2017), respectively, with this being greater than both the 1% GB winter threshold for national importance of 3,500 and the 1% international importance threshold of 13,300 individuals.

The number of dunlin residing within the Mersey Narrows and North Wirral Foreshore are mostly confined to the north Wirral coastline (Ross-Smith *et al*, 2015). WeBS count data collected over five wintering periods between 2011/12 to 2015/16 provide evidence that the Mersey Narrows is of relatively little importance to this species, with only eleven records and a maximum count of 115 birds in February 2016 on the opposite side of the River Mersey to Princes Dock. No dunlin were recorded in the winter¸ spring or autumn bird surveys (TEP, 2015). Although this species is a cited interest feature of a number of nearby designated sites

it is only found in very low numbers within close proximity to the Princes Dock site so is reasonably considered to be of only **local importance**.

3.3.11 Redshank

Redshank are an abundant passage migrant and abundant winter visitor to the Lancashire (White *et al*., 2008) and Wirral coastlines, with the Mersey and Dee Estuaries combining to be the most important location for this species in the UK (Norman, 2008). The species is a cited species within the Mersey Narrows and North Wirral Foreshore SPA, Mersey Estuary SPA and Mersey Narrows SSSI designations and is on the BoCC Amber list (Eaton *et* al., 2015), due to being of European conservation concern and showing a decline of over 20% in their breeding and non-breeding population. Regionally, Lancashire supports a wintering population of approximately 11,000 birds, mostly in Morecambe Bay and the Ribble Estuary (White *et al*., 2013). The Mersey and Dee estuaries support approximately 2,600 and 8,800 birds during the winter (Frost *et al*, 2017), respectively, with these being greater than both the 1% GB winter threshold for national importance of 1,200 and the 1% international importance threshold of 2,400 individuals.

The number of redshank residing within the Mersey Narrows and North Wirral Foreshore has increased in importance in a regional context over the last 10-15 years (Ross-Smith *et al*, 2015). The last five years of WeBS count data collected over the wintering periods between 2011/12 to 2015/16 also provide evidence for this area becoming more important for this species, with maximum winter counts increasing from 22 in November 2011 to 400 in April 2015 birds in the Mersey Narrows count sector. Redshank were not recorded in any of the count sectors within or in close proximity to the Princes Dock during the winter, spring or autumn bird surveys (TEP, 2015). Due to this species being a cited interest feature of nearby designated sites and being found in reasonable numbers within close proximity to the Princes Dock site it is reasonably considered to be of only **regional importance**.

3.3.12 Little tern

Little terns are a passage migrant through Cheshire and south Lancashire, with no breeding colonies within either county (White *et al*., 2008 and Norman 2008). The closest colony to Princes Docks is a large colony in the Dee Estuary, over the Welsh border at Gronant, Flintshire (Brenchley *et al*., 2013), which hosts approximately 125 pairs. The species is a cited species within the Liverpool Bay proposed SPA extension designation and is on the BoCC Amber list (Eaton *et* al., 2015), due to being of conservation concern and showing a moderate decline of over 20% in their breeding range. The colony in Flintshire contains greater than the 1% international importance threshold of 190 individuals.

Little tern are not regularly recorded in the Mersey Narrows and no records of this species exist for its occurrence in the River Mersey in the last five years of WeBS data. No little terns were recorded in any of the TEP bird surveys (TEP, 2015). Due to this species being a cited interest feature of a nearby designated site, but not being recorded within close proximity to the Princes Dock site it is reasonably considered to be of only **local importance**.

3.3.13 Common tern

Common terns are a summer visitor to Lancashire, with breeding restricted mainly to two locations (White *et al*., 2008), but although absent as a breeding species in Cheshire a large colony does exist in the Dee Estuary, over the Welsh border in Shotton, Flintshire (Norman,

2008). The species is a cited species within the Liverpool Bay proposed SPA extension designation and is on the BoCC Amber list (Eaton *et* al., 2015), due to over 50% of their breeding population being located in ten or fewer sites. Regionally, Lancashire supports a breeding population of approximately 650 pairs, mostly at a colony in Seaforth, within close proximity to Princes Dock (White *et al*., 2013). The only colony associated with the Mersey Estuary, at Seaforth, is included in the Lancashire estimate above, whilst the Dee Estuary colony at Shotton Steel Works supports up to approximately 450 breeding pairs (CAWOS, 2015). None of the breeding sites within Lancashire, Cheshire or Flintshire contain greater than the 1% international importance threshold of 1,800 individuals.

The number of common tern residing within the Mersey Narrows and North Wirral Foreshore are mostly confined to coastline with sandy beaches, with very few birds recorded within the Mersey Narrows (Ross-Smith *et al*, 2015). WeBS count data collected over the years between 2011 and 2016, though the focus is predominantly during the non-breeding period, also provide evidence that only low numbers of birds utilise the Mersey Narrows, with a maximum count of 4 birds in September 2015. No common terns were recorded in the bird surveys (TEP, 2015) within close proximity to the Princes Dock. However, this species is a cited interest feature of a nearby designated site and despite only being found in low numbers within close proximity to the Princes Dock site it is reasonably considered to be of only **regional importance**.

3.3.14 Black-headed gull

Black-headed gulls are an abundant winter visitor and breeding bird in the Lancashire (White *et al*., 2008) and Wirral coastlines (Norman, 2008). The species is not a cited species within the SPA designations within close proximity of Princes Dock and is on the BoCC Amber list (Eaton *et* al., 2015), due to showing a moderate decline in its non-breeding population. Regionally, It is thought that between 50,000 and 100,000 birds spend the winter in Lancashire (White *et al*., 2013) and over 25,000 in Cheshire (CAWOS, 2015) during the non-breeding season, which are both over the 1% threshold of 22,000 birds at a national level and 20,000 birds at an international level, though the Mersey Estuary estimate of approximately 5,300 (Frost *et al*, 2017) falls short of the national and international 1% importance thresholds.

The number of black-headed gulls residing within the Mersey Narrows and North Wirral Foreshore are mostly confined to the north Wirral coastline (Ross-Smith *et al*, 2015). However, they are a relatively common bird recorded throughout the non-breeding season and in the last five years of WeBS count data collected over the wintering periods between 2011/12 to 2015/16 the maximum count is of 396 birds in December 2015. Black-headed gulls were the most prevalent gull species regularly recorded in the bird surveys (TEP, 2015), with a maximum count of 48 birds within close proximity of the Princes Dock. Due to this species not being a cited interest feature of the nearby designated sites and only found in relatively low numbers, when considering the regional population, within close proximity to the Princes Dock site it is more reasonably considered to be of only **local importance**.

3.3.15 Little gull

Little gulls are a scarce winter visitor and passage migrant in Lancashire (White *et al*., 2008) and around the coast of the Wirral (CAWOS, 2015) and are a proposed additional feature of the Liverpool Bay proposed SPA extension. They are known to mostly winter in the Atlantic Ocean with only small numbers found throughout the Irish Sea during winter (Balmer *et al*., 2013). They are on the BOCC Green list (Eaton *et al*., 2009) meaning that its population is

stable or of least concern. Regionally, Lancashire supports a wintering population of approximately 500 birds (White *et al.,* 2013), whilst birds in Cheshire tend to be categorised as migrants only. The Lancashire population is greater than both the 1% GB winter threshold for national importance of 195, but not the 1% international importance threshold of 1,100 individuals.

They are a regularly occurring species to Seaforth, within the Mersey Narrows and North Wirral Foreshore, though this site is not within close proximity to Princes Dock (Ross-Smith *et al*, 2015). This is evidenced in the last five years of WeBS count data collected over the wintering periods between 2011/12 to 2015/16 with no birds recorded in the Mersey Narrows count sector. Little gulls were not recorded in the bird surveys (TEP, 2015) within close proximity of the Princes Dock. Although this species being a cited interest feature of a nearby designated site it is not known to be present within close proximity to the Princes Dock site it is more reasonably considered to be of only **local importance**.

3.3.16 Lesser black-backed gull

Lesser black-backed gulls are a winter visitor and common breeding bird in Lancashire (White *et al*., 2008) and winter visitor and uncommon breeder in Cheshire (Norman, 2008). However, despite Lancashire being of importance for this species as a breeding location with up to 15,000 pairs, the Mersey Estuary only hosts an estimated 500 pairs nesting on roof tops in Liverpool city centre and along the docks, with perhaps another 200 pairs on the Wirral's Mersey Estuary coastline (Norman, 2008), but is not recorded as having ever bred at the Princes Dock development site. The species is not a cited species within the SPA designations within close proximity of Princes Dock and they are on the BOCC Amber list (Eaton *et* al., 2009) with respect to their breeding status, but not their non-breeding status. The regional wintering population within Lancashire is approximately 2,000 individuals (White *et al*., 2013), whilst Cheshire hosts approximately 2-3,000 birds (CAWOS, 2015), which exceed the 1% threshold for national importance of 1,200 birds, but not the international importance 1% threshold of 10,200.

The number of lesser black-backed gulls residing within the Mersey Narrows and North Wirral Foreshore is relatively low at approximately 150 birds (Ross-Smith *et al*, 2015) during the non-breeding season. This is also reflected in the last five years of WeBS count data collected over the wintering periods between 2011/12 to 2015/16 the maximum count is of 16 birds in April 2013, though a peak of 44 birds occurred outside of the non-breeding season in July 2012. Lesser black-backed gulls were regularly recorded in small numbers in the bird surveys (TEP, 2015), with a maximum count of 61 birds recorded in West Waterloo Dock in the month of August, which is within close proximity of the Princes Dock. Due to this species not being a cited interest feature of the nearby designated sites and only found in low numbers within close proximity to the Princes Dock site it is more reasonably considered to be of only **local importance**.

3.3.17 Herring gull

Herring gulls are an abundant winter visitor and common breeding bird in Lancashire (White *et al*., 2008) and very common winter visitor and uncommon breeder Cheshire (Norman). However, despite Lancashire being of importance for this species as a breeding location with up to 50,000 pairs, the Mersey Estuary only hosts an estimated 200 pairs nesting on roof tops in Liverpool city centre and along the docks (White *et al*., 2013), with perhaps another 50-100 pairs on the Wirral's Mersey Estuary coastline (CAWOS, 2015 & 2016), but is not recorded as

having ever bred at the Princes Dock development site. The species is not a cited species within the SPA designations within close proximity of Princes Dock although they are on the BOCC Red list (Eaton *et* al., 2009), due to having a long-term decline in breeding and non-breeding populations in GB and wintering in internationally important numbers in GB. The wintering population is 50,000 birds in Lancashire (White *et al*., 2013) and over 20,000 in Cheshire (Norman, 2008), though the number within the Mersey Estuary is considerably lower and below the GB wintering 1% threshold for national importance of 7,300 and the 1% international importance threshold of 10,200.

Herring gull numbers are relatively moderate within the Mersey Narrows and North Wirral Foreshore, with perhaps as many as 1,500 birds (Ross-Smith *et al*, 2015) during the non-breeding season. However, within the last five years of WeBS count data collected over the wintering periods between 2011/12 to 2015/16 the maximum counts have been relatively low within the Mersey Narrows count sector with a peak of 59 in December 2015. Herring gulls were regularly recorded in small numbers in the bird surveys (TEP, 2015), with a maximum count of 296 birds recorded in Princes Half Tide Dock in the month of April. Due to this species not being a cited interest feature of the nearby designated sites and only found in low numbers within close proximity to the Princes Dock site it is more reasonably considered to be of only **local importance**.

3.3.18 Great black-backed gull

Great black-backed gull are a common winter visitor and scarce breeder in Lancashire (White *et al*., 2008) and very common winter visitor and rare breeder Cheshire (CAWOS, 2015). They are on the BOCC Amber list (Eaton *et* al., 2009), due to showing moderate declines in their breeding and non-breeding population of between 25% and 50%. Regionally, the estimated wintering population for Lancashire is approximately 1,000 birds (White *et al*., 2013), whilst Cheshire hosts approximately 200 birds (CAWOS, 2014 & 2015 though the number within the Mersey Estuary is considerably lower and below the GB wintering 1% threshold for national importance of 760 and the 1% international importance threshold of 4,200.

Great black-backed gull numbers are relatively low within the Mersey Narrows and North Wirral Foreshore (Ross-Smith *et al*, 2015) during the non-breeding season. This is reflected in the last five years of WeBS count data collected over the wintering periods between 2011/12 to 2015/16 with the maximum counts being of 4 birds in October 2011, though 9 birds were recorded in July 2012. Great black-backed gulls were scarcely recorded and in only very low numbers in the bird surveys (TEP, 2015), with a maximum count of 18 birds recorded in Canning Branch Docks in the month of July. Due to this species not being a cited interest feature of the nearby designated sites and only found in very low numbers within close proximity to the Princes Dock site it is more reasonably considered to be of only **local importance**.

3.3.19 Black-legged kittiwake

Black-legged kittiwakes (kittwakes) are a rare breeder, passage migrant and winter visitor to Lancashire (White *et al*., 2008) and a passage migrant and winter visitor to the Wirral (Norman, 2008). The species is not a cited species within designated sites within close proximity to Princes Dock and is on the BoCC Red list (Eaton *et al*., 2015), due to suffering a severe decline in their breeding population (over 50%) in over 25 years. Regionally, Lancashire supports only two colonies, the first of approx. 180 pairs on a gas platform in Morecambe Bay

and the other on the seawall between Langston and Alexandra Docks, approximately 3km to the north of Princes Dock (White *et al*., 2013).

Kittiwakes were not recorded as part of the waterbird surveys undertaken (Ross-Smith *et al* , 2015) or as part of the waterbird surveys (TEP, 2015) and they are not known to breed on any of the structures within the proposed development site (pers comm – County Bird Recorder). This species is not known to be nesting in the Princes Dock site and the Liverpool population is only a small proportion of the national population (380,000 pairs: Musgrove *et al*., 2013) so is reasonably considered to be of only **local importance**.

3.3.20 Black redstart

Black redstart is a rare and irregularly recorded breeder and rare winter visitor to Lancashire (White *et al*., 2008) with the Liverpool docklands offering suitable nesting locations within the older warehouses and outbuildings (White *et al*., 2013). The species is protected under the Wildlife and Countryside Act 1891 (as amended) and given additional protection from disturbance by being listed in Schedule 1 of the Act. It is also categorised as Red listed in BoCC 4 (Eaton *et al*, 2015), due to having suffered a serious decline in its breeding population nationally by over 50% in over 25 years. Regionally, Lancashire supports a breeding population of approximately one or two pairs (White *et al*., 2013), with only one pair known to breed within Liverpool city centre and the surrounding docklands.

Black redstarts are not known to breed on any of the structures within the proposed development site (pers comm County Bird Recorder). A male was recorded in song at Clarence Dock in 2014 (White *et al*, 2016), which is approximately 750m to the north of the Princes Dock. However, although this is a Schedule 1 species it is not known to be nesting or foraging in the Princes Dock site, so is reasonably considered to be of only **local importance**.

4. Summary of key findings

The Princes Dock and the land within close proximity to it in the surrounding docks on the urbanised eastern side of the Mersey Estuary within the City of Liverpool supports very few waterbirds during any season across the calendar year. This is evidenced through the desk study for this report that examined site-specific survey data, national survey databases and grey literature within County bird reports and County avifauna. The Princes Dock was found to not be of importance for any particular bird species as a breeding location or non-breeding location to nest, forage, loaf or roost. It is largely void of waterbirds, though some relatively common species do reside on it on occasion.

The Princes Dock is, however, within close proximity to a number of nationally and internationally important designated sites for waterbirds. The closest of these sites, the Mersey Narrows and North Wirral Foreshore SPA, is within 850 m of the Princes Dock, albeit on the opposite side of the River Mersey. However, it is only the southern most tip of this designated site that falls within 850 m of the Princes Dock.

Of the bird species studied within this report four were valued at of regional importance; oystercatcher, turnstone, redshank and common tern. Although none of these four species are known to reside within the Princes Dock in significant numbers the three wader species are known to reside within the Mersey Narrows on the opposite side of the River Mersey and common tern is known to utilise coastal waters all along the River Mersey. These four species are also interest features of designated sites within the Study Area.

This information is applied in the screening process for the proposed development in the next section.

5. Screening of ornithology receptors

5.1 Approach to screening

The screening, carried out on designated sites and species separately below, is based on the source-pathway-receptor method. This considers the proposed development as a potential source of adverse effects on birds (see Section 1.2 above), the route by which that potential adverse effect might reach those birds (the 'pathway', which in many cases is dependent on distance) and the presence of the designated site or the presence of the species in significant numbers.

5.2 Species

Section 1.2 above identified the following potential source of adverse effects on birds:

a) Construction phase; indirect effect; displacement etc of prey (food) items for birds
b) Construction phase; direct effect; loss of land and / or water under the footprint of the Project
c) Construction phase; direct effect; displacement of birds due to noise and / or vibration
d) Construction phase; direct effect; displacement of birds due to visual disturbance
e) Construction phase; direct effect; death or injury to birds due to pollution
f) Operation phase; indirect effect; displacement etc of prey (food) items for birds
g) Operation phase; direct effect; loss of land and / or water under the footprint of the Project
h) Operation phase; direct effect; displacement of birds due to noise and / or vibration
i) Operation phase; direct effect; displacement of birds due to visual disturbance
j) Operation phase; direct effect; death or injury to birds due to pollution

The pathway, for screening purpose, for the at-a-distance effects (displacement of prey, noise, visual and pollution) is based on a precautionary distance of 1 km. It is APEM's experience of similar projects that even far carrying effects when examined at the detailed stage with defined construction details and embedded mitigation do not carry more than 2-500m. The pathway for the loss of land and / or water under the footprint is the outer boundary of the application area (i.e. within Princes Dock).

The presence or absence of birds in significant numbers, their conservation value and their importance in a geographical context has been described in Section 3.3 above.

For a bird species to be screened in it has to occur in or adjacent to Princes Dock or be an interest feature of a designated site within 1 km and be of regional or greater conservation importance. This is summarised in Table 2 with the screened in species highlighted.

Table 2 Summary of screening of bird species

Species	Occurs in or adjacent to Princes Dock	Feature of designated site within 1 km	Overall conservation value	Screened in / out
Shelduck	No	No	Local	Out
Cormorant	Yes	Yes	Local	Out
Gt crested grebe	No	No	Local	Out
Peregrine falcon	No	No	Local	Out
Oystercatcher	No	Yes	Regional	In
Lapwing	No	No	Local	Out
Curlew	No	No	Local	Out
Turnstone	No	Yes	Regional	In
Knot	No	Yes	Local	Out
Dunlin	No	Yes	Local	Out
Redshank	No	Yes	Regional	In
Little tern	No	Yes	Local	Out
Common tern	No	Yes	Regional	In
Black-hdd gull	Yes	No	Local	Out
Little gull	No	Yes	Local	Out
Lssr black-bd gull	Yes	No	Local	Out
Herring gull	Yes	No	Local	Out
Gt black-bd gull	No	No	Local	Out
Black-lg kittiwake	No	No	Local	Out
Black redstart	Yes	No	Local	In

5.3 Sites

A designated site is screened in if there is a direct overlap between the site and the project footprint or it is sited within 1 km of the Project and one or more of its bird interest features has been screened as a result of the species based screening described above. This is summarised in Table 3 with the screened in sites highlighted.

Table 3 Summary of screening of protected sites with bird interest features

Site	Overlap with Project boundary	Sited within 1 km of Project	Bird interest feature screened in	Screened in / out
Mersey Narrows & North Wirral Foreshore Ramsar site	No	Yes	Yes	In
Mersey Estuary Ramsar site	No	No	Yes	Out
Liverpool Bay SPA	No	No	No	Out

Site	Overlap with Project boundary	Sited within 1 km of Project	Bird interest feature screened in	Screened in / out
Liverpool Bay proposed SPA extension	No	Yes	Yes	In
Mersey Narrows & North Wirral Foreshore SPA.	No	Yes	Yes	In
Mersey Estuary SPA	No	No	Yes	Out
Mersey Estuary SSSI	No	No	Yes	Out
Mersey Narrows SSSI	No	Yes	Yes	In
New Ferry SSSI	No	No	No	Out
North Wirral Foreshore SSSI	No	No	Yes	Out

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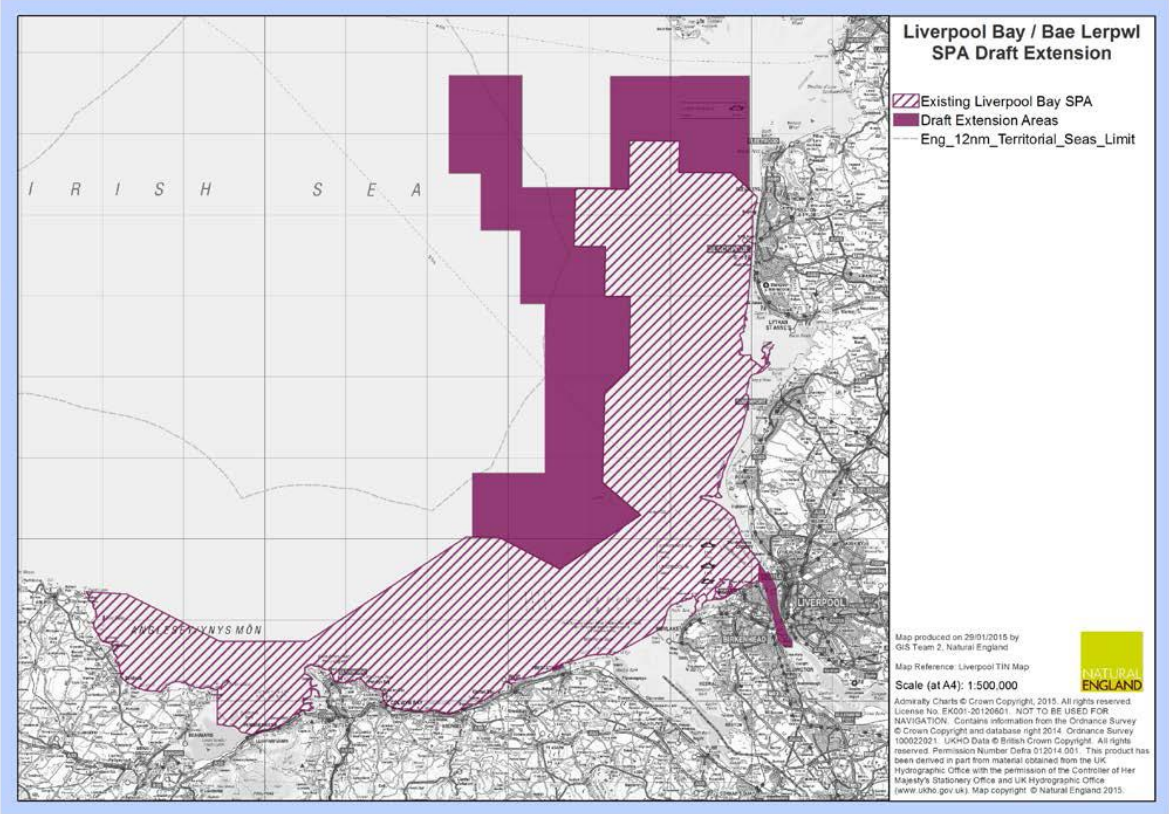
Appendix 1 Map of Proposed Extension of Liverpool Bay SPA



Appendix 2 Scientific names of birds included in the report

The table below lists the names of birds used throughout this report and the scientific names of those birds. The bird species names that have been used are those that are in common use amongst English ornithologists. This corresponds to the “British (English) vernacular name 2012” identified by the British Ornithologists Union (BOU, 2012). The corresponding scientific names are those also listed in that BOU publication.

British (English) Vernacular Name	Scientific Name
Eider	*Somateria mollissima*
Common scoter	*Melanitta nigra*
Red-breasted merganser	*Mergus serrator*
Red-throated diver	*Gavia stellata*
Great crested grebe	*Podiceps cristatus*
Peregrine falcon	*Falco peregrinus*
Oystercatcher	*Haematopus ostralegus*
Ringed plover	*Charadrius hiaticula*
Sanderling	*Calidris alba*
Dunlin	*Calidris alpina*
Curlew	*Numenius arquata*
Redshank	*Tringa totanus*
Turnstone	*Arenaria interpres*
Little gull	*Hydrocoloeus minutus*
Common gull	*Larus canus*
Lesser black-backed gull	*Larus fuscus*
Great black-backed gull	*Larus marinus*
Herring gull	*Larus argentatus*
Black-headed gull	*Chroicocephalus ridibundus*
Black-legged kittiwake	*Rissa tridactyla*
Black redstart	*Phoenicurus ochruros*

Appendix 13.3a: Mersey Estuary Fish Species List

Appendix 13.3: Mersey Estuary Fish Species List

Species list of fish recorded in the Mersey Estuary (data collated from ERL, Hering 1998, APEM 2008, APEM 2011).

Common name	Scientific name
Bass	*Dicentrarchus labrax*
Bib	*Trisopterus luscus*
Brill	*Scophthalmus rhombus*
Butterfish	*Pholis gunnellus*
Chub	*Leuciscus cephalus*
Cod	*Gadus morhua*
Common bream	*Abramis brama*
Common goby	*Pomatoschistus microps*
Common sand eel	*Ammodytes tobianus*
Corbin's sandeel	*Hyperoplus immaculatus*
Common sole	*Solea solea*
Corkwing wrasse	*Crenilabrus melops*
Dab	*Limanda limanda*
European eel	*Anguilla anguilla*
European smelt	*Osmerus eperlanus*
Fifteen-spined stickleback	*Spinachia spinachia*
Five-bearded rockling	*Ciliata mustela*
Flounder	*Platichthys flesus*
Greater pipefish	*Syngnathus acus*
Grey gurnard	*Eutriglia gurnardus*
Herring	*Clupea harengus*
Lesser weaver	*Trachinus vipera/ Echiichthys vipera*
Long spined sea scorpion	*Taurulus bubalis*
Lumpsucker	*Cyclopterus lumpus*
Nillson’s pipefish	*Syngnathus rostellatus*
Perch	*Perca fluviatilis*
Plaice	*Pleuronectes platessa*
Pogge	*Agonus cataphractus*
Poor cod	*Trisopterus minutus*
River lamprey	*Lampetra fluviatilis*
Roach	*Rutilus rutilus*
Salmon	*Salmo salar*
Sand goby	*Pomatoschistus minutus*
Sand smelt	*Atherina presbyter*
Sea lamprey	*Petromyzon marinus*

Common name	Scientific name
Sea-snail	*Liparis liparis*
Sea trout	*Salmo trutta*
Short spined sea scorpion	*Myoxocephalus scorpius*
Solonette	*Buglossidium luteum*
Sprat	*Sprattus sprattus*
Thicklipped grey mullet	*Chelon labrosus*
Thinlipped grey-mullet	*Liza ramada*
Thornback Ray	*Raja clavata*
Three-spined stickleback	*Gasterosteus aculeatus*
Transparent goby	*Aphia minuta*
Whiting	*Merlangius merlangus*

Appendix 13.4a: Preliminary Ecological Appraisal

Liverpool Cruise Terminal

Preliminary Ecological Appraisal

October 2017

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Quality Assurance – Approval Status

This document has been prepared and checked in accordance with
Waterman Group's IMS (BS EN ISO 9001: 2015, BS EN ISO 14001: 2015 and BS OHSAS 18001:2007)

Issue	Date	Prepared by	Checked by	Approved by
First	October 2017	Samantha Rogers Consultant Ecologist	Niall Machin Associate Director	Niall Machin Associate Director

Comments

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Appendices

1. Introduction

1.1. Waterman Infrastructure & Environment Ltd (Waterman) was commissioned by Liverpool City Council (LCC) to carry out a Preliminary Ecological Appraisal (PEA) at Princess Parade, Liverpool (hereafter referred to as the 'Site').

1.2. The Applicant, LCC, is proposing the development of a permanent Cruise Terminal Facility at the former Princes Jetty, Liverpool, to replace the existing temporary Cruise Terminal, which would close when the new facility becomes operational (hereafter referred to as the 'Development').

1.3. The Site is approximately 5.77 hectares (ha) in area, centred on Ordnance Survey Grid Reference SJ33589084. The Site largely comprises hardstanding with a small area of ornamental planting, amenity grassland, small wooden jetty, a large jetty with some sparse ephemeral vegetation and an operational jetty all adjacent to the River Mersey.

1.4. This PEA includes an ecological data search and an 'Extended' Phase 1 Habitat Survey and survey for common invasive weeds.

1.5. As detailed within industry guidance (CIEEM, 2016)[1], a PEA can be used to support a planning application provided no 'Important Ecological Features' (IEFs) are identified and no significant ecological effects are anticipated. If this is not the case, an Ecological Impact Assessment (EcIA) is normally required by the Local Planning Authority (LPA). The Development has been determined to be an EIA development, as detailed above and an EcIA, if required, will be presented as a chapter within the EIA process.

1.6. The purpose of this report is to:

- Identify the potential for Important Ecological Features (IEFs) to be present within the identified Zone of Influence (ZoI) and any resulting constraints or significant ecological effects to the Development;
- Inform master-planning to allow significant ecological effects to be avoided or minimised wherever possible;
- Allow any further ecological assessments needed to inform an EcIA to be identified and appropriately designed, as required;
- Allow likely mitigation, compensation and ecological enhancement measures to be developed, to ensure compliance with nature conservation legislation and planning policy (**Appendix A**); and
- Form a basis for agreeing the scope of the EcIA with relevant consultees, as required.

[1] CIEEM (2016). *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd Edition*. Chartered Institute of Ecology and Environmental Management, Winchester.

2. Methodology

Scope of the Assessment

2.1. This section summarises the methodologies used for undertaking the PEA based on current guidelines[2],[3],[4]. This PEA included an ecological data search, 'Extended' Phase 1 Habitat Survey and invasive species survey.

2.2. The ZoI is the area(s) over which ecological features maybe impacted by the biophysical changes caused by the proposed Development. Based on the scale and nature of the Development, it has been assessed that the ZoI arising from these works is unlikely to be greater than 1km from the Site terrestrially (sites and species) and 10km in terms of (estuarine/marine) European sites. Therefore, this distance has been used to collect the ecological data search information. The 'Extended' Phase 1 Habitat survey area comprised primarily the Site, as access was not available to adjacent land (which primarily comprises hardstanding and warehouse style buildings). However, adjacent land was viewed where possible from the Site and aerial photography for the area has also been reviewed. As referenced in industry guidance, IEFs that are anticipated to be affected by the Development have been identified and subject to assessment. In this report, designated sites, habitats and species that fall into the categories in **Table 1** and **Table 2** have been identified as being ecologically important and/or legally protected/controlled and form the scope of data gathering during the data search and Site surveys.

Table 1: Geographical Scale of Important Ecological Feature Categories

Geographical Level of Importance	Category
International	Statutory designated sites: Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar sites (including candidate SACs and proposed SACs, SPAs and Ramsar sites)
National	Statutory designated sites: Sites of Special Scientific Interest (SSSI) and National Nature Reserves (NNR)[5]; Ancient Woodland; Habitats and species of principal importance for the conservation of biodiversity as listed on Schedule 41 (S41) of the NERC Act, 2006, including ecologically important hedgerows under the Hedgerow Regulations; and Red List and rare species (using IUNC criteria[6]) and Birds of Conservation Concern (Red List[7])
County	Local Nature Reserves (LNR) Non-statutory designated wildlife sites: known as Sites of Nature Conservation Importance (SNCI's) in Liverpool; and Local Biodiversity Action Plan (LBAP) habitats and species.

[2] Chartered Institute of Ecology and Environmental Management (2013). *Guidelines for Preliminary Ecological Appraisal.* Technical Guidance Series.

[3] Chartered Institute of Ecology and Environmental Management (2015). *Guidelines for Preliminary Ecological Assessment.* Technical Guidance Series.

[4] BSI (2013) BS 42020:2013. Biodiversity - Code of Practice for Planning and Development.

[5] DCLG (2012). *National Planning Policy Framework,* paragraph 118.

[6] http://www.iucnredlist.org/technical-documents/categories-and-criteria

[7] https://www.rspb.org.uk/birds-and-wildlife/bird-and-wildlife-guides/bird-guide/status_explained.aspx

Table 2: Legally protected and Invasive Species

Legislation (Summarised in Appendix A)
Species included on Schedule IV of the Habitats and Species Regulations 2010 (as amended);
Species included on Schedules 1, 5 and 8 of the Wildlife and Countryside Act 1981 (as amended), excluding species that are only protected in relation to their sale (Section 9[5] and 13[2]);
Species included on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended), which it is an offence to release or allow to escape into the wild or which it is an offence to plant or otherwise cause to grow in the wild; and
Badgers, which are protected under the Protection of Badgers Act 1992.

Ecological Data Search

2.3. The aim of the ecological data search is to collate existing ecological records for the Site and adjacent areas. Obtaining existing records is an important part of the evaluation process, as it provides additional information that may not be apparent during a site survey.

2.4. An ecological desk study was undertaken in April 2017, during which all records of protected species, and/or other notable fauna and flora within 1km of the Site were requested from Local Biodiversity Records Centre for North Merseyside (LBRCNM). Records also included those species listed on the North Merseyside Biodiversity Action Plan (LBAP).

2.5. Records of important statutory and non-statutory sites designated for their nature conservation value within 1km of the Site were searched for on the Multi-Agency Geographic Information for the Countryside[8]. For European sites, the area of search was increased to 10km.

2.6. In addition, Habitats of Principal Importance (HoPI) and Species of Principal Importance (SoPI) listed under Section 41 (S41) of the NERC Act, as well as Habitat Action Plans (HAPs) and Species Action Plans (SAPs) listed under the LBAP, were consulted to assign an ecological context to the Site.

'Extended' Phase 1 Habitat Survey

2.7. An 'Extended' Phase 1 Habitat Survey of the Site was undertaken on the 10th of April 2017. Due to Site boundary changes, an update survey was undertaken on the 18th September 2017 using the Joint Nature Conservancy Council[9] standard 'Phase 1' survey technique. The Phase 1 Habitat Survey methodology was 'Extended' by undertaking an assessment of the Site to support protected and notable faunal species. All habitat types within the Site were mapped (**Figure 1**) with target notes where appropriate.

2.8. Where access allowed, adjacent habitats were also considered to assess the Site within the wider landscape, and to provide information with which to assess possible impacts of the proposed Development.

[8] Magic.defra.gov.uk. (2014). *Magic*. [online] Available at: http://magic.defra.gov.uk/ [Accessed April 2017].

[9] JNCC. (2010). *Handbook for Phase 1 Habitat Survey*. Nature Conservancy Council

2.9. A floral species list was collated for the Site during the 'Extended' Phase 1 Habitat Survey. As such, the species list detailed within the results section of this report can be used to inform any future BREEAM reports (specific assessment guidelines dependant).

Invasive Species Assessment

2.10. The list of invasive plant species included on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) is extensive and these plants are found in a range of different habitats, including aquatic habitats. The 'Extended' Phase 1 Habitat Survey checked for the presence of common invasive species including; Japanese knotweed *Fallopia japonica*, giant knotweed *Fallopia sachalinensis*, hybrid knotweed *Fallopia baldschuanica*, giant hogweed *Heracleum mantegazzianum* and Himalayan balsam *Impatiens glandulifera.*

IEF Assessment

2.11. Data gathered as part of this PEA has been used to identify potential IEFs (i.e. designated sites, habitats and species as listed in **Tables 1** and **2**) that are anticipated to be affected by the Development within the ZoI (up to 1km from the Site terrestrially and 10km in relation to Special Protection Areas (SPAs)).

2.12. However, not all the IEFs within the ZoI have the potential to be significantly affected by the Development, or the legislation pertaining to them to be contravened. Therefore, where features are unlikely to be affected by the Development, or where any effects that impact IEFs are unlikely to be significant, for the reasons[10] listed below, such features have been scoped out of the assessment:

- No pathway of effect has been identified, for example the feature is sufficient distance from the Site or there is the presence of a barrier between its location and the Site[11] ; or
- The feature is of insufficient biodiversity conservation value within the ZoI, due to its quality, extent or population size[12].

2.13. For all remaining features scoped into the assessment, the pathway of effect (e.g. habitat loss, lighting, noise etc.) and potential impact of this on the feature have been identified.

Consultation

2.14. No consultation has been undertaken at this stage.

Constraints and Limitations

2.15. No access to the jetties was possible due to health and safety concerns. However, as much of the area as possible was viewed through the security fence with binoculars.

[10] Positive or negative effects on ecological features that have the potential to influence a planning decision are considered to be significant

[11] Whilst the ZoI of potential effects arising from the development is up to 1km from the Site terrestrially and 10km aquatically with regards to designated sites, the ecological ZoI (within which the feature could be affected) for each feature may vary and for some features may be much less, e.g. great crested newts generally move up to a maximum of 500m from a breeding pond and movement can be restricted by barriers such as busy roads and fast flowing rivers

[12] E.g. whilst a Priority Species such as skylark *Alauda arvensis* or house sparrow *Passer domesticus* is of National importance (**Table 2**), the impact of development on individual or a small population of such a species, which are generally commonly found, is unlikely to be assessed as significant

2.16. The Site survey was conducted within the optimum survey season (April-September) for 'Extended' Phase 1 Habitat Surveys, when most plant species are visible; all plants were identified through their floristic and vegetative characteristics where possible.

2.17. All other contractors, designers and the client should be aware of the following: The design recommendations within this report are assessed to be the most effective ecological solution at this initial stage of the project. No other pre-construction information has been provided, obtained or referred to during the preparation of this report (including, but not limited to, services information, geotechnical reports and ordnance reports). In deciding whether and how to progress with this project, it will be incumbent upon the client, designers and contractors to obtain and refer to relevant pre-construction and maintenance information, as required by the Construction (Design and Management) Regulations to ensure compliance. Waterman can assist with the development and co-ordination of this design to support effective risk management on this project upon request.

3. Results

Desk Study

Statutory Sites

3.1. The Site is not located within any current designated sites. However, three Ramsars, three SPAs, three SSSIs and two SACs are located within 10km of the centre of the Site, as described in **Table 3** below.

3.2. In addition to the results in **Table 3**, the Site is located within an area currently under consultation to be included within the Liverpool Bay SPA extension. The outcome of the consultation had not been published at the time of writing this report.

Table 3: Summary of Desk Study Results of Relevant Statutory Sites within 10km of the Site

Site Name	Designation	Distance from Site (km)	Description
Liverpool Bay	pSPA	0km	In 2016 it was proposed to extend Liverpool Bay SPA (consultation results currently being reviewed). One of the extensions includes the River Mersey (including the section of river within the Development Site) to incorporate common tern *Sterna hirundo* foraging requirements. Liverpool Bay SPA is located in the south-eastern region of the northern part of the Irish Sea, bordering northwest England and north Wales and running as a broad arc from Morecambe Bay to the east coast of Anglesey. The site is designated for red-throated divers, common scoters and water bird assemblage.
Mersey Narrows & North Wirral Foreshore	Ramsar / SPA / SSSI	0.8km west	The Mersey Narrows and North Wirral Foreshore SPA is located on the north-west coast of England at the mouths of the Mersey and Dee estuaries. The site comprises intertidal habitats at Egremont foreshore, man-made lagoons at Seaforth Nature Reserve and the extensive intertidal flats at North Wirral Foreshore. Egremont is most important as a feeding habitat for waders at low tide whilst Seaforth is primarily a high-tide roost site, as well as a nesting site for terns. North Wirral Foreshore supports large numbers of feeding waders at low tide and includes important high-tide roost sites. The most notable feature of the site is the exceptionally high density of wintering turnstone *Arenaria interpres*. Mersey Narrows and North Wirral Foreshore has clear links in terms of bird movements with the nearby Dee Estuary SPA,

Site Name	Designation	Distance from Site (km)	Description
			Ribble and Alt Estuaries SPA, and (to a lesser extent) Mersey Estuary SPA.
Dee Estuary	SAC	4.2km north west	The Dee Estuary is designated due to the notable habitats present such as the mudflats / sandflats which are not covered by sea water at low tide, lagoons and the fauna and flora they in turn support.
Mersey Estuary	Ramsar / SPA / SSSI	5.3km south east	The Mersey Estuary is located on the Irish Sea coast of north-west England. It is a large, sheltered estuary which comprises large areas of saltmarsh and extensive intertidal sand- and mud-flats, with limited areas of brackish marsh, rocky shoreline and boulder clay cliffs, within a rural and industrial environment. The intertidal flats and saltmarshes provide feeding and roosting sites for large populations of waterbirds. During the winter, the site is of major importance for ducks and waders. The site is also important during the spring and autumn migration periods, particularly for wader populations moving along the west coast of Britain.
Sefton Coast	SAC / SSSI	6.3km north	The site is of special interest for intertidal mud and sandflats, embryonic shifting dunes, mobile dunes, dunes with creeping willow *Salix arenaria*, humid dune slacks, fixed dunes, dune grasslands and dune heath. Small areas of saltmarsh are also present. Its assemblages of vascular and non-vascular plants, the nationally rare grey hair grass *Corynephorus canescens*, nationally scarce liverwort *Petalophyllum ralfsii* and nationally rare moss *Bryum neodamense*, are also of special interest. The site is of special interest for its populations of internationally important wintering waterfowl and its nationally and, in some cases, internationally important populations of individual waders. Its populations of sand lizard *Lacerta agilis*, natterjack toad *Bufo calamita* and great-crested newt *Triturus cristatus* are also of special interest, along with the populations of the Red Data Book species, sandhill rustic moth *Luperina nickerlii gueneei.*
Ribble & Alt Estuaries	Ramsar / SPA	6.4km	The Ribble and Alt Estuaries lies on the coast of Lancashire and Merseyside. It comprises two estuaries, of which the Ribble Estuary is the larger, together with an extensive area of sandy

Site Name	Designation	Distance from Site (km)	Description
			foreshore along the Sefton Coast. It forms part of the chain of western SPAs that fringe the Irish Sea. There is considerable interchange in the movements of wintering birds between this site and Morecambe Bay, the Mersey Estuary, the Dee Estuary and Martin Mere. The site consists of extensive sand- and mud-flats and, particularly in the Ribble Estuary, large areas of saltmarsh. There are also areas of coastal grazing marsh located behind the sea embankments. The intertidal flats are rich in invertebrates, on which waders and some of the wildfowl feed. The larger expanses of saltmarsh and areas of coastal grazing marsh support breeding birds during the summer, including large concentrations of gulls and terns.

Non-Statutory Sites

3.3. The Site is not located within 1km of any non-statutory designated sites.

Ancient Woodland

3.4. There is no ancient woodland within 1km of the Site.

Protected, BAP and Other Notable Species

3.5. Records of legally protected or otherwise notable species of flora and fauna within 1km of the Site were provided by LBRCNM. A summary of the most significant results within the last 15 years of relevance to the Site are provided in **Table 4** below. Full results can be obtained from the data providers but cannot be presented in this report because of copyright. For some records, only a four-figure grid reference has been provided by LBRCNM and therefore 'within 1km' has been stated in **Table 4**. It should be noted that the distances provided in **Table 4** below are taken from the central grid reference of the Site and therefore are approximate.

Table 4: Summary of desk study records with the last 15 years of relevant flora and fauna within 1km of the Site

Species	Category of Importance*	Number of Records	Most recent record	Location of records relevant to the study area (km)
Birds				
Little ringed plover *Charadrius dubius*	Legal, Schedule 1 of the WCA*	3	2003	500m north

Species	Category of Importance*	Number of Records	Most recent record	Location of records relevant to the study area (km)
Starling *Sturnus vulgaris*	Legal, S41** and LBAP***	3	2003	Within 1km
Marine Mammals				
Common porpoise *Phocoena phocoena*	Legal, Hab regs**** and S41	5	2012	Within 1km
Bony fish				
Atlantic cod *Gadus morhua*	Legal, S41	135	2010	Within 1km
European eel *Anguilla anguilla*	Legal, S41	2	2016	Within 1km
Whiting *Merlangius merlangus*	Legal, S41	148	2012	Within 1km
Invasive Species				
Canada goose *Branta canadensis*	Legal, Schedule 9 of the WCA	4	2011	Within 1km
Japense knotweed	Legal, Schedule 9 of the WCA	4	2009	Within 1km

* WCA - The Wildlife and Countryside Act 1981 (as amended)

**S41 – The Natural Environment and Rural Communities Act 2006

*** North Merseyside Biodiversity Action Plan

**** The Conservation (Natural Habitats, &c.) Regulations 2010 (Schedule 2)

Extended Phase 1 Habitat Survey

Habitats

3.6. The following habitat types, described in more detail below, were identified on and directly adjacent to the Site during the 'Extended' Phase 1 Habitat Survey:

- Buildings;
- Amenity grassland;
- Hardstanding;
- Ornamental planting;
- Rivers; and
- Built structures.

3.7. The habitat descriptions given below should be read in conjunction with **Figure 1** which includes target notes and the photographs (Plates) presented in **Appendix B**.

Buildings

3.8. Six buildings are current located within the Site boundary. The buildings consist of offices and storage units upon the working jetty (known as the landing stage). Building 1 (B1) is the pilot launch building, it is single storey with a reversed metal pitched roof. The building in constructed of glass and metal walls and no gaps / crevices are considered suitable for roosting bats. Building 2 (B2) is of the same construction as B1 but it is much larger, again no signs of any suitable gaps / crevices for roosting bats were found at the time of survey on this building. Building 3 (B3) is a small single storey building formed of corrugated metal. The building has a gentle sloping metal roof with no roosting potential for bats. Building 4 (B4) and building 5 (B5) are two very small single storey porta cabins with flat roofs. Building 6 (B6) is the same as B4 & B5 but is larger. All three porta cabins along with the other three buildings on Site are considered to be negligible for roosting bats and are unlikely to be used by notable nesting birds.

Amenity grassland

3.9. Amenity grassland (**Plate 1**) was recorded adjacent to the Titanic Memorial (which is itself excluded from the Site) in the south of the Site. The amenity grassland is in regular maintenance, maintaining a closely mown sward. Species recorded included Yorkshire fog *Holcus lanatus*, mouse ear *Cerastium fontanum*, common daisy *Bellis perennis*, perennial rye grass *Lolium perenne*, white clover *Trifolium repens*, dandelion *Taraxacum officinale* and ribwort plantain *Plantago lanceolata*.

Hardstanding

3.10. The majority of the Site is hardstanding (**Plate 2**) with large expanses of road, pavement, jettys and car parking. The hardstanding is generally in good condition with limited cracks and crevices.

Ornamental planting

3.11. Ornamental planting (**Plate 3**) was recorded within one of the main carparks. Species recorded included ornamental grasses, ornamental evergreen plants, *Euonymus spp.* and St John's-wort *Hypericum sp*, gorse *Ulex sp,* and Japanese rose *Rosa rugosa.*

River

3.12. The River Mersey is located to the south west of the Site. The R. Mersey is a tidal waterbody which eventually flows into the Irish Sea and qualifies as a HoPI under the NERC Act.

3.13. Where the Site lies along the R. Mersey, the river is 0.9km wide and could form part of the Liverpool Bay pSPA extension (further details in designated sites above). Areas of bladder wrack *Fucus vesiculosus* are present upon steps leading down from the Site into the water and around jetty stilts and river walls. Although not recorded during the survey, the River Mersey supports numerous fish and aquatic invertebrate species.

Built structures

3.14. A large inaccessible jetty (**Plate 4**) topped with concrete with sparsely scattered patches of ephemeral vegetation such as ragwort *Jacobaea vulgaris*, cat's-ear *Hypochaeris radicata*, perennial rye grass, Yorkshire fog and creeping buttercup *Ranunculus repens,* and buddleia *Buddleia davidii*.

3.15. In addition, a wooden jetty (**Plate 5**) is present adjacent to the concrete topped jetty. At the time of the survey, birds were recorded using this jetty, further details in the Birds section below.

3.16. A current working jetty is also present, the jetty is made from metal and concrete and provides limited ecological value. The working jetty is connected by three metal bridges, these bridges provide suitable nesting areas for common bird species such as feral pigeon.

Protected, BAP and other Notable Fauna

3.17. The fauna descriptions provided below should be read in conjunction with **Figure 1** which includes target notes (TN). As a result of the 'Extended' Phase 1 Habitat Survey and a review of the ecological desk study an assessment is made below on the potential of the Site to support:

- Birds; and
- Invasive species.

Birds

3.18. The ecological data search returned records for starling (SoPI) and little ringed plover (S1 on the WCA) within 1km in the last 15 years.

3.19. The Site is located within an area of the River Mersey which is currently under consultation to be included in the Liverpool Bay Special Protection Area (pSPA) in particular for foraging common tern *Sterna hirundo,* but no terns were observed on this stretch of the river during either the April or September surveys. Kittiwakes are known to breed upon the river walls within the Liverpool Dock area but again no kittiwakes were recorded during the surveys and the river walls within the Site are considered not suitable for this species.

3.20. During the 'Extended' Phase 1 Habitat Survey, herring gull *Larus argentatus* (SoPI), Canada goose *Branta canadensis* (an invasive species listed under S9 of the WCA), feral pigeon *Columba livia* and lesser black-backed gull *Larus fuscus* were recorded using the wooden jetty on Site (**TN1**).

3.21. The Site offers some potential for low numbers of common and notable species of nesting and resting birds, predominantly on the wooden jetty. Given the habitats on Site being predominantly hardstanding, it is unlikely the Site would support any notable birds associated with the designated sites (detailed above) such as common tern given the lack of breeding habitat and the presence of better quality habitats further afield (e.g. Seaforth Nature Reserve to the north).

Invasive Species

3.22. Records for Japanese knotweed and Canada geese were returned in the ecological data search both of which are listed on Schedule 9 of the WCA. In addition, Canada geese were also recorded during the 'Extended' Phase 1 Habitat Survey. No other invasive species were recorded at the time of the survey.

4. Assessment

4.1. The potential IEFs that are anticipated to be affected by the Development (based on the results of the PEA and the Development plans received to date) are listed in **Table 5** below. This table details the rationale for the inclusion of each potential IEF and also details the potential effect pathways and any requirement for further ecological assessments.

Table 5: Potential Important Ecological Features Anticipated to be Affected by the Development

Potential Important Ecological Feature	Category of Importance	Rationale	Potential Effect Pathway	Requirement for Further Ecological Assessment
Designated sites	International	The operational phase of the new dock could result in a change of vessel, vessel routes or increased traffic travelling up and down the River Mersey. The Site is located within 10km of numerous statutory designated sites designated for feeding and foraging bird species and also located immediately adjacent to an area currently in consultation to be included in a SPA.	The construction and operational phases of the Development may impact habitats supporting notable bird species within the designated sites, potentially impacting the qualifying features for the designations.	Yes, a Habitats Regulations Assessment (HRA) Screening Report.

4.2. All other ecological features identified through the PEA have been scoped out of further assessment because the population or area likely to be affected by the Development is of insufficient size or diversity to be of ecological value, no potential effect pathway between the Development and these features has been identified; and/or contravention of the legislation relating to the feature is unlikely to occur. The rationale for scoping out features is provided in **Table 6** below.

Table 6: Ecological Features Scoped out of the Assessment

Ecological Feature	Rational
On Site habitats (all)	Habitat types commonly found locally and nationally and not assessed to be of geographical or legal importance or will be likely to be significantly impacted.

Ecological Feature	Rational
Adjacent river habitat	No significant impact, pending HRA Screening Report
Birds	Based on data search and survey results, usage of the Site is likely to be limited to low numbers of common bird species only. Within the wider locale, more suitable habitat is present offering more opportunities to larger number of notable bird species. Impact on birds using nearby SPA and pSPA to be assessed in HRA Screening Report.
Invasive species	No floral invasive species were recorded on Site. Whilst Canada geese were recorded on the Site at the time of the survey, given their transient nature, it is likely they will utilise multiple sites within the locale. Japanese knotweed was recorded in the data search within 1km however, none was recorded on Site as such, no remedial measures are required.

5. Recommendations

5.1. The PEA has identified a single IEF anticipated to be affected by the Development (based on plans received to date) that could result in significant ecological effects. The requirement for further ecological assessments has been highlighted within **Table 5** and a detailed scope is provided below.

5.2. To minimise or avoid any significant ecological effects and inform the emerging scheme design, ecological mitigation measures have been provided. In addition, ecological enhancement measures are also recommended.

5.3. Upon scheme fix and based on the results of the further assessments recommended below, the mitigation and enhancement measures will need to be confirmed / finalised in the EcIA and any other reports as required.

5.4. Although birds and the river habitat have been scoped out of the assessment (**Table 6**), pending the findings of the HRA Screening Report, mitigation and enhancement measures to ensure the Development meets legal compliance are still required. These measures are also set out below.

Designated Sites

5.5. The Site is located within an area currently in consultation to be included in the Liverpool Bay SPA and is within 10km of numerous statutory designated sites for which the qualifying features are related to the habitats associated with the River Mersey and, in particular, the feeding / foraging breeding bird assemblages they support. As such, it is recommended a HRA Screening Report is undertaken to assess the potential impacts on the statutory designated sites. This will assess the impacts during the construction and operational phases of the Development and is in-line with Policy GI 5 of the Draft Liverpool Local Plan.

Habitats

5.6. No habitats have been assessed to be IEFs. However, indirect impacts on the River Mersey (a HoPI under the NERC Act) may occur during the construction phase of the Development such as pollution run off and light spill. As such, it is recommended that mitigation in the form of protection measures are adhered to during the construction phase of the Development. These measures would ensure legal and good practice compliance is adopted. The measures would be documented within a Construction Environmental Management Plan (CEMP).

5.7. To conserve and increase the ecological value of habitats at the Site the following enhancements should be considered as part of the Development:

- The inclusion of ecologically beneficial soft landscaping within the Development proposals such as green or brown roof or species rich grassland;
- The use of native species or species of benefit to wildlife within any proposed landscape scheme to provide foraging opportunities for birds, invertebrates and other fauna is recommended to enhance the Site for wildlife;
- Artificial habitats for birds are also recommended (see fauna section below) to enhance the Site for birds;

- A landscape habitat and management plan should be produced to ensure the continuing success of the new habitats to be created on Site; and
- Where new landscaping is to be undertaken as part of the Development proposals horticultural practice should include the use of peat-free composts, mulches and soil conditioners. The use of pesticides (herbicides, insecticides, fungicides and slug pellets) will be discouraged to prevent fatal effects on the food chain particularly invertebrates, birds and/or mammals. Any pesticides used should be non-residual.

Protected and Notable Fauna

5.8. No protected or notable terrestrial fauna on Site or within the ZoI will be impacted by the Development.

5.9. However, it is it is recommended that mitigation in the form of protection measures are adhered to during the construction phase of the Development for potential nesting birds. These measures would ensure legal compliance and that good practice is adopted. The measures would be documented within a Construction Environmental Management Plan (CEMP) and include;

- Timing constraints associated with Site clearance works including the removal of habitats with the potential to support nesting birds as detailed below.

Birds

5.10. Birds are not assessed to be an IEF as the habitats at the Site (including the jetties and river walls) are considered unlikely to support any large populations of notable or protected bird species. However, there are opportunities on Site to support common species and low numbers of breeding birds. As such the following mitigation measure is recommended to ensure legal compliance:

- Should any habitats of value to nesting birds require removal to facilitate the Development this will be undertaken outside of the breeding bird season (March to August inclusive). However, if works cannot be undertaken outside the breeding bird season an ecologist will inspect any vegetation / building / structure to be removed. An experienced ecologist will be deployed to carry out an inspection at least within 24 hours prior to the clearance. If an occupied nest is detected, an appropriate buffer zone will be created around the nest, and clearance of this area delayed until the young have fledged.

5.11. Opportunities to enhance the Site for birds should be incorporated into the design of the Development to increase the value of the Site for bird species. It is recommended that artificial nest sites are targeted at SoPI species and LBAP species. The following bird enhancements are recommended:

- ‘Schwegler Starling Next Box 3S’ – This nest box has been designed with a large, deep cavity and 45mm entrance hole to attract starlings. Can be installed on mature trees or buildings. As well as starlings, this nest box is suitable for other species. The bird boxes should be placed at least 3m above ground level to prevent vandalism and face east or west; and
- ‘Schwegler Sparrow Terrace 1SP’ – Suitable for house sparrows. The nest box contains three separate nesting cavities. They can be installed on buildings either affixed to the exterior wall or incorporated into the wall. The bird boxes should be placed at least 3m above ground level to prevent vandalism and face east or west.

- ‘Vivara Pro Open Front Woodstone Nest Box’ – Suitable for black redstart. Boxes should be positioned at least 3m high and away from prevailing winds.
- ‘Schwegler Swallow Nest 10’ – suitable for swallows and house martin, the woodcrete nest provides a durable natural alternative for swallows when mud is in limited supply. Boxes should be positioned in a sheltered area underneath the eaves of buildings if possible.

5.12. The use of native plant species as recommended above would provide additional foraging habitat for local bird species.

6. Conclusions

6.1. As a result of the PEA and based on the Development plans received to date, terrestrial ecological features within the ZoI including all habitats present on Site and birds have been scoped out of the assessment due to insufficient biodiversity conservation value or a lack of an identified pathway for potential effects to occur. However, IEFs within the ZoI that are anticipated to be affected by the Development comprise the European designated sites with 10km.

6.2. It is determined that further ecological assessments as detailed in **Table 7** below would be required to inform the emerging scheme design and when finalised support the production of an EcIA which addresses marine / aquatic elements. The Development has been determined to be an EIA development, but no terrestrial IEFs have been noted on Site, therefore this PEA which only covers terrestrial ecology can be used within the planning application process on its own. It should be noted that this report covers terrestrial elements of ecology only and marine or aquatic components should be covered separately.

Table 7: Summary of Additional Ecological Assessments

Habitats/Species	Additional Ecological Assessment
Designated sites	HRA Screening Report

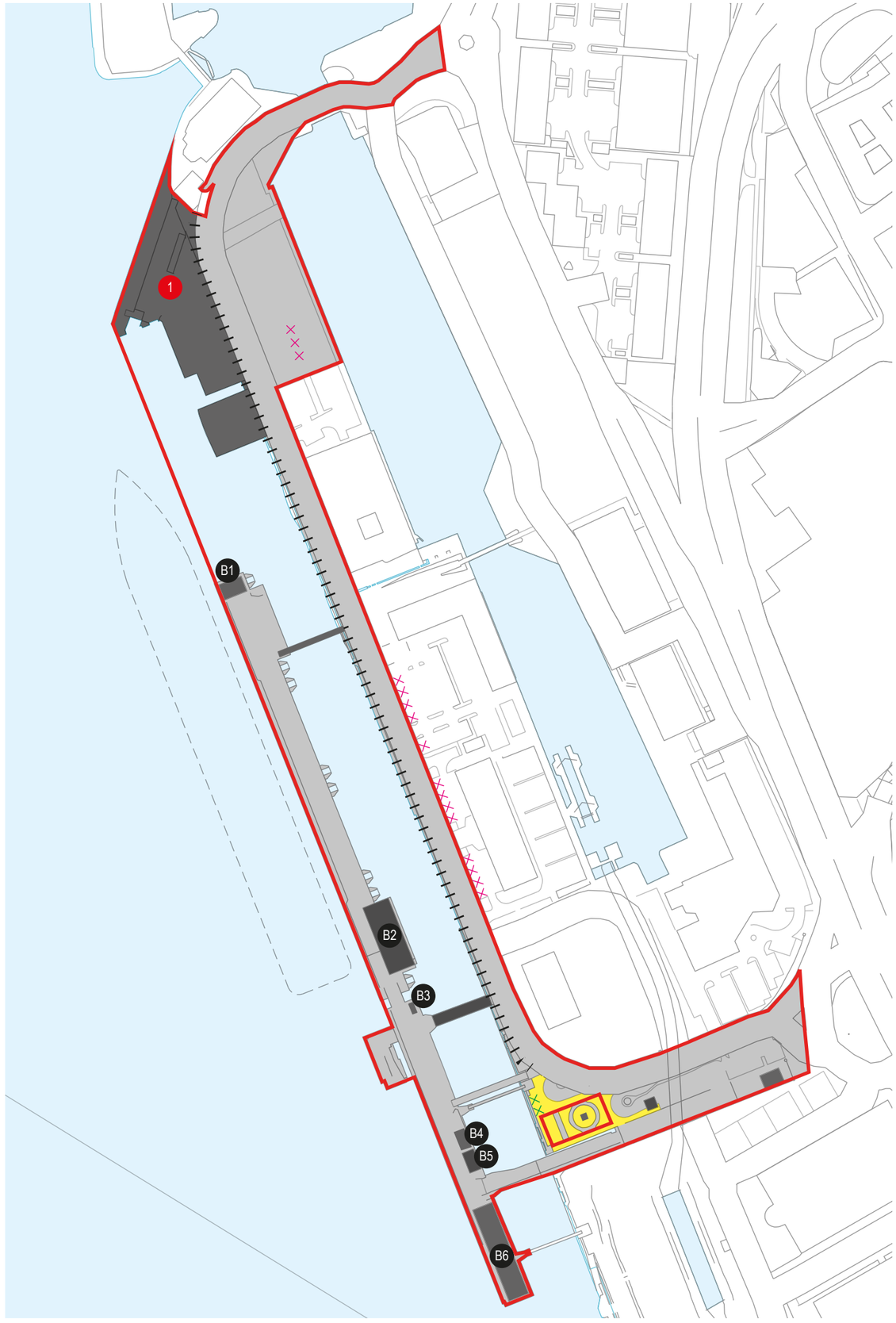
6.3. To ensure legal compliance and ensure good practice measures are adopted during the construction phase of the Development, recommendations have been made within this report with regards to the Site preparation and construction phases of the Development.

6.4. To inform the emerging scheme design, ecological enhancement measures are also recommended.

6.5. It should be noted that this PEA is relevant to the legislation detailed in Section 2 and **Appendix A** at the time of writing. If there are any changes to legislation prior to the Development being completed, the advice within this PEA may require amending / updating in line with any legislative updates.

6.6. If there is a significant period of time (most LPAs consider this period to be to 18 months) between this PEA and the Development commencing, the ecological value of the Site may change and the Site should therefore be subject to an update survey.

Figures



waterman

- Site Boundary
- Building / Structure
- B — Building Number
- Hardstanding
- Amenity Grassland
- Ornamental Planting
- Tidal Waters
- Fence
- Scattered Scrub
- 1 — Target Note

N

Project Details	WIE12464-100: Liverpool Cruise Terminal
Figure Title	Figure 1: Habitat Features Plan
Figure Ref	WIE12464-100_GR_PEA_1A
Date	September 2017
File Location	\\s-lncs\wiel\projects\wie12464\100\graphics\pea\issued figures

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APPENDICES

A. Planning Policy and Summarised Flora and Fauna Legislation

National Planning Policy

National Planning Policy Framework, 2012

A1. The National Planning Policy Framework[13] (NPPF) was published in March 2012. Section 11 (outlined below) of the NPPF, 'Conserving and Enhancing the Natural Environment', effectively replaces former Planning Policy Statement 9: Biodiversity and Geological Conservation. However, Government Circular 06/2005[14] - Biodiversity and Geological Conservation: Statutory Obligations and Their Impact within the Planning System, remains valid and is referenced within the NPPF.

A2. The NPPF encourages the planning system to contribute to and enhance the natural and local environment. This should be achieved by:

- *"Protecting and enhancing valued landscapes, geological conservation interests and soils;*
- *Recognising the wider benefits of ecosystem services;*
- *Minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the government's commitment to halt the overall decline in biodiversity, including by establishing ecological networks that are more resilient to current and future pressures;*
- *Preventing both new and existing development from contributing to or being put at an unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability; and*
- *Remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate".*

A3. The NPPF also stipulates that Local Planning Authorities (LPAs), when determining planning applications, should seek to conserve and enhance biodiversity, by applying the following principles:

- *"Development proposals where the primary objective is to conserve or enhance biodiversity should be permitted; and*
- *Opportunities to incorporate biodiversity in and around developments should be encouraged".*

A4. If significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful effects) adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused.

National Planning Practice Guidance, 2014

A5. The Government's National Planning Practice Guidance[15] (NPPG) is intended to provide guidance to local planning authorities and developers on the implementation of the planning policies set out within the NPPF. The guidance of most relevance to ecology and biodiversity is the Natural Environment Chapter, which explains key issues in implementing policy to protect biodiversity, including local requirements.

[13] Department of Communities and Local Government. (2012). *National Planning Policy Framework*.

[14] Department of Communities and Local Government. (2005). *Circular 06/05: Biodiversity and Geological Conservation – Statutory Obligations and their Impact within the Planning System*.

[15] Department for Communities and Local Government. (2014). *National Planning Practice Guidance*. DCLG, London.

Local Planning Policy

Draft Liverpool Local Plan September 2016

A6. The Draft Liverpool Local Plan[16] (LLP) covers the administrative area of the Liverpool and sets out aims and objectives driving developments within the city. The following policies from the LLP are considered applicable in this assessment:

Policy GI 5 - Protection of Biodiversity and Geodiversity

1. Development which may result in a likely significant effect on an internationally important site must be accompanied by sufficient evidence to enable the Council to make a Habitats Regulations Assessment. Adverse effects should be avoided and/or mitigated to ensure that the integrity of internationally important sites is protected. Development which may adversely affect the integrity of internationally important sites will only be permitted where there are no alternative solutions and there are imperative reasons of overriding public interest and suitable compensatory provision is secured. This also applies to sites and habitats outside the designated boundaries that support species listed as being important in the designations of the internationally important sites.

2. Development which may affect other designated sites of nature or geological conservation importance, Priority Habitats, legally protected species and / or Priority Species will be assessed as follows:

- *Development which may cause significant harm will only be permitted for:*
  - *National sites (Mersey Estuary Site of Special Scientific Interest (SSSI)): where there are no alternatives and where the reasons for and the benefits of development clearly outweigh the impact on the nature conservation value of the site and its broader contribution to the national network; Local Sites (Local Nature Reserves (LNRs), Local Wildlife Site (LWS) and Regionally Important Geological/Geomorphological Sites (RIGS)): where the reasons for and the benefits of development clearly outweigh the impact on the nature conservation value of the site and its broader contribution to the Liverpool City Region (LCR)Ecological Network; and Priority Habitats: where the reasons for and the benefits of development on balance clearly outweigh the impact on the nature conservation value of the habitat and its broader contribution to the LCR Ecological Network.*

Biodiversity Action Plans

UK Post-2010 Biodiversity Framework

A7. The Environment Departments of all four governments in the UK work together through the Four Countries Biodiversity Group. Together they have agreed, and Ministers have signed, a framework of priorities for UK-level work for the Convention on Biological Diversity. Published on 17 July 2012, the 'UK Post-2010 Biodiversity Framework'[17] covers the period from 2011 to 2020. This now supersedes the UK Biodiversity Action Plan (UK BAP)[18]. However, many of the tools developed under UK BAP remain of use, for example, background information about the lists of priority habitats and species. The lists of priority species and habitats agreed under UK BAP still form the basis of much biodiversity work in the countries.

A8. Although the UK Post-2010 Biodiversity Framework does not confer any statutory legal protection, in practice many of the species listed already receive statutory legal protection under UK and / or European legislation. In addition, the majority of Priority national (English) BAP habitats and species are now those listed as Habitats of Principal Importance (HoPI) and Species of Principal Importance (SoPI) in England listed under Section 41 (S41) of the NERC Act 2006. For the

[16] Liverpool City Council (2016) *The Draft Liverpool Local Plan I*

[17] JNCC and DEFRA (on behalf of the Four Countries' Biodiversity Group). (2012). *UK Post-2010 Biodiversity Framework*.

[18] HMSO. (1994) *Biodiversity The UK Action Plan*.

purpose of this report, habitats and species listed under S41 of the NERC Act are referred to as having superseded the UK BAP. All public bodies have a legal obligation or 'biodiversity duty' under Section 40 of the NERC Act 2006 to conserve biodiversity by having particular regard to those species and habitats listed under S41.

A9. Based on the results of the PEA the following HoPIs and SoPIs listed under S41 are considered to be of potential value on and/or immediately adjacent to the Site:

- House sparrow (SoPI);
- Starling (SoPI);
- Herring gull (SoPI); and
- Running water (HoPI).

Local Biodiversity Action Plan

A10. At a local level, the Site is covered by the North Merseyside Biodiversity Action Plan[19] (LBAP). This document identifies habitats and species of importance locally and contains local targets relevant for planning and mitigation within Liverpool.

A11. Based on the results of the PEA a number of LBAP priority species (SAPs) and habitats (HAPs) are considered to be of potential value on and/or immediately adjacent to the Site, including:

- Urban birds e.g. house sparrow and swift *Apus apus* (SAPs).

Guidance

Biodiversity 2020: A strategy for England's wildlife and ecosystem services

A12. In October 2010, over 190 countries signed an historic global agreement in Nagoya, Japan to take urgent and effective action to halt the alarming global declines in biodiversity. This agreement recognised just how important it is to look after the natural world. It established a new global vision for biodiversity, including a set of strategic goals and targets to drive action. England's response to this agreement was the publication of '*Biodiversity 2020: A strategy for England's wildlife and ecosystem services*'[20]. The mission for this strategy is:

"to halt overall biodiversity loss, support healthy well-functioning ecosystems and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people."

BS 42020: 2013 Biodiversity: Code of Practice for Planning and Development

A13. The UK commitment to halt overall loss of biodiversity by 2020 in line with the European Biodiversity Strategy and UN Aichi targets[21], is passed down to local authorities to implement, mainly through planning policy. To assist organizations affected by these commitments, BSI has published BS 42020 which offers a coherent methodology for biodiversity management.

A14. This British Standard sets out to assist those concerned with ecological issues as they arise through the planning process in matters relating to permitted development and activities involved in the management of land outside the scope of land use planning, which could have site-specific ecological implications.

[19] Merseyside Biodiversity Group (2008) *North Merseyside Biodiversity Action Plan*

[20] Defra. (2011) *Biodiversity 2020: A strategy for England's wildlife and ecosystem services.*

[21] https://www.cbd.int/sp/targets/

A15. The standard has been produced with input from a number of organisations including the Chartered Institute of Ecology and Environmental Management (CIEEM) and the Association of Local Government Ecologists (ALGE) and provides:

- Guidance on how to produce clear and concise ecological information to accompany planning applications;
- recommendations on professional ethics, conduct, competence and judgement to give confidence that proposals for biodiversity conservation, and consequent decisions/actions taken, are sound and appropriate; and
- direction on effective decision-making in biodiversity management a framework to demonstrate how biodiversity has been managed during the development process to minimize impact.

Legislation

A16. Specific habitats and species receive legal protection in England under various pieces of legislation, including

- The Conservation of Habitats and Species Regulations 2010 (as amended)[22];
- The Wildlife and Countryside Act 1981 (as amended)[23];
- The Natural Environment and Rural Communities Act 2006[24];

[22] HMSO (2010) The Conservation of Habitats and Species Regulations 2010 (as amended).

[23] HMSO (1981) 'Wildlife and Countryside Act 1981 (as amended)'

[24] ODPM (2006) 'Natural Environment and Rural Communities Act (2006)'

B. Photographs

Plate 1: Amenity grassland present on Site

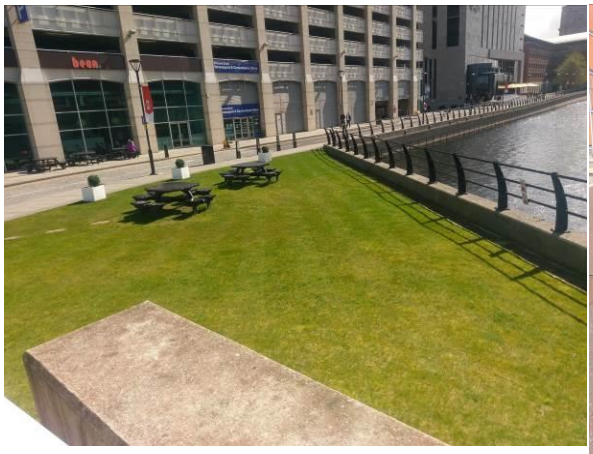
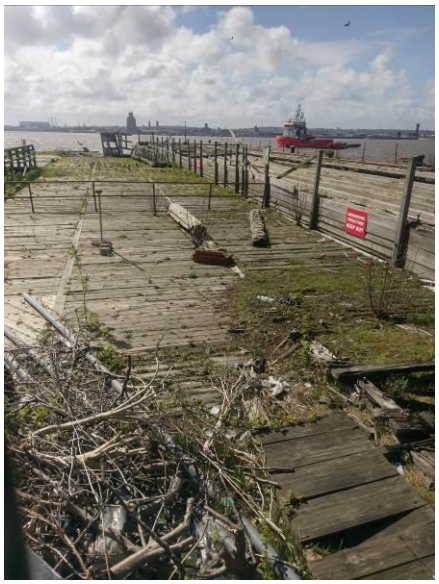


Plate 2: Example of hardstanding present on Site

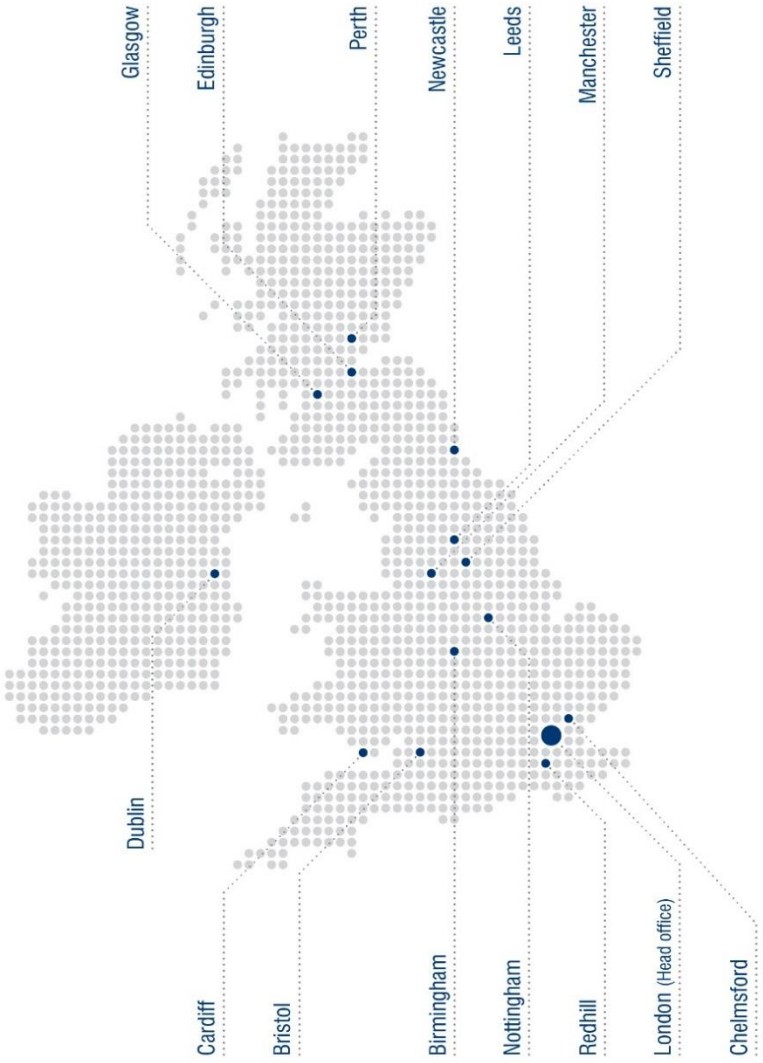
Plate 3: Ornamental planting present in carpark

Plate 4: Large concrete topped jetty

Plate 5: Wooden jetty



UK and Ireland Office Locations



Appendix 13.5a: Summary of Relevant Ecological Legislation, Planning Policy and Guidelines

Legislation, Planning Policy and Guidance

A summary of the main legislation, policy and guidance of relevance to the Ecology assessment is provided below.

International Legislation and Conventions

Table 1: A Summary of International Legislation and Conventions of Relevance to the Project

Title	Summary & Relevance
Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) (the 'Habitats Directive')	Provides a framework for the conservation and management of natural habitats, wild fauna (except birds) and flora in Europe. Its aim is to maintain or restore natural habitats and wild species at a favourable conservation status. The relevant provisions of the Directive are the identification and classification of Special Areas of Conservation (SACs) (Article 4) and procedures for the protection of SACs (Article 6). SACs are identified based on the presence of natural habitat types listed in Annex I and populations of the species listed in Annex II. The Directive requires national Governments to establish SACs, and to have in place mechanisms to protect and manage them. SACs are also termed Natura 2000 sites, and those that are covered by tidal water (continuously or intermittently) are also termed 'European Marine Site' (EMS) - although this is not a statutory site designation.
Birds Directive - Council Directive 2009/147/EC on the Conservation of Wild Birds	This Directive provides a framework for the conservation and management of wild birds in Europe. The most relevant provisions of the Directive are the identification and classification of Special Protection Areas (SPAs) for rare or vulnerable species listed in Annex I of the Directive and for all regularly occurring migratory species (required by Article 4). It also establishes a general scheme of protection for all wild birds (required by Article 5). The Directive requires national Governments to establish SPAs and to have in place mechanisms to protect and manage them. The SPA protection procedures originally set out in Article 4 of the Birds Directive have been replaced by the Article 6 provisions of the Habitats Directive.
Water Framework Directive (WFD) (2000/60/EC)	The WFD establishes a framework for the management and protection of Europe's water resources. It is implemented in England and Wales through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (the Water Framework Regulations). The aim of the WFD is to achieve 'good ecological and chemical status' (or Potential for Heavily Modified Water Bodies) in all inland and coastal waters (up to 1 nautical mile for ecological status and 12 nautical miles for chemical status) by 22nd December 2021 unless alternative objectives are set or there are grounds for derogation. Ecological status is an expression of the quality of the structure and functioning of surface water ecosystems as indicated by the condition of a number of 'quality elements'. These include hydro-morphological, chemical and biological indicators (which in coastal waters are phytoplankton, other aquatic flora (including macroalgae and angiosperms) and benthic invertebrates). The development and implementation of strategic long-term River Basin Management Plans (RBMPs) is a key requirement of the WFD. They include a programme of measures outlining the on-going monitoring and management actions required for water bodies to achieve 'good' status/potential.
Marine Strategy Framework Directive (MSFD) (2008/56/EC)	The MSFD aims to achieve Good Environmental Status (GES) in Europe's seas by 2020 and applies beyond 1 nautical mile from the coast in England and Wales. GES involves protecting the marine environment, preventing its deterioration and restoring it where practical, while using marine resources sustainably. The Directive sets out 11 high-level Descriptors of GES which cover all the key aspects of the marine ecosystem and all the main human pressures on them. The European Commission has also produced a Decision document (Commission Decision 2010/477/EU) which provides more detailed criteria and indicators of GES which Member States must use when implementing the Directive. The Directive came into force on 15th July 2008, and was transposed into UK law via the Marine Strategy Regulations 2010.
EIA Directive (2011/92/EU)	The EIA Directive (2011/92/EU) requires the assessment of the effects of certain public and private projects on the environment.

Title	Summary & Relevance
EIA amending Directive (2014/52/EU)	EIA amending Directive (2014/52/EU) of 16 April 2014 amends Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment. In particular it simplifies the rules for assessing the potential effects of projects on the environment and improves the level of environmental protection.
EU Alien Invasive Species Regulation (Regulation No 1143/2014)	This regulation outlines the European Commission's proposals for new legislation to prevent and manage the introduction and spread of invasive non-native species which were made on 9th September 2013. The proposal is designed to establish a framework for action to prevent, minimise and mitigate the adverse impacts of invasive non-native species on biodiversity and ecosystem services and focuses on a list of invasive alien species of EU concern, which will be drawn up with Member States using risk assessments and scientific evidence. Selected species will be banned from the EU, meaning it will not be possible to import, buy, use, release or sell them. The proposal is for three types of intervention: prevention; early warning and rapid response; and management. The Regulation came into force on 1st January 2015.
Convention for the Protection of the Marine Environment of the North-East Atlantic (the 'OSPAR Convention'), 1992	This is the mechanism by which fifteen governments of the western coasts and catchments of Europe, together with the European Community, cooperate to protect the marine environment of the North-East Atlantic. The Convention included the establishment of a list of threatened and/or declining species and habitats which provides an overview of the species/habitats in need of protection in the North-East Atlantic and is being used by the OSPAR Commission to guide the setting of priorities for further work.
Ramsar Convention on Wetlands of International Importance (1972)	In accordance with Government advice in both England and Wales, Ramsar sites (internationally important wetlands) must be given the same consideration as European sites, so they are afforded the same protection as those under the Habitats Directive - Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora.
Convention on the Conservation of European Wildlife and Natural Habitats (the 'Bern Convention')	This Convention was adopted in Bern, Switzerland in 1979, and came into force in 1982. The principal aims of the Convention are to ensure conservation and protection of all wild plant and animal species and their natural habitats (listed in Appendices I and II of the Convention), to increase co-operation between contracting parties, and to afford special protection to the most vulnerable or threatened species (including migratory species).
Convention on the Conservation of Migratory Species of Wild Animals (the 'Bonn Convention')	This Convention was adopted in Bonn, Germany in 1979 and came into force in 1985. Contracting Parties work together to conserve migratory species and their habitats by providing strict protection for endangered migratory species (listed in Appendix 1 of the Convention), concluding multilateral agreements for the conservation and management of migratory species which require or would benefit from international co-operation (listed in Appendix 2 of the Convention), and by undertaking co-operative research activities.
ASCOBANS	ASCOBANS was concluded in 1991 as the Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS) under the auspices of the Convention on Migratory Species (Bonn Convention) and entered into force in 1994. In February 2008, an extension of the agreement area came into force which changed the name to **Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas. Under ASCOBANS regional conservation plans have been developed for small cetaceans.**
Council Regulation (EC) No 1100/2007	This Regulation establishes a framework for the protection and sustainable use of the stock of European eel of the species *Anguilla anguilla* in Community waters, in coastal lagoons, in estuaries, and in rivers and communicating inland waters of Member States that flow into the seas in ICES areas III, IV, VI, VII, VIII, IX or into the Mediterranean Sea. It was transposed into UK law by the Eels (England and Wales) Regulations 2009 (the 'Eels Regulations') (see below).
Convention on Biological Diversity 1992	The Convention focuses on the conservation of all species and ecosystems and, therefore, provides protection to all biodiversity. The Convention requires the development of national strategies, plans or programmes for the conservation and sustainable use of biodiversity, its sustainable use, and equitable sharing of benefits arising from the utilisation of natural resources (i.e. the Ecosystem Approach). In accordance with this, the UK developed Biodiversity Action Plans (BAPs) (see below).

National Legislation

Table 2: A Summary of National Legislation of Relevance to the Project

Title	Summary & Relevance
Marine and Coastal Access Act 2009	This Act is the UK interpretation of the MSFD and aims to enable better protection of marine ecosystems and prevent a decline in marine biodiversity. The Act contains provisions to allow for the designation of Marine Conservation Zones (MCZs) and the creation of a network of Marine Protected Areas (MPAs). MCZs protect a range of nationally important marine wildlife, habitats, geology and geomorphology and can be designated anywhere in English and Welsh inshore and UK offshore waters. Details of nearby MCZs are provided in Baseline Conditions below.
Wildlife and Countryside Act 1981 (amended by the Countryside and Rights of Way (CRoW) Act 2000)	This Act is the principal mechanism for the legislative protection of wildlife in Britain. It consolidates and amends existing national legislation to implement the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) and Council Directive 79/409/EEC on the conservation of wild birds (Birds Directive) in Great Britain. The Act provides for the designation of Sites of Special Scientific Interest (SSSIs), which are selected as the best national examples of habitat types, sites with notable species and sites of geological importance. Various species of marine animals are also protected from being killed, injured or disturbed under provisions in Schedule 5 of the WCA 1981.
National Environment and Rural Communities (NERC) Act 2006	The NERC Act 2006 makes provision for bodies concerned with the natural environment and rural communities, amends protection for some designated wildlife areas and amends the law relating to rights of way. Section 41 of the Act required the Secretary of State to publish a list of habitats and species of principal importance for the conservation of biodiversity in England. This list (the S41 list) includes habitats and species which were identified as requiring action in the UK Biodiversity Action Plan (UK BAP) in line with the 1992 Convention on Biological Diversity.
Eels (England and Wales) Regulations 2009 (the 'Eels Regulations')	These regulations transpose the Council Regulation (EC) No 1100/2007 to UK law and afford new powers to the Environment Agency to implement measures for the recovery of European eel stock. It applies to all freshwater and estuarine waters in England and Wales and the aim is to achieve 40% escapement of adult eels relative to escapement levels under pristine conditions.
The Protection of Badgers Act 1992	In the UK badgers are primarily afforded protection under the Protection of Badgers Act 1992. This makes it illegal to wilfully kill, injure, take, possess or cruelly ill-treat a badger, or to attempt to do so and to intentionally or recklessly interfere with a sett. Sett interference includes disturbing badgers whilst they are occupying a sett, as well as damaging or destroying a sett or obstructing access to it.
The Town and Country Planning (Environmental Impact Assessment) Regulations 2017	The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 ('the TCP Regulations') transpose the 2014 amended EIA Directive into UK law. The objective of the EIA Directive is to provide a high level of protection of the environment and to help integrate environmental considerations into the preparation of proposals for development to reduce their impact on the environment. The EIA Directive prohibits the granting of consent for development which is likely to have a significant effect on the environment unless an EIA has been carried out. The TCP Regulations set out how this will be done within the UK.
The Conservation of Habitats and Species Regulations (2010)	The Conservation of Habitats and Species Regulations 2010 (the 'Habitats Regulations') consolidate and update the Conservation (Natural Habitats, &c.) Regulations 1994. The 1994 Regulations transposed Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (EC Habitats Directive) into national law. The Regulations implement the Habitats and Birds Directives and make provision for the protection and management of sites, including the control of potentially damaging operations that may affect designated sites.
Conservation of Seals Act (1970)	Provide for the protection and conservation of seals in England and Wales and Scotland and in the adjacent territorial waters.

National Policy

Table 3: A Summary of National Policy of Relevance to the Project

Title	Summary & Relevance
UK Marine Policy Statement (MPS)	This is the framework for preparing Marine Plans and taking decisions affecting the marine environment. Adopted by the UK Government, the Scottish Government, the Welsh Government and the Northern Ireland Executive, the MPS is intended to help achieve the shared UK vision for clean, healthy, safe, productive and biologically diverse oceans and seas. The MPS aims to enable an appropriate and consistent approach to marine planning across UK waters, and to ensure the sustainable use of marine resources and strategic management of marine activities from renewable energy to nature conservation, fishing, recreation and tourism.
National Planning Policy Framework	The National Planning Policy Framework ('the Framework') was published in March 2012. The Framework replaces previous Planning Policy Statements including Planning Policy Statement 9 (PPS9) Biodiversity and Geological Conservation. The Framework is a material consideration that must be taken into account in the determination of planning applications. The Framework requires that an overall approach is taken to sustainable development, incorporating social, economic and environmental dimensions which should not be considered in isolation. A section of the framework document addresses 'Conserving and enhancing the natural environment'. Amongst other objectives this section indicates when determining planning applications, local planning authorities should aim to conserve and enhance biodiversity by applying a number of outlined principles.
UK Post-2010 Biodiversity Framework	The UK Post-2010 Biodiversity Framework has succeeded the UK Biodiversity Action Plan (UK BAP). The Framework demonstrates how the work of the four countries and the UK contributes to achieving the Aichi Biodiversity Targets, and identifies the activities required to complement the country biodiversity strategies in achieving the targets. Although the UK BAP has been superseded, the list of UK BAP priority habitats and species remains a useful reference for local authority decision-makers and forms the basis of the Section 41 list of the NERC Act (see above)

Local Policy

Table 4: A Summary of Local Policy of Relevance to the Project

Title	Summary & Relevance
Marine Plans	The English coastline has been divided into 12 inland and offshore Marine Planning Zones (MPZs). At present, the East Coast Inshore and East Coast Offshore plans have been published following an extensive stakeholder engagement process, and all others are currently in development. The Project lies within the North West Inshore MPZ. As the plan has yet to be produced, the MPZ will act as the planning framework for the proposed Project, along with terrestrial policies and guidance, primarily the National Planning Policy Framework.
Local Plan	The draft Liverpool Local Plan 2016 sets out the sets out the Council's policies and proposals for the way in which land, buildings and infrastructure should be developed. The proposed Project is located within the Liverpool City Council area.
North Merseyside Biodiversity Action Plan	The North Merseyside Biodiversity Action Plan aims to help local people become more aware of the area's natural environment and the issues facing it. It includes individual Species and Habitat Action Plans. This plan currently covers terrestrial and freshwater habitats and species only however there are plans to review the plan and incorporate the North West Coast and Marine Biodiversity Action Plan.
Mersey Estuary Management Plan	The MEMP 2007 provides a framework for co-ordinated action among the local authorities and interest groups of the Mersey Estuary.

Title	Summary & Relevance
Mersey Waterfront Regional Park Strategic Framework	The objectives of this Strategic Framework are to establish a vision for the Mersey Waterfront Regional Park to 2020 to provide a more integrated approach to coastal planning and management including the protection and enhancement of biodiversity and habitats.

Appendix 13.6a: Consideration of Liverpool Bay SPA

The text in this Appendix relates to the specific text concerning Liverpool Bay SPA that is included within the broader set of comments in Section 4.1 Nature Conservation Designations of the MMO's EIA Scoping Opinion. The MMO state: "*Liverpool Bay SPA was fully classified as an SPA on 31 October 2017. The site must be considered within any assessments coming forward as a whole site rather than two distinct sites. All interest features of the site need to be included in the ES and the most up to date citation for population figures of the birds must be used. As a result of the extension to the SPA, numbers of red throated diver and common scoter have also been amended, please refer to the site citation for up to date population numbers"*.

At the time that the November 2017 ES was prepared the Liverpool Bay European Site nature conservation designation consisted of two components:

A. The classified Liverpool Bay SPA; and
B. The proposed extension to the Liverpool Bay SPA (usually referred to as the Liverpool Bay pSPA).

Both components, along with their associated interest features, were assessed in the November 2017 ES Chapter 13: Marine Ecology, Ornithology and Terrestrial Ecology. This complies with the UK Government policy[128] that proposed SPAs should be assessed in the same manner as classified SPAs. Both components, along with their associated interest features, were the subject of a screening process included in Appendix 13.2a of the ES Addendum.

For clarity and ease of reference by the MMO (noting that it makes no difference to the outcome of the assessment) the relevant scoping, screening and assessment text is repeated below, and updated where necessary, on the basis of the newly classified site, all its interest features and the up to date population numbers.

Update to Screening Appendix (Appendix 13.2a of the ES Addendum)

As part of a scoping process to inform the Screening Appendix (the scoping process is not explicitly recorded in the Screening Appendix but is alluded to in Section 1.2) there was consideration of what might be the "*potential sources of adverse effects on birds arising from the proposed development*". When considering potential effects in the operation and maintenance phase, two potential issues that have now been raised by the MMO were considered and judged at the time of preparing the Screening Appendix to be out of the scope of assessment. These issues and why they were considered out of scope were:

Potential effects in O&M phase: Maintenance dredging in the River Mersey

There will not be any maintenance dredging associated with the Project. Accordingly, this potential source of effect was scoped out of the assessment of ornithology receptors.

[128] Office of the Deputy Prime Minister, 2005. Government Circular: Biodiversity and Geological Conservation – Statutory Obligations and their Impact within the Planning System. ODPM Circular 06/2005. 16th August 2005

Potential effects in O&M phase: Cruise ship movements from the River Mersey to open marine waters

Cruise ships using the LCT would enter and leave the River Mersey and traverse through to open marine waters using existing shipping channels. Such routes are already heavily used and their continued use by cruise ships represents no significant change. Accordingly, this potential source of effect was scoped out of the assessment of ornithology receptors.

Protected sites with bird interest features: International and European sites

[Originally Section 3.2.1 and Table 1 with the SPA and pSPA listed separately]

The consolidated text is:

Liverpool Bay SPA was classified, with an extension in area and with additional interest features to the original SPA on 31st October 2017. The SPA is 252,758 ha in extent and adjacent to the proposed development. It is primarily marine waters of the Irish Sea but part includes coastal waters in the Mersey Estuary and intertidal waters in the Dee Estuary. Its bird interest features are red-throated diver (non-breeding, population 1,171 individuals), common scoter (non-breeding, 56,679 individuals), little gull (non-breeding, population 319 individuals), common tern (foraging from an adjoining terrestrial breeding colony, population 180 pairs), little tern (foraging from an adjoining terrestrial breeding colony, population 130 pairs) and a non-breeding waterbird assemblage (69,687 individuals) including as its main components (i.e. >1% GB population or >2,000 birds): Red-throated diver, common scoter, red-breasted merganser and cormorant.

Bird species – occurrence and ecology: Cormorant

[Originally section 3.3.2]

Revision to add the information that this species is an interest feature of the Liverpool Bay SPA through it being a major component of the non-breeding waterbird assemblage. The receptor evaluation remains the same as it was already noted that it was part of the non-breeding waterbird assemblage of the Mersey Narrows and North Wirral Foreshore SPA.

Bird species – occurrence and ecology: Little tern

[Originally section 3.3.12]

Amendment to text so as to refer to this species as a cited species of the Liverpool Bay SPA. The receptor evaluation remains the same as it was already noted that it was an interest feature of a European site.

Bird species – occurrence and ecology: Common tern

[Originally section 3.3.13]

Amendment to text so as to refer to this species as a cited species of the Liverpool Bay SPA. The receptor evaluation remains the same as it was already noted that it was an interest feature of a European site.

Bird species – occurrence and ecology: Little gull

[Originally section 3.3.15]

Amendment to text so as to refer to this species as a cited species of the Liverpool Bay SPA. The receptor evaluation remains the same as it was already noted that it was an interest feature of a European site.

Bird species – occurrence and ecology: Red-throated diver

This bird was not included in the original species accounts because the desk study identified that it did not occur in proximity to the Development. The receptor evaluation, based on it not occurring in proximity to the proposed development and it being an interest feature of a designated site in close proximity, is **local importance**.

Bird species – occurrence and ecology: Red-breasted merganser

This bird was not included in the original species accounts because the desk study identified that it did not occur in proximity to the Development. The receptor evaluation, based on it not occurring in proximity to the Developmentand it being an interest feature of a designated site in close proximity, is **local importance**.

Screening of ornithology receptors: Sites

[Originally Section 5.3 and Table 3]

Originally Liverpool Bay SPA was screened out and Liverpool Bay proposed SPA extension screened in. The consolidated text, with the Liverpool Bay SPA screened in, is:

Site	Overlap with Project boundary	Sited within 1 km of Project	Bird interest feature screened in	Screened in / out
Liverpool Bay SPA	No	Yes	Yes	In

ES Chapter

Existing Baseline Conditions: Designated Sites - European Sites and Ramsar Sites

[Originally Section 13.42-43 and Table 13.8 with the SPA and pSPA listed separately]

The consolidated text is:

Site	Nature Conservation Value	Interest features	Distance to Site (km)
Liverpool Bay SPA	European	Red-throated diver (non-breeding) Common scoter (non-breeding) Little gull (non-breeding) Common tern (foraging from breeding colony) Little tern (foraging from breeding colony) Non-breeding waterbird assemblage: Red-throated diver, common scoter, red-breasted merganser and cormorant.	0

Ornithology receptors: Confirmation of screening

[Originally Section 13.91-99]

This section originally confirmed the outcome reported in the Screening Appendix, that five bird species had been screened in for assessment – oystercatcher, turnstone, redshank, common tern and black redstart. Only one of these is an interest feature of the Liverpool Bay SPA – common tern.

Ornithology receptors: Impact assessment

[Originally Section 13.100-251]

As described above the Liverpool Bay SPA and one of its interest features – common tern – was screened in for assessment.

For clarity a summary of the screening and assessment process and outcomes for all interest features of the Liverpool Bay SPA is provided in a tabulated format below.

Interest feature	Screening	Assessment
Red-throated diver Non-breeding 1,171 individuals	Screened out as not found within close proximity to the Site	N/A
Common scoter Non-breeding 56,679 individuals	Screened out as not found within close proximity to the Site	N/A
Little gull Non-breeding 319 individuals	Screened out as not found within close proximity to the Site	N/A

Interest feature	Screening	Assessment
Common tern Foraging from breeding colony 180 pairs	Screened in as occurs feeding within River Mersey	Construction phase Loss of habitat: None. Neutral effect; no significant impact. Disturbance (visual): None. Neutral effect; no significant impact. Noise & vibration: Localised & temporary. Negligible, no significant impact. Water quality/pollution: Low risk. Negligible, no significant impact. Food chain: Localised & temporary. Negligible, no significant impact. O&M phase Disturbance (visual): None. Neutral effect; no significant impact. Noise & vibration: Localised. Negligible, no significant impact. Water quality/pollution: Low risk. Negligible, no significant impact.
Little tern Foraging from breeding colony 130 pairs	Screened out as not found within close proximity to the Site	N/A
Red-breasted merganser Non-breeding Part of assemblage of 69,687 individuals	Screened out as not found within close proximity to the Site	N/A
Cormorant Non-breeding (assemblage) Part of assemblage of 69,687 individuals	Screened out as only found in low numbers within close proximity to the Site	N/A

Note that should the MMO require that cormorant be screened in, then the impact assessment for cormorant would consider the same potential effects, and the assessment would have the same outcome, as for common tern. This would modify the tabulated information above to:

Interest feature	Screening	Assessment
Cormorant Non-breeding (assemblage) Part of assemblage of 69,687 individuals	Screened in as occurs feeding within River Mersey	Construction phase Loss of habitat: Localised & small scale. Negligible; no significant impact. Disturbance (visual): None. Neutral effect; no significant impact. Noise & vibration: Localised & temporary. Negligible, no significant impact. Water quality/pollution: Low risk. Negligible, no significant impact. Food chain: Localised & temporary. Negligible, no significant impact. O&M phase Disturbance (visual): None. Neutral effect; no significant impact. Noise & vibration: Localised. Negligible, no significant impact. Water quality/pollution: Low risk. Negligible, no significant impact.

Appendix 13.7a: Information to inform a Habitat Regulations Assessment (HRA) Appropriate Assessment

Liverpool Cruise Terminal

Information to inform a Habitat Regulations Assessment (HRA) Appropriate Assessment

October 2019

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Project Number: WIE12464-100

Quality Assurance – Approval Status

This document has been prepared and checked in accordance with
Waterman Group's IMS (BS EN ISO 9001: 2008, BS EN ISO 14001: 2004 and BS OHSAS 18001:2007)

Issue	Date	Prepared by	Checked by	Approved by
10-2-1-HRA	November 2017	Niall Machin Associate Director	Simon Dowell Senior Consultant	Gavin Spowage Associate Director
Comments:	HRA to support planning application			
10-4-1-HRA	June 2018	Niall Machin Associate Director	Gavin Spowage Associate Director	Gavin Spowage Associate Director
Comments:	HRA to support application for HRO and Marine Licence			
11-2-3-AA	January 2019	Niall Machin Associate Director	Gavin Spowage Associate Director	Gavin Spowage Associate Director
Comments:	HRA and Appropriate Assessment to support application for HRO and Marine Licence			
11-3-1-AA	October 2019	Niall Machin Associate Director	Gavin Spowage Associate Director	Gavin Spowage Associate Director
Comments:	Addressing Natural England consultation responses			

Disclaimer

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1. Introduction

Background

1.1. Waterman Infrastructure & Environment Ltd ('Waterman') was commissioned by Liverpool City Council ('LCC') to carry out a Habitat Regulations Assessment ('HRA') Screening Report in relation to LCC's proposals to construct a permanent cruise terminal facility (the 'Development') at Princes Parade, Liverpool (the 'Site'). Further details of the Development can be found in section 2 of this report. The HRA Screening Report (ref WIE12464-100-10-4-1-HRA) was published in June 2018 in support of LCC's application for planning permission in respect of the Development.

1.2. The HRA Screening Report identified *'possible impacts from dismantling, construction and operation from conversion of existing terminal facilities to the proposed new terminal on Liverpool Bay SPA feature great cormorant*' but concluded that '*with the mitigation proposed for great cormorant*[1] *resting and roosting areas there would be no likely significant impacts'*.

1.3. In Spring 2018, the Court of Justice of the European Union ('CJEU') gave its ruling in the People Over Wind case, which provided a new interpretation of when and how mitigation measures should be considered in an HRA. In departing from previous decisions, the CJEU held that measures designed specifically to avoid or reduce likely significant effects should not be evaluated at the screening stage but reserved for the appropriate assessment.

1.4. In August 2018, the Mersey Docks and Harbour Company ('MDHC') applied to the Marine Management Organisation ('MMO') for a Harbour Revision Order ('HRO') in respect of the Development. The statutory objection/representation period in relation to the HRO application ran from 10 August 2018 to 21 September 2018. Natural England ('NE'), as a statutory consultee, were consulted about the application by the MMO. In their response to the consultation[2], Natural England stated:

- *In summary, Natural England advises that there is likely significant effect, therefore a requirement for appropriate assessment, and as it stands insufficient information within the application documents to conclude that the proposed works, as described in the Harbour Revision Order, will not have an adverse effect on the internationally designated sites. This is due to uncertainty of the mitigation measures required (particularly for cormorants).*
- *Whilst Natural England concurs with the overall conclusion that the application will result in likely significant effect (i.e. for cormorant) we advise that the assessment currently does not provide enough information and/or certainty to justify the assessment conclusion. Where there is a likelihood of significant effects (excluding any measures intended to avoid or reduce harmful effects on the European Site), or there are uncertainties, a competent authority should undertake an Appropriate Assessment in order to fully assess the implications of the proposal in view of the conservation objectives for the European sites in question. Natural England therefore advises that an Appropriate Assessment should now be undertaken.*
- *Natural England highlights the recent ruling made by the Court of Justice of the European Union (the CJEU) on the interpretation of the Habitats Directive in the case of People Over Wind and Sweetman vs Coillte Teoranta (ref: C 323/17). The case relates to the treatment of mitigation measures at the screening stage of a HRA when deciding whether an appropriate assessment of a plan/project is required. The Court's Ruling goes against established practice in the UK that mitigation measures can, to a certain degree, be taken into account at the screening stage. As a result, Natural England advises that any "embedded" mitigation relating to protected sites under the Habitat Regulations 2017 Regulation 63 (1) should no longer be considered at the screening*

[1] For the rest of this report, this species will be referred to as 'cormorant' in line with NE advice.
[2] DC10147 The Proposed Mersey Docks and Harbour Company (Liverpool Cruise Terminal Extension) Harbour Revision Order Location: Princes Jetty, Princes Dock Liverpool

stage, but taken forward and considered at the appropriate assessment stage to inform a decision as to whether no adverse effect on site integrity can be ascertained. In light of the recent case law, any reliance on measures intended to avoid or reduce harmful effects at the likely significant stage is vulnerable to legal challenge.

- *Mitigation. We advise that consideration of appropriate mitigation measures for the overall scheme should be provided as part of the application for the HRO. Whist we acknowledge detailed methodologies may be provided later through planning and marine licence applications, we advise that sufficient detail and commitment is required to justify and support conclusions of an appropriate assessment to demonstrate that there will be no adverse effect on site integrity and therefore no further progression through the Habitats Regulations tests will be required.*
- *In combination and cumulative assessment: Wirral Waters Scheme. We disagree with the comments that state that there is little biodiversity interest within the Wirral Waters site and that the ecological receptors are not significantly affected by the proposed (Wirral Waters) works (EAD 15 pg. 25) One of the key species identified at outline planning permission stage for which mitigation would be required was cormorant. Furthermore, since the outline permission was granted a colony of breeding common terns have become established in East Float dock. Natural England has been providing advice on the schemes coming forward and has highlighted that mitigation measures (for cormorants and common terns) will be required to avoid adverse effect on site integrity.*
- *Uncertainties remain relating to effects that may become significant when considered in combination with other plans or projects. ….consideration also needs to be given to the in combination effects with other plans and projects (if it can be determined that the project itself would not result in likely significant effect).*
- *The in combination assessment needs to assess whether there are any other plans and projects in the vicinity which have the same effect as this development i.e. habitat loss and displacement. We advise that as part of any in combination assessment you consider all schemes which may impact on the interest features of designated sites. This could include plans or projects from neighbouring Local Planning Authorities and the MMO.*
- *We acknowledge that Port related activities have been included, however there is limited evidence to demonstrate what is meant by these and how they have been considered in combination. The recent application for the Twelve Quays Terminal at Birkenhead could also be included within the in combination assessment.*

1.5. This HRA has therefore been updated to reflect comments received from NE in response to the HRO consultation, including NE's request that an Appropriate Assessment be undertaken. This HRA supersedes the versions of the HRA submitted with the November 2017 ES (entitled 'Information to Inform a Habitats Regulations Assessment (HRA) Screening Report: Assessment of Likely Significant Effects (ALSE), November 2017') and the ES Addendum (first issue, June 2018) (entitled 'Information to Inform a Habitats Regulations Assessment (HRA) Screening Report: Assessment of Likely Significant Effects (ALSE), June 2018') in their entirety.

Habitats Regulations Assessment of Projects, Natura 2000 and European Sites

1.6. Natura 2000 is the cornerstone of European nature conservation policy; it is an EU-wide network of Special Protection Areas ('SPA') classified under the 1979 Birds Directive and Special Areas of Conservation (SAC) designated under the 1992 Habitats Directive. Together, the network comprises

over 25,500 sites and safeguards the most valuable and threatened habitats and species across Europe; it represents the largest, coordinated network of protected areas in the world.

1.7. In the UK, the individual sites are more commonly referred to as 'European sites' which, according to UK Government policy[3], also comprise 'Wetlands of International Importance', or Ramsar sites. Around 8.6% of the UK land area forms part of this network including, locally, sites such as Liverpool Bay SPA, Mersey Narrows and North Wirral Foreshore SPA and Ramsar, the Mersey Estuary SPA and Ramsar and the Dee Estuary SPA and Ramsar sites.

1.8. Importantly, HRA employs the precautionary principle and Regulation 63 of the Habitats Regulations 2017 (SI 2017/1012) (the 'Regulations') ensures that where a project is '*likely to have a significant effect'* ('LSE'), it can only be approved if it can be ascertained that it '*will not adversely affect the integrity of the European site*'.

1.9. To enable this decision to be made, the Regulations employ a series of mandatory tests outlined in Fig 1 (derived from Circular 06/05[4]) which must be followed. In practical terms however, experience gained from implementation of the process since their inception in 1994 has encouraged the adoption of additional filters at the outset to explore if the project even needs to be subject to HRA at all. This more practical approach is described in Fig 2 where many of the component steps are given expression. It is the process described in Fig 2 that is followed in this HRA.

3 ODPM Circular 06/2005 Government Circular R: Biodiversity and Geological Conservation – Statutory Obligations and their Impact within the Planning System (16 August 2005)

4 Circular 06/05: Biodiversity and Geological Conservation – Statutory Obligations and Their Impact Within the Planning System. ISBN 9780117539518

Figure 1: Consideration of development proposals affecting European sites

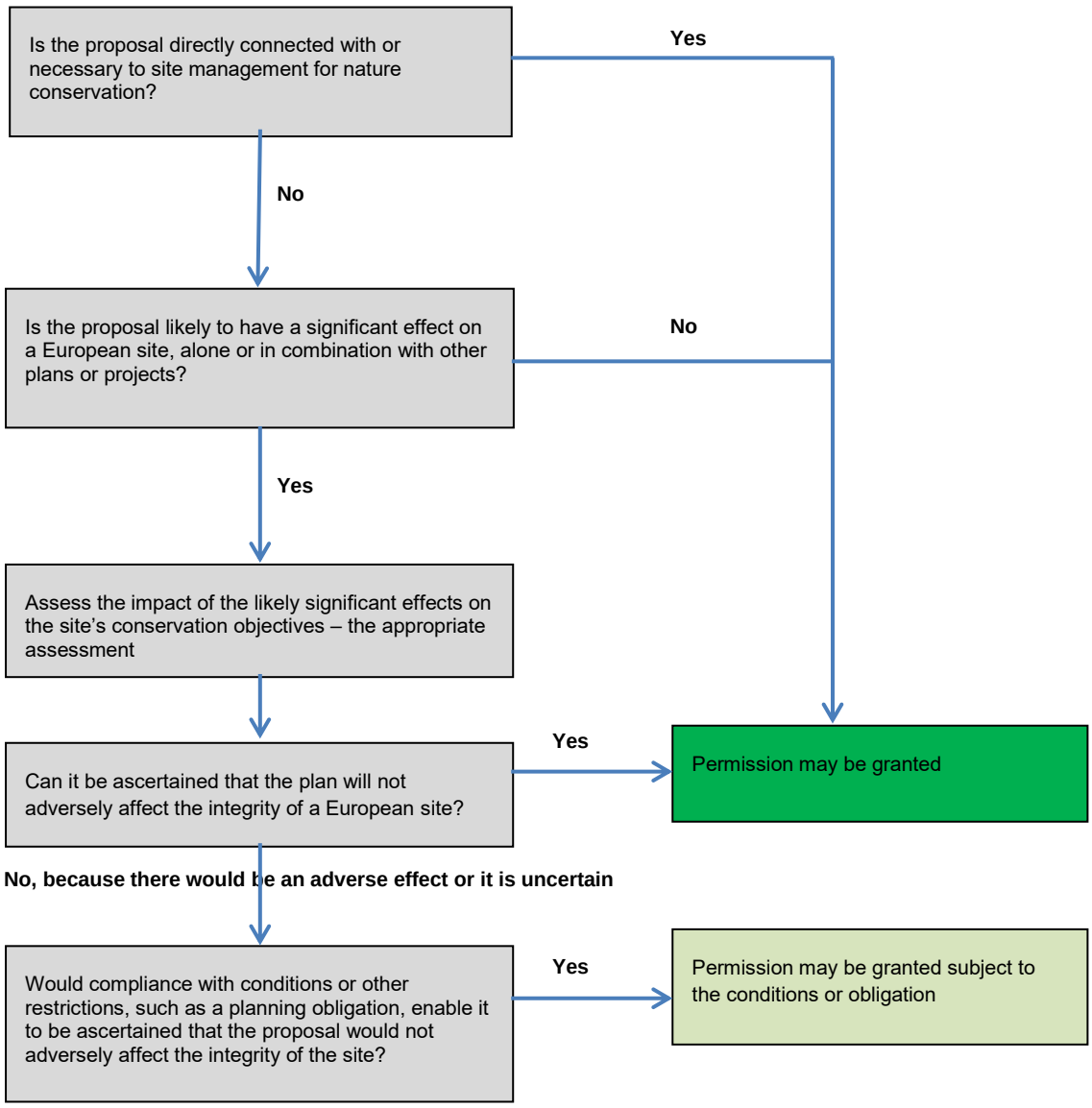
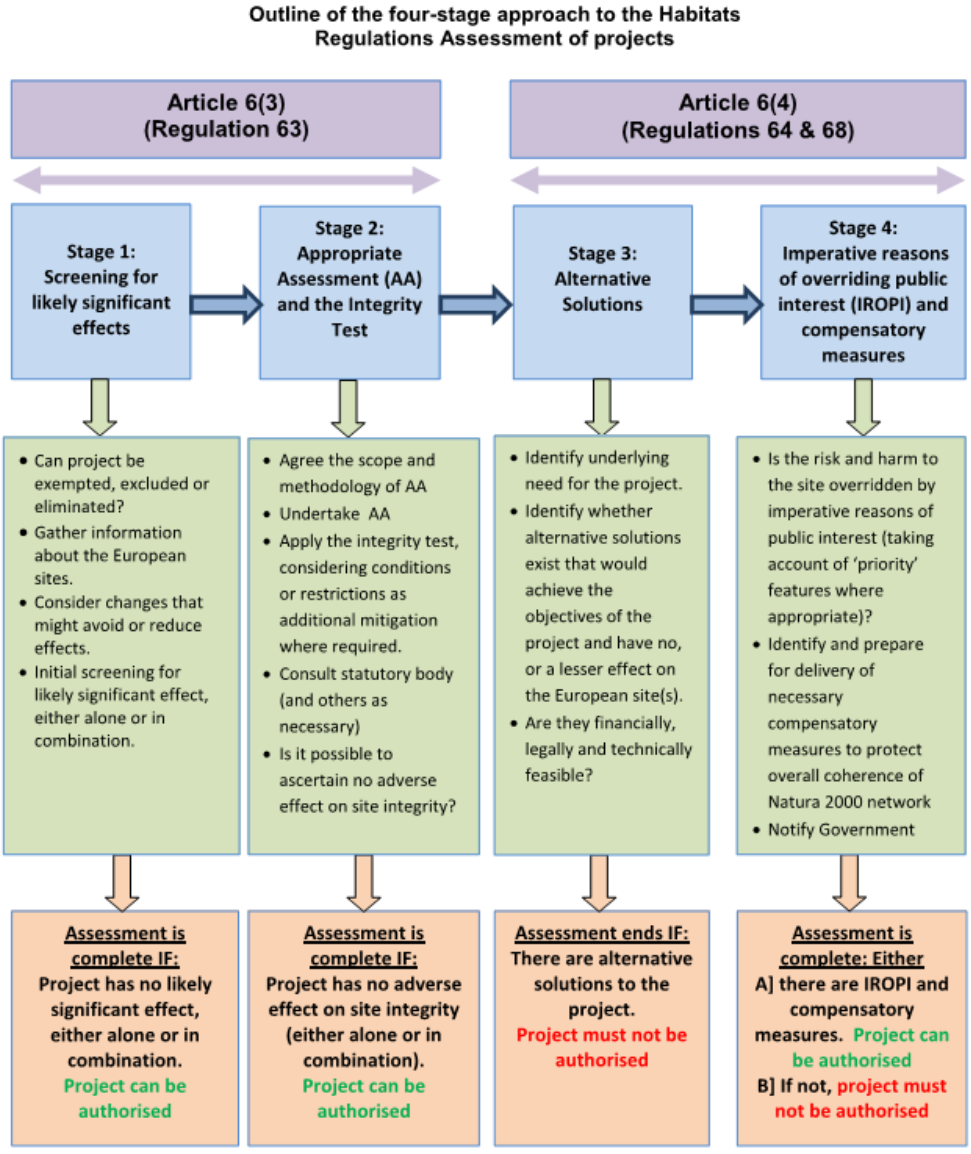


Figure 2: Outline of the four stage approach to the assessment of projects under the Habitats Regulations[1]



1.10. So, for example, the initial test adopted in this HRA (in section 2) firstly explores if the project can be excluded from the HRA simply because it is considered that it could not have any conceivable effect on a European site before exploring whether the project is actually necessary for the management of a European site (in section 2 of this HRA).

1.11. If the project cannot be ruled out at this stage, the competent authority (i.e. the Council) must then identify whether the project is *'… likely to have a significant effect on a European Site … either alone or in combination with other plans or projects'* and with or without mitigation. If significant effects are found to be absent or can be avoided, the project may be adopted without further scrutiny.

1.12. An *in-combination* assessment is required only where an impact is identified which is so small that *alone*, its effects would not be significant but, when combined with other minor effects on the same feature from other plans or projects, the combined 'residual effects' become significant. Together, these first few steps of Stage 1 (in Fig 2 – shown for plans but equally applicable for projects) are often referred to as '*screening*'.

1.13. In order to carry out this screening exercise, this HRA relies heavily on the Habitats Regulations Assessment Handbook. This draws on best practice and case law at home and across the EU to identify over 180 principles that inform how HRA should be carried out. Subscribers to the Handbook include Natural England, the Environment Agency and the Planning Inspectorate which ensures that key decision-makers utilise the approach shown in Fig 2. In addition, the design and layout of the HRA has been influenced by a number of HRAs from over the years.

1.14. Three principles are particularly relevant here:

- *… irrespective of the normal English meaning of 'likely', in this statutory context a 'likely significant effect' is a possible significant effect; one whose occurrence cannot be excluded on the basis of objective information';*
- *A significant effect is any effect that would undermine the conservation objectives for a European site …;*
- *'Objective', in this context, means clear verifiable fact rather than subjective opinion. … There should be credible evidence to show that there is a real rather than a hypothetical risk of effects that could undermine the site's conservation objectives. Any serious possibility of a risk that the conservation objectives might be undermined should trigger an 'appropriate assessment'.*

1.15. The level of scrutiny in a screening exercise is important both in terms of the level of scrutiny and the depth of the evidence base. Indeed, the third principle above highlights that the initial screening phase is not meant to be exhaustive, a point candidly described by Advocate General Sharpston in paragraphs 49 and 50 of the Sweetman case[5] when describing the levels of scrutiny to be applied to each test as follows:

> '*The threshold at the first stage* [the test for LSE] *… is thus a very low one. It operates merely as a trigger, in order to determine whether an appropriate assessment must be undertaken … The threshold at (the second)* [the appropriate assessment] *stage is noticeably higher than that laid down at the first stage. That is because the question (to use more simple terminology) is not 'should we bother to check?' (the question at the first stage) but rather 'what will happen to the site if this plan or project goes ahead …'*.

1.16. The judge in the Bagmoor Wind case[6] was similarly clear:

> '*If the absence of risk … can only be demonstrated after a detailed investigation, or expert opinion, that is an indicator that a risk exists and the authority must move from preliminary examination to appropriate assessment*'.

1.17. HRA is an iterative process enabling the early identification of potential conflicts and providing the opportunity to resolve them prior to submission/approval, perhaps by steering development away from sensitive sites or by influencing their design or scale. As both the European Court of Justice and domestic courts have shown though, there are limits to the effectiveness of undertaking a full, formal assessment during these early stages when evidence regarding ecological matters and indeed the actual allocations is often lacking.

1.18. This is where a way has to be found that whilst mindful of the need for the precautionary principle to be applied, the HRA must strive to identify only those plausible effects and not the extremely unlikely.

5 C-258/11 Sweetman reference for a preliminary ruling from the Supreme Court of Ireland .. opinion of the Advocate General 22 November 2012

6 Bagmoor Wind Limited v The Scottish Ministers Court of Sessions [2012] CSIH 93

Indeed, the Court of Appeal (re Boggis[7]) stated that there should be "*credible evidence that there was a real, rather than a hypothetical, risk"*.

1.19. As stated above, in Spring 2018, the European Court of Justice gave its ruling on the People Over Wind case which provided a new interpretation of when and how mitigation measures should be considered in an HRA. In departing from previous decisions, the Court held that measures designed specifically to avoid or reduce likely significant effects should not be evaluated at the screening stage but reserved for the appropriate assessment. The implications of this recent judgment are still to be fully understood, in circumstances where the project which is the specific subject of consideration under the Directive and Regulations itself includes measures which provide for mitigation, but for the avoidance of doubt this HRA takes full account of this ruling by considering mitigation as part of any appropriate assessment.

1.20. Some proposals will already have been considered by Liverpool City Council (as the competent authority with advice sought from Natural England) under the relevant Habitats Regulations during the Local Plan making process. Unless there are reasons for doubt, any extant HRA decisions will always be adopted in this evaluation.

1.21. This is an important point which draws on Defra guidance[8] and C12.1 of the Handbook[9] which allows competent authorities to reduce the duplication of effort by utilising earlier conclusions where there has been no material change in circumstances.

1.22. In terms of the overall need for this exercise, as its origins are firmly embedded in the European Union's Habitats Directive, the decision to leave the EU potentially casts doubt on the need for the HRA. However, UK law and policy is currently unchanged and the need for HRA remains.

1.23. Lastly, although this HRA has been prepared to assist the MMO in discharging its duties under the Regulations, the document is neither designed to, nor can it replace the formal exercise to be undertaken separately by the MMO. The MMO is the competent authority and it must decide to adopt this report or otherwise.

7 Peter Charles Boggis and Easton Bavants Conservation v Natural England and Waveney District Council, High Court of Justice Court of Appeal case C1/2009/0041/QBACF Citation No [2009] EWCA Civ. 1061 20th October 2009

8 Habitats Directive – Guidance on competent authority coordination under the Habitats Regulations, Defra (July 2012).

9 Tyldesley, D., and Chapman, C., (2013) *The Habitats Regulations Assessment Handbook,* revised July 2018 edition UK: DTA Publications Ltd

2. The Development

Overview of the Development

2.1. LCC is seeking a Marine Works Licence and MDHC is seeking a HRO to construct a new cruise liner terminal facility and supporting infrastructure (i.e. the Development) to replace the existing temporary cruise terminal at the Site (refer to **Figure 3**). The main elements of the Development comprise:

- Demolition of buildings and structures, including controlled removal of the existing Princes Jetty;
- Construction of a new landing stage and suspended deck;
- Construction of a cruise liner terminal building;
- Modification of the existing cruise liner terminal building to accommodate cruise related ancillary uses, including staff facilities and storage, on completion of the new cruise liner terminal;
- Terminal parking, pickup and drop off facilities;
- Erection of vehicular and pedestrian linkspans (linking the new terminal building and the existing pontoons); and
- Erection of passenger boarding bridges.

2.2. The buildings and structures to be demolished comprise:

- Princes Jetty: To facilitate the construction of the new terminal building, the existing Princes Jetty structure must be removed. The jetty is currently in a state of disrepair and is unsuitable for safe berthing of vessels;
- The pilot launch buildings on Pontoon D; and
- Mooring dolphins between Princes Jetty and Pontoon D.

2.3. The new terminal building would be located in the north-west corner of the Site on top of a new suspended deck structure constructed over the River Mersey. The deck would comprise reinforced concrete slabs supported on a grid of precast reinforced concrete beams that would in-turn be supported on steel tubular piles. The pile layout would be coordinated with the new terminal building so that they would support the deck and also act as foundations for the new building.

Proposed Cruise Ship Operations

2.4. There would be two types of cruise liner visit:

- Transit (or 'Port of Call') relates to cruises berthing at Liverpool Cruise Terminal to allow passengers to have a day trip ashore locally or beyond.
- Turnaround:
  - Turnaround disembarkation relates to a cruise ship berthed to allow passengers to leave the ship at the end of their cruise (and to replenish ship's stores). This generally takes place in the morning.
  - Turnaround embarkation relates to the same cruise ship remaining berthed to allow passengers to board the ship at the start of their cruise. This generally takes place in the afternoon to avoid overlapping with the disembarkation operations.

2.5. Table 1 sets out the current estimates for the number of cruise vessels predicted to visit the Development per year in 2018 (2020 is the predicated year of opening) until 2027. Currently (2017) 62 vessels use the existing cruise facility. The season would last from March to November and peak-season would be July and August. These figures have been used for the purposes of assessment within the technical chapters of this ES.

Table 1. Estimated Cruise Liner Visits 2018-2027

Year	Estimated Transit Vessels	Estimated Turnaround Vessels			Target	Estimated Total Passengers
		Medium	Large	Extra-Large	Total	
2018	36	23	1	1	61	
2019	36	24	1	1	62	
2020	37	10	19	1	67	84,000
2021	38	8	19	4	69	86,000
2022	39	8	20	4	71	110,000
2023	39	8	22	5	74	130,000
2024	40	8	24	6	78	140,000
2025	42	8	24	6	80	155,000
2026	42	8	24	6	80	160,000
2027	42	8	24	6	80	170,000

Note: medium vessel = 900 passengers, large vessel = 1500 passengers, extra large vessel = 2500 passengers

Cruise Liner Terminal Building

2.6. The Cruise Liner Terminal Building would be built on the suspended deck described above. It would be a predominantly two-storey building, expected to comprise:

- Baggage x-ray area;
- Baggage hall;
- Customs area;
- Ground floor entrance atrium and departure lounge; and
- Café at 1st floor level.

Drainage Infrastructure

2.7. It is anticipated that surface water from all the areas other than highways areas would be discharged directly to the River Mersey, via interceptors and pollution abatement controls as appropriate.

2.8. Foul water drainage would be connected to the existing public network which runs adjacent to the Site. It is not anticipated that foul water from vessels would be discharged in to the landward sewerage system.

External Lighting

2.9. The external lighting proposals would be designed in accordance with LCC's lighting policies. Detailed lighting strategies would be developed with the agreement of Peel Ports and LCC to ensure that any navigational risks are minimised or eliminated and measures to minimise obtrusive or nuisance light are incorporated.

3. Identifying the European Sites Potentially at Risk

3.1. Drawing on Stage 1 of Fig.2, before identifying potentially vulnerable sites, the Handbook (F3.2 – 3.4) first provides mechanisms that allow exploration of whether the project can be excluded, eliminated or exempted from HRA because it does not lie within the scope of HRA, could have no conceivable impact on any European Site, or is necessary for the management of a European site. As none of these apply, the next steps in Stage 1 of Fig 2 need to be pursued by identifying which European sites and which features may be vulnerable as follows.

3.2. To encourage a consistent, reliable and repeatable process, the *Handbook* (F4.4) identifies 16 generic criteria, listed below in Table 3 (columns 1 & 2), that when evaluated generates a precautionary, 'long' list of European sites in column 3 which might be affected by the project[10]. However, when considered further, (using readily available information and local knowledge) (column 4) the list of plausible threats can be refined and the list of affected sites reduced (column 5). Albeit a coarse filter, this enables the exercise to comply with the Boggis case and attempts to only consider realistic and credible threats whilst avoiding the hypothetical or extremely unlikely.

3.3. In their correspondence[11], MEAS advised that at least the following sites should be included in the ALSE assessment: proposed Liverpool Bay SPA extension, Mersey Narrows SPA/Ramsar; the Mersey Estuary SPA/Ramsar; Ribble and Alt Estuaries SPA/Ramsar; and the Dee Estuary SPA/Ramsar. In 2016 Defra consulted on a proposed SPA extension to Liverpool Bay including further inshore along the River Mersey to offer protection to foraging little gull *Hydrocoloeus minutus* (out to sea), common tern *Sterna hirundo* (breeds Mersey Narrows and North Wirral Foreshore SPA) and little tern *Sternula albifrons* (breeds Dee Estuary). This extension was fully classified as an SPA on 31st October 2017. In addition, we have added the Liverpool Bay SPA and the SACs at the Dee Estuary and Sefton Coast. Therefore, the European sites identified as potentially vulnerable to impacts from the Development comprise the following:

Table 2: European Sites Vulnerable to Effects Arising from the Cruise Ship Terminal

Vulnerable European sites (CCAP HRA)
Liverpool Bay SPA
Mersey Estuary SPA, Ramsar
Mersey Narrows and North Wirral Foreshore SPA, Ramsar
The Dee Estuary SPA, Ramsar, SAC
Ribble and Alt Estuaries SPA, Ramsar
Sefton Coast SAC

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10 This table is taken from the Handbook albeit with changes to the number and titles of columns appropriate to this HRA.
11 MEAS Development Management Advice, 06.09.17 Ref LI17 053, from Lucy Atkinson

Table 3: Potential mechanisms and the initial list of European sites that could be affected

Types of project (or potential effects)	Sites to scan for and check	Initial list of potentially affected European sites	Additional context	Final list of European sites selected
1. All projects (terrestrial, coastal and marine)	Sites within the geographic area relevant to the project / Sites within which the project is wholly or partly located	Liverpool Bay SPA Mersey Estuary SPA, Ramsar Mersey Narrows and North Wirral Foreshore SPA, Ramsar The Dee Estuary SPA, Ramsar, SAC Ribble and Alt Estuaries SPA, Ramsar Sefton Coast SAC	N/A	Unchanged: Liverpool Bay SPA Mersey Estuary SPA, Ramsar Mersey Narrows and North Wirral Foreshore SPA, Ramsar The Dee Estuary SPA, Ramsar, SAC Ribble and Alt Estuaries SPA, Ramsar Sefton Coast SAC
2. Projects that could affect the aquatic environment	Sites upstream or downstream of the project location in the case of river or estuary sites	Liverpool Bay SPA Mersey Estuary SPA, Ramsar	Effects considered are those associated with the physical presence of built development and the *localised* effects on surface and ground water resources and quality resulting from changes in run-off, sedimentation, erosion etc. No development is proposed that could lead to such significant estuarine effects in the vicinity of the list of relevant European sites. Therefore, **effects on the aquatic environment are removed from further consideration.** Marine considerations are set out in 3 below. Note that the *indirect* effects of changes to wastewater disposal are assessed separately under '7d'.	Changed: None
	Open water, peatland, fen, marsh and other wetland sites with relevant hydrological links to the project, irrespective of distance from the project location	None.		
3. Projects that could affect the marine environment	Sites that could be affected by changes in water quality, currents or flows; or effects on the inter-tidal or sub-tidal areas	Liverpool Bay SPA Mersey Estuary SPA, Ramsar Mersey Narrows and North Wirral Foreshore SPA, Ramsar	Impacts from **construction** are expected on great cormorant *Phalacrocorax carbo*, a component species of the bird assemblage	Changed: Liverpool Bay SPA

Types of project (or potential effects)	Sites to scan for and check	Initial list of potentially affected European sites	Additional context	Final list of European sites selected
	or the sea bed, or marine species	The Dee Estuary SPA, Ramsar, SAC Ribble and Alt Estuaries SPA, Ramsar Sefton Coast SAC	feature of Liverpool Bay SPA as a result of temporary loss of roosting/resting structures (Prince's Jetty). Construction impacts are not considered to impact upon other features of the SPA. Construction impacts will not impact other European Sites due to the distances involved being too great in relation to disturbance and the minimal changes from the scheme in relation to water quality, flows, impacts on inter-tidal or sub-tidal areas, sea bed or marine species, including the Mersey Narrows and North Wirral Foreshore SPA & Ramsar which is over 800m away at its closest point (Seacombe Ferry Terminal), where the only feature species present would be roosting/resting cormorant and these birds are over 800m distant and their roosting/resting structures will not be impacted in any way. Noise issues are addressed under 14 below. Other features of the Mersey Narrows and North Wirral Foreshore SPA will not be impacted by disturbance or any changes to water quality, flows, impacts on inter-tidal or sub-tidal areas, sea bed or marine species, because: • Winter waders like knot, bar tailed godwit and other assemblage waders would not be impacted as there are no significant impacts to inter-tidal habitat on	

Types of project (or potential effects)	Sites to scan for and check	Initial list of potentially affected European sites	Additional context	Final list of European sites selected
			western side of River Mersey and the closest inter-tidal habitat is over 1km away. There would be no impact when such species are feeding at low tide in winter and no impacts on any high tide roosts (distances too great and effects negligible). • Other Mersey Narrows SPA feature species are the same as for Liverpool Bay and are addressed elsewhere in this assessment. Impacts from **operational** use include potential impacts from an increase (up to 30%) in cruise liner vessels up to 2025. However, cruise liner operations are guided by strict procedures and standards such that significant impacts on water quality are considered unlikely. Potential impacts upon bird species using Liverpool Bay in relation to disturbance are addressed under 14 below. Sefton Coast SAC and the Dee Estuary SAC are not considered vulnerable to impacts related to shipping/vessels. Whilst some SPAs may be vulnerable to pollution from commercial shipping (chemical pollution, dumping of litter at sea), this is not considered to be an issue for cruise liners given their codes of	

Types of project (or potential effects)	Sites to scan for and check	Initial list of potentially affected European sites	Additional context	Final list of European sites selected
			conduct and methods of operation: therefore the remaining SPAs / Ramsars are considered not to be impacted.	
4. Projects that could affect the coast	Sites in the same coastal 'cell', or part of the same coastal ecosystem, or where there are interrelationships with or between different physical coastal processes	Liverpool Bay SPA Mersey Estuary SPA, Ramsar Mersey Narrows and North Wirral Foreshore SPA, Ramsar The Dee Estuary SPA, Ramsar, SAC Ribble and Alt Estuaries SPA, Ramsar Sefton Coast SAC	Dismantling, construction and operational impacts would not result in any changes to coastal processes.	Changed: None
5. Projects that could affect mobile species	Sites whose qualifying features include mobile species which may be affected by the project irrespective of the location of the project or whether the species would be in or out of the site when they might be affected	Liverpool Bay SPA Mersey Estuary SPA, Ramsar Mersey Narrows and North Wirral Foreshore SPA, Ramsar The Dee Estuary SPA, Ramsar Ribble and Alt Estuaries SPA, Ramsar	With the exception of cormorant, none of the mobile species (e.g. foraging and breeding common tern, foraging and breeding little tern, roosting little gull) relevant to European sites occur on the Development site, although common tern may forage along the adjacent River Mersey. A 30-33% increase in cruise vessels using the Mersey is not considered to impact on foraging common tern, little tern and little gulls which are not affected by ships of this size/speed and such ship movements. Natural England's Site Improvement Plan for Liverpool Bay SPA does not cite little gull, common tern or little tern as features affected by 'transportation and service corridors' (Version 3.0 dated 20.03.2015).	Changed: None

Types of project (or potential effects)	Sites to scan for and check	Initial list of potentially affected European sites	Additional context	Final list of European sites selected
			In general, gulls and terns are generally less affected by disturbance[12]. Impacts on cormorant are addressed in 3 above and 14 below. The 30-33% increase in cruise liner vessels will not impact upon wintering shorebirds (ducks and waders) using the SPA mudflats for feeding, nor wintering sea duck (common scoter, red breasted merganser) and red throated divers (all features of Liverpool Bay SPA): cruises generally operate outside of the winter period when wintering birds use the estuaries and coasts. Cruise liners in Liverpool operate from March through to November. Disturbance impacts are addressed in 14 below.	
6. Projects that could increase recreational pressure on European sites potentially vulnerable or sensitive to such pressure	(a) European sites within which the project would be wholly or partly located	Liverpool Bay SPA	None of the species listed in the Liverpool Bay SPA citation (red throated diver; little gull; little tern; common tern; common scoter; red-breasted merganser; and cormorant) are susceptible to recreational disturbance of the type associated with cruise liners. The main source of potential recreational disturbance from the	Changed. None

[12] Camphuysen, C.J. 1989. Beached bird surveys in the Netherlands 1915-1988; Seabird mortality in the southern North Sea since the early days of Oil Pollution. Techn. Rapport Vogelbescherming 1, Werkgroep Noordzee, Amsterdam. Williams, J.M., Tasker, M.L., Carter, I.C. & Webb, A. 1994. A method of assessing seabird vulnerability to surface pollutants. Ibis, 137, S147-S152. Furness, R.W. & Tasker, M.L. 2000. Seabird-fishery interactions: quantifying the sensitivity of seabirds to reductions in sandeel abundance, and identification of key areas for sensitive seabirds in the North Sea. Marine Ecology Progress Series. 202, 253-264. Garthe, S. & Hüppop, O. 2004. Scaling the possible adverse effects of marine wind farms on seabirds: developing and applying a vulnerability index. Journal of Applied Ecology, 41, 724-734. King, S., Maclean, I. M. D., Norman, T. & Prior, A. 2009. Developing Guidance on Ornithological Cumulative Impact Assessment for Offshore Wind Farm Developers. COWRIE

Types of project (or potential effects)	Sites to scan for and check	Initial list of potentially affected European sites	Additional context	Final list of European sites selected
			proposed development is the 30-33% increase in vessel traffic, i.e. visual disturbance. The predicted vessel usage for future years is indicated in Table 1 with 2020 being the opening year. It is predicted that for the opening year there would be a 'worst case' of 14 cruise ships in the busiest month which is just two more cruise ships than currently use the existing terminal. In 2027, there is predicted to be a slight increase to 16 cruise ships in the busiest month. It is considered that birds in the area listed above are already habituated to regular movement of large vessels and associated visual disturbance within the Mersey Estuary. Therefore, there would be no change in recreational disturbance to foraging and breeding common and little tern, and roosting little gull using the Liverpool Bay SPA as a result of the Development as cruise ship frequencies will remain broadly the same albeit with a small, gradual annual increase.	
	(b) Such European sites within an agreed zone of influence or other reasonable and evidence-based travel distance of the project location boundaries that may be affected by local recreational or other visitor pressure generated by the project	Liverpool Bay SPA Mersey Estuary SPA, Ramsar Mersey Narrows and North Wirral Foreshore SPA, Ramsar The Dee Estuary SPA, Ramsar, SAC Ribble and Alt Estuaries SPA, Ramsar Sefton Coast SAC	There would be no increase in recreational and or visitor pressure on these sites, apart from an increase in cruise vessels (30-33%) which is addressed under 14. It is considered inconceivable that any increases in visitors coming ashore in Liverpool would increase recreational disturbance on any of these sites, given their destination	Changed: None.

Types of project (or potential effects)	Sites to scan for and check	Initial list of potentially affected European sites	Additional context	Final list of European sites selected
			as the City of Liverpool and its urban attractions, especially given the fact that visitors are arriving outside of the winter period and therefore would not impact wintering birds.	
	(c) Such European sites within an agreed zone of influence or other evidence-based longer travel distance of the project, which are major (regional or national) visitor attractions such as European sites which are National Nature Reserves where public visiting is promoted, sites in National Parks, coastal sites and sites in other major tourist or visitor destinations	None	N/a	Unchanged: None
7. Projects that would increase the amount of development	(a) Sites that are used for, or could be affected by, water abstraction irrespective of distance from the project	None	N/a	Unchanged
	(b) Sites used for, or could be affected by, discharge of effluent from waste water treatment works or other waste management streams serving the project, irrespective of distance from the project	Liverpool Bay SPA,	It is anticipated that surface water from the all areas other than highways areas would be discharged directly to the River Mersey, via interceptors and pollution abatement controls as appropriate. Foul water drainage would be connected to the existing public network which runs adjacent to the Site. It is not anticipated that foul water from vessels would be discharged in to the landward sewerage system.	Changed: None

Types of project (or potential effects)	Sites to scan for and check	Initial list of potentially affected European sites	Additional context	Final list of European sites selected
			Codes of conduct and operational standards cover release of sewage from cruise liners at sea.	
	(c) Sites that could be affected by the provision of new or extended transport or other infrastructure	None	Areas of parking associated with the proposed new cruise terminal would be within Plot 11 which is currently already used for car parking. Therefore, no change.	Unchanged: None
	(d) Sites that could be affected by increased deposition of air pollutants arising from the proposals, including emissions from significant increases in traffic	Liverpool Bay SPA.	In the absence of mitigation the contributions of cruise ship emissions and the effect of operational traffic for the Development are predicted to have a potential effect of negligible significance on local air quality at relevant receptors surrounding the Site. In addition, the proposed Development, in line with the recommendations made in the LCC Cabinet Paper (August 2017), would allow future installation of shore-side power should the cruise industry move in that direction and would have the potential to bring about air quality benefits by removing the need for cruise ships to use their engines while in port and therefore reducing pollutant emissions from the cruise ships while they are in port. No major new point source emitters of airborne pollution are proposed on the terminal site. The Development, including any associated road traffic emissions, is predicted to result in a 'negligible' impact at all of the existing sensitive air pollution receptors modelled.	Changed: None.

Types of project (or potential effects)	Sites to scan for and check	Initial list of potentially affected European sites	Additional context	Final list of European sites selected
			Any potential impacts to the River Mersey from construction (e.g. demolition dust) would be addressed by a CEMP. The features of the SPA, including those most relevant to the location (foraging and breeding common tern and little gull, wintering cormorant) would not be affected.	
8 Projects comprising linear developments or infrastructure	Sites within a specified distance from the centre line of the proposed route (or alternative routes), the distance may be varied for differing types of site / qualifying features and in the absence of established good practice standards, distance(s) to be agreed by the statutory nature conservation body	None	No such infrastructure proposed	Unchanged: None
9. Projects that introduce new activities or new uses into the marine, coastal or terrestrial environment	Sites considered to have qualifying features potentially vulnerable or sensitive to the effects of the new activities proposed by the project	None	No such **new** activities proposed	Unchanged: None
10. Projects that could change the nature, area, extent, intensity, density, timing or scale of existing activities or uses	Sites considered to have qualifying features potentially vulnerable or sensitive to the effects of the changes to existing activities proposed by the project	None	Addressed under 14 below.	Unchanged: None
11. Projects that could change the quantity, quality, timing, treatment or mitigation of emissions or discharges to air, water or soil	Sites considered to have qualifying features potentially vulnerable or sensitive to the changes in emissions or discharges that could arise as a result of the project, over and above those already identified	None	Addressed under 3 and 7d above.	Unchanged: None

Types of project (or potential effects)	Sites to scan for and check	Initial list of potentially affected European sites	Additional context	Final list of European sites selected
12. Projects that could change the quantity, volume, timing, rate, or other characteristics of biological resources harvested, extracted or consumed	Sites whose qualifying features include the biological resources which the project may affect, or whose qualifying features depend on the biological resources which the project may affect, for example as prey species or supporting habitat or which may be disturbed by the harvesting, extraction or consumption	None	No such activities proposed	Unchanged: None
13. Projects that could change the quantity, volume, timing, rate, or other characteristics of physical resources extracted or consumed	Sites whose qualifying features rely on the non-biological resources which the project may affect, for example, as habitat or a physical environment on which habitat may develop or which may be disturbed by the extraction or consumption	None	No such activities proposed	Unchanged: None
14. Projects which could introduce or increase, or alter the timing, nature or location of disturbance to species	Sites whose qualifying features are considered to be potentially sensitive to disturbance, for example as a result of noise, activity or movement, or the presence of disturbing features that could be brought about by the project	Liverpool Bay SPA Mersey Estuary SPA, Ramsar Mersey Narrows and North Wirral Foreshore SPA, Ramsar The Dee Estuary SPA, Ramsar Ribble and Alt Estuaries SPA, Ramsar	Disturbance impacts from dismantling, construction and operation from conversion of existing terminal facilities to the proposed new terminal may impact Liverpool Bay SPA (cormorant). Whilst cormorants are acclimatised to noise and disturbance within the dockside environment, there may be some local temporary impact. Impacts from temporary loss of resting/roosting structures is addressed in 3 above. Disturbance would not impact upon other cited Liverpool Bay SPA species. Noise issues from piling are not considered to impact birds cited for	Changed: Liverpool Bay SPA

Types of project (or potential effects)	Sites to scan for and check	Initial list of potentially affected European sites	Additional context	Final list of European sites selected
			other European Sites, including the Mersey Narrows and North Wirral Foreshore SPA/RAMSAR. This SPA is about 850m to the west of the development site and at this distance noise from piling is reduced to 36.2dB and the ES[13] concludes that any effects would be neutral for species of wader associated with the SPA (oystercatcher, redshank, bar-tailed godwit, grey plover, knot, sanderling, dunlin and turnstone). Impacts from **operational** use include potential impacts from an increase (30-33%) in cruise liner vessels up to 2025. Significant impacts on SPA/Ramsar bird features are considered unlikely due to: • Cruise liners run from March to November, therefore there is unlikely to be any significant impact on wintering cormorant, sea duck and divers (i.e. Liverpool Bay SPA), waders and wildflowl using the sea, estuary or mudflats. • Given the deep water required for cruise vessels, there will be no impact to waterbirds using mudflats. No high tide locations are impacted by cruise vessel movements.	

13 Waterman January 2019; Liverpool Cruise Terminal, Environmental Statement Addendum (Second Issue) WIE12464-103-R-ES-Addendum-12-6-1

Types of project (or potential effects)	Sites to scan for and check	Initial list of potentially affected European sites	Additional context	Final list of European sites selected
			• Foraging species such as common tern, little tern and little gull are not impacted by shipping movement. • Dee Estuary SPA, Mersey Estuary SPA/Ramsar and Mersey Narrows and North Wirral Foreshore SPA/Ramsar are considered too distant from cruise vessel movements to be impacted. Seaforth Dock (part of Mersey Narrows SPA) is a high tide roost and also a breeding area for common tern: this site will not be impacted by an increase in cruise liner vessels. Neither will any breeding areas for little tern on the Dee Estuary. • In terms of light pollution, there may be an increased exposure to light pollution from an increase in vessel numbers. Lighting of the terminal building and linkspan bridge would be designed to minimise light spillage in line with the recommendations set out in the Lighting Strategy[14] for the proposed Development. None of the relevant species would be susceptible to light pollution at night essentially in the spring-autumn period (foraging little gulls and common tern active in	

14 Ramboll, 2017. Liverpool Cruise Liner Terminal – External Lighting Statement, Rev 01.

Types of project (or potential effects)	Sites to scan for and check	Initial list of potentially affected European sites	Additional context	Final list of European sites selected
			the daytime; seabirds, divers and wildfowl feeding on the mudflats not significantly affected by March to November vessel movements at high tide/night-time; breeding terns unaffected; cormorants habituated to a degree of light pollution when they roost in cities).	
15. Projects which could introduce or increase or change the timing, nature or location of light or noise pollution	Sites whose qualifying features are considered to be potentially sensitive to the effects of changes in light or noise that could be brought about by the project	None	Addressed under 14 above.	Unchanged: None
16. Projects which could introduce or increase a potential cause of mortality of species	Sites whose qualifying features are considered to be potentially sensitive to the source of new or increased mortality that could be brought about by the project.	None	No such activities proposed	Unchanged: None

3.4. The outputs of the review carried out in Table 1 rules out the possibility of any credible effects from any aspect of the project on all the relevant European Sites, with the exception of possible impacts from dismantling, construction and operation from conversion of existing terminal facilities to the proposed new terminal on Liverpool Bay SPA feature cormorant. The rationale for the assessments set out in Table 3 above are set out in Table 4 below.

Table 4: Detailed Pathway to Impact Assessment

Qualifying feature	European Site affected	Pathway to impact (with Table 3 references)	Assessment of Likely Significant Effects	Conclusion
Dismantling and construction impacts				
SPA cormorant	Liverpool Bay SPA	Impact on marine environment (Type 3). Direct: displacement of birds from feeding, roosting or nesting locations due to loss of land and / or water under the footprint of the construction works. Direct: displacement of birds from feeding, roosting or nesting locations due to noise and / or vibration. Such effects can arise from a number of activities involved in the construction process including vehicle movements, piling etc. Direct: displacement of birds from feeding,	Winter bird surveys during 2017/18[15] recorded a peak count of 12 cormorant, with the majority of these birds perched on permanent structures within the Site, including six birds perched on the Prince's Jetty. The peak count equates to 1.6% of the cormorant population of the Liverpool Bay SPA. Cormorant is not a qualifying species under Article 4.1 of the Birds Directive, rather it is cited as a component of the 'Assemblage qualification' (SPA selection stage 1.3) which comprises 69,687 individual waterbirds during the non-breeding season, of which 732 are cormorants (12 birds representing 1.6% of the Liverpool Bay SPA cormorant population). However, Liverpool Bay SPA would be judged as being significant for cormorant given it supports more than 1% of the non-breeding UK Population of 35,000[16]. Some of the structures used by cormorant to rest/roost are to be removed, e.g. demolition of the existing jetty (140 wooden posts). This would classify as loss of habitat for this species and is classified as displacement of birds from resting/roosting locations due to loss of land under the footprint of the construction works. Direct impact from noise, vibration and human presence, causing potential displacement of cormorant from resting/roosting locations is considered a minor temporary impact given the fact that cormorants are habituated to the urban environment in the Docks.	LSE cannot be ruled out

15 Liverpool Cruise Terminal. Wintering Bird Surveys. APEM January 2018 Ref P00001343.
16 JNCC The status of UK SPAs in the 2000s: the Third Review, undated.

Qualifying feature	European Site affected	Pathway to impact (with Table 3 references)	Assessment of Likely Significant Effects	Conclusion
		roosting or nesting locations due to the presence of human activity i.e. visual disturbance. Such effects can arise from a number of activities involved in the construction process including lighting, vessel movements, vehicle activity and the presence of people outside of vehicles. Direct: death or injury to birds through contamination with chemical substances i.e. pollution. Such effects can include spills or leaks of fuel, oil and chemicals and / or the reworking and translocation of previously contaminated sediments into the water environment. Indirect: displacement / disruption / removal / smothering of species that are prey (food) items for birds and / or the habitats supporting such prey species.	No impacts are considered to affect cormorants from the remaining listed indirect and direct effects, including changes to water quality from suspended solids and release of sediment chemicals: such changes would be temporary and localised and the magnitude of effect negligible given the extent of the River Mersey.	

Qualifying feature	European Site affected	Pathway to impact (with Table 3 references)	Assessment of Likely Significant Effects	Conclusion
Other SPA bird species	Liverpool Bay SPA Mersey Narrows and North Wirral Foreshore SPA/RAMSAR	As above	The impacts from dismantling and construction are not considered to affect any of the other names bird species for these Sites. Liverpool Bay species: Little gull: forage out at sea and will not be impacted by any loss of habitat or disturbance issues; Little tern: breeding and feeding area too distant to be impacted by any loss of habitat or disturbance issues; Common tern: feed in Mersey but main breeding areas at Seaforth Docks around 6km to the north. Common tern now also breed in Birkenhead Docks about 1.5km to the SW. Given the small number that forage in the vicinity of the development (5-10) and the extensive feeding area of the River Mersey, no impact is expected from loss of habitat or disturbance. Any impact from changes to water quality would be temporary and localised and the magnitude of effect negligible given the extent of the River Mersey; Red-throated diver and common scoter: citation refers to wintering birds out at sea, too distant for any impacts from loss of habitat or disturbance; Red-breasted merganser: assemblage species, winters further out to sea, no impacts from habitat loss or disturbance. Mersey Narrows and North Wirral Foreshore species (additional to the above) Non-breeding little gull and breeding common tern: impact as above. Bar-tailed godwit, oystercatcher, grey plover, sanderling, dunlin, knot, turnstone and redshank: over 800m from site and noise levels (e.g. from piling) not significant, no disturbance expected.	No LSE

Qualifying feature	European Site affected	Pathway to impact (with Table 3 references)	Assessment of Likely Significant Effects	Conclusion
Operational impacts				
Cormorant	Liverpool Bay SPA	Physical disturbance and displacement (visual), Type 14; Airborne noise and vibration Type 14;	Once operational, the main potential impacts to cormorant would be from increased ship movements and docking and associated disturbance from on-shore and docking activity. Given the small increases involved (up to four cruise ships per month in the busiest months, in summer) this is considered negligible, given that the highest cormorant numbers are in winter, when the terminal will be at its lowest use. In the absence of mitigation, cormorant may be impacted through the lack of resting/roosting structures, however given the relative lack of Cruise Terminal activity in the peak cormorant winter period, it is considered that cormorant would adapt to the new dock structures for roosting. Cormorant use both open sea and estuary habitats and will roost / rest on dock structures (mostly in winter). Any impact from disturbance is considered negligible given the acknowledged habituation of this species and other species in cities to people, e.g. *'Overall, apart from the oystercatcher roost at the Garston Docks, and the particularly high levels of disturbance associated with the Liverpool town centre docks, the majority of birds observed exhibited high levels of habituation to visual and noise disturbance at the docks. This included human visual disturbance, construction works and other dock activities, vehicle movements and boat/shipping movements*[17]*'.*	No LSE
SPA foraging common tern, little tern and little gull.	Liverpool Bay SPA	Physical disturbance and displacement (visual) from vessel movements, Type 14;	Little gulls (50+) forage out to sea in spring and will not be impacted by a slight increase in cruise liners. Little terns forage offshore close to Dee Estuary breeding colony (130 pairs Gronant Beach) and will not be impacted by a slight increase in cruise liners. Common terns breed at Seaforth Docks (180 pairs, Mersey Narrows and North Wirral Foreshore SPA) and their predicted foraging area extends north approximately to Formby, west along most of the Wirral foreshore, and into the mouth of the Mersey Estuary approximately to Rock Ferry[18]. Greatest usage of marine areas was seen closer to the colony, but common terns were recorded at count locations throughout the proposed extension into the Mersey Estuary and as far as South	No LSE.

17 Assessment of Supporting Habitat (Docks) for Use by Qualifying Features of Natura 2000 Sites in the Liverpool City Region. Ornithology Report. Ref 4157.005. Aug 2015. TEP for Merseyside Environmental Advisory Service.

18 JNCC Departmental Brief: Liverpool Bay potential SPA. Advice to Welsh and UK Government, March 2016

Qualifying feature	European Site affected	Pathway to impact (with Table 3 references)	Assessment of Likely Significant Effects	Conclusion
			Ferry Quay (south of the Development Site). Only small numbers of common terns were found to forage upriver in the vicinity of the Development Site (5-10 around Prince's Dock). Given the existing high numbers of vessels using the Mersey and Liverpool Docks, the inevitable conclusion is that common tern foraging is not impacted by shipping. In this context, an increase in 30-33% of cruise liners is not considered to have any impact on foraging common tern within the River Mersey and out to Liverpool Bay. No impacts from small increase in light pollution from additional vessels or terminal building (no impact to birds at night).	
SPA/Ramsar wintering birds	Liverpool Bay SPA (common scoter, red throated diver,: red breasted merganser, cormorant). Mersey Narrows SPA/Ramsar: bar-tailed godwit, knot, redshank, sanderling, turnstone, dunlin, grey plover, oystercatcher, cormorant. Mersey Estuary SPA/Ramsar: golden plover, redshank, dunlin, pintail, shelduck, teal, wigeon, curlew, grey plover, great crested grebe and lapwing. Ribble and Alt Estuaries SPA, Ramsar: bar-tailed godwit, Bewick's swan, whooper swan, golden plover, ringed plover, sanderling, black-tailed godwit, dunlin, grey	.Physical disturbance and displacement (visual) from vessel movements, Type 14;	Impacts to wintering birds (red throated diver, red breasted merganser , cormorant and common scoter) on the open sea is negligible given small increase in vessel movements, area for displacement and use of existing routes. Impacts to all other species negligible given they feed on estuary mudflats (not impacted by vessel movements in deep water), cruise vessels operate in the spring / summer months (not in winter) and no high tide roosts would be affected. No impacts from small increase in light pollution from additional vessels or terminal building (vessels operating outside crucial winter period; no impact to birds at night).	No LSE

Qualifying feature	European Site affected	Pathway to impact (with Table 3 references)	Assessment of Likely Significant Effects	Conclusion
	plover, knot, oystercatcher, pink-footed goose, pintail, redshank, shelduck, teal and wigeon. Dee Estuary SPA, Ramsar: bar-tailed godwit, black tailed godwit, curlew, dunlin, grey plover, knot, oystercatcher, pintail, redshank, shelduck and teal.			
SPA/Ramsar passage birds	Mersey Narrows SPA/Ramsar: knot, redshank, turnstone. Mersey Estuary SPA/Ramsar: ringed plover. Dee Estuary SPA, Ramsar: sandwich tern, redshank.	Physical disturbance and displacement (visual) from vessel movements, Type 14;	Impacts to wader species (knot, redshank, turnstone, ringed plover and redshank) is negligible given they feed on estuary mudflats (not impacted by vessel movements in deep water) and no high tide roosts would be affected. No impacts from small increase in light pollution from additional vessels or terminal building (vessels operating outside crucial winter period; no impact to birds at night). Impacts to passage sandwich terns is negligible given passage birds rest on exposed sandbanks (not impacted by vessels in deep water) and no impact when birds foraging.	No LSE
Breeding tern species	Mersey Narrows SPA/Ramsar: common tern Dee Estuary SPA/Ramsar: common and little terns Ribble and Alt Estuary SPA/Ramsar: common tern	Physical disturbance and displacement (visual) from vessel movements, Type 14;	No impact to breeding sites from vessel movements. Closest is Seaforth Dock – no impact on this breeding colony. No impacts from small increase in light pollution from additional vessels or terminal building (no impact to birds at night).	No LSE
Foraging terns and gulls, wintering and	As above	Water quality impacts either directly from new development at cruise terminal, or from	Discharges from cruise terminal controlled and pollution interceptors employed for surface water run off: no impact. Cruise liner discharges carefully controlled through existing standards: no impacts.	No LSE

Qualifying feature	European Site affected	Pathway to impact (with Table 3 references)	Assessment of Likely Significant Effects	Conclusion
passage waterbirds and terns		operations (vessel movements) (Type 3 and 7b effects).		
Foraging terns and gulls, wintering and passage waterbirds and terns	As above	Air pollution impacts (Type 7d effect).	Emissions from additional vessels are predicted to have a potential effect of negligible significance on local air quality at relevant receptors surrounding the Site. No major new point source emitters of airborne pollution are proposed on the terminal site. The Development, including road traffic emissions, is predicted to result in a 'negligible' impact all of the existing sensitive air pollution receptors modelled. Any potential impacts to the River Mersey from construction (e.g. demolition dust) would be addressed by a CEMP. The features of the Liverpool Bay SPA, including cormorant would not be affected.	No LSE
Foraging terns and gulls, wintering and passage waterbirds and terns	As above	Recreational disturbance (Type 6 a and 6b)	The operational use is not expected to increase recreational disturbance from tourists arriving in Liverpool.	No LSE

Screening Conclusions and Next Steps

3.9. The overall conclusion is that, at the screening stage, LSEs could not be ruled out in relation to dismantling/construction impacts of loss of roosting/resting habitat and a degree of temporary disturbance for cormorant, an assemblage species for the Liverpool Bay SPA. All other potential impacts were screened out of further scrutiny within the HRA.

3.10. An appropriate assessment is now required that will assess whether it can be ascertained that an adverse effect on the integrity of the European sites can be ruled out. Drawing on the recent People Over Wind ruling, this will explore if the addition of mitigation measures can avoid a negative outcome.

4. Appropriate Assessment and Integrity Test

4.1. The initial screening assessment has identified that likely significant effects cannot be ruled out **alone** in relation to dismantling/construction impacts of loss of roosting habitat for cormorant, an assemblage species for the Liverpool Bay SPA.

4.2. The role of the appropriate assessment is to identify whether it can be ascertained that the proposed development (alone or in combination with other plans and projects) 'will not adversely affect the integrity of the European site'. In line with the recent People Over Wind ruling it will also explore if mitigation can be applied that would allow a positive conclusion to be drawn.

4.3. The Handbook[19] states (E.11):

The work undertaken at the screening stage will form a valuable start to the appropriate assessment. In some cases no further information may be needed, or available, and in other cases it may not be feasible to obtain any further information. However, the appropriate assessment is likely to be a more detailed study of the implications of the project for the European Site(s) potentially affected.

4.4. **Table 5** below summarises the potential impact and the conservation objectives for Liverpool Bay SPA. The following section assesses the impact in relation to mitigation measures included within the Development.

Table 5. Subject of Appropriate Assessment and SPA Conservation Objectives

European site	Potentially vulnerable features identified during screening	Conservation objectives
Liverpool Bay SPA	Cormorant (assemblage species).	The Conservation Advice Package for the Liverpool Bay SPA has not yet been updated following the extension of the site. The overarching conservation objective of the Liverpool Bay SPA is to ensure that the integrity of the site is maintained or restored as appropriate. For each of the qualifying features there are three key conservation objectives: • The size of the population should be stable or increasing, allowing for natural variability, and sustainable in the long term. • There should be sufficient habitat, of sufficient quality, to support the population in the long term. • Factors affecting the population or its foraging habitat should be under appropriate control. There is an additional objective for little tern: The distribution of the population should be being maintained, or where appropriate increasing.

4.5. The screening exercise has concluded that a likely significant effect cannot be ruled out alone for impact on cormorant, an SPA assemblage species. This is because of concern that:

- Loss of existing Prince's Jetty which is be used by cormorant for roosting/resting; and
- Localised temporary disturbance from construction works.

4.6. This impact and mitigation is addressed below.

[19] Tyldesley, D., and Chapman, C., (2013) The Habitats Regulations Assessment Handbook, revised July 2018 edition UK: DTA Publications Ltd

Survey results

4.7. The previous section confirmed that the Development would only have potential LSE in relation to cormorant from loss of habitat during dismantling and construction.

4.8. Winter bird surveys during 2017/18[20] recorded a peak count of 12 cormorant, with the majority of these birds perched on permanent structures within the Site, including six birds perched on the Prince's Jetty. The peak count equates to 1.6% of the cormorant population of the Liverpool Bay SPA. Cormorant is not a qualifying species under Article 4.1 of the Birds Directive, rather it is cited as a component of the 'Assemblage qualification' (SPA selection stage 1.3) which comprises 69,687 individual waterbirds during the non-breeding season, of which 732 are cormorants (12 birds representing 1.6% of the Liverpool Bay SPA cormorant population). However, Liverpool Bay SPA would be judged as being significant for cormorant given it supports more than 1% of the non-breeding UK Population of 35,000.

Impacts to cormorants in absence of mitigation

4.9. Some of the structures used by cormorant to rest/roost are to be removed, e.g. demolition of the existing jetty (140 wooden posts). This would classify as loss of habitat for this species and is classified as displacement of birds from resting/roosting locations due to loss of land under the footprint of the construction works. Construction may also cause localised disturbance to cormorants resting on structures.

4.10. No impacts are considered to affect cormorants from other listed indirect and direct effects, including changes to water quality from suspended solids and release of sediment chemicals: such changes would be temporary and localised and the magnitude of effect negligible given the extent of the River Mersey.

Scheme mitigation

4.11. The previous section confirmed that the Development would only have potential LSE in relation to cormorant from loss of habitat and disturbance during dismantling and construction.

4.12. To mitigate for any *permanent* potential impact, the scheme design accommodates resting/roosting cormorant by including the following provision:

- Incorporation of horizontal suspended deck braces (**Appendix C**) in the new dock structure which would be suitable for cormorant to rest/roost upon.
- The applicant will provide a permanent floating pontoon in Princes Half Tide Dock for cormorant to rest/roost upon. Any cormorant relocated and/or disturbed could use this new structure for resting/roosting.

4.13. To mitigate for the *temporary* loss of roosting/resting structures and disturbance, whilst the new terminal is under construction, the proposal includes

- The installation of a permanent floating pontoon in Princes Half Tide Dock for cormorant to rest/roost upon. This would be installed prior to the wooden jetties being dismantled. Any cormorant relocated and/or disturbed could use this new structure for resting/roosting.

Design of permanent floating pontoon

4.14. The design of the permanent floating pontoon is set out in the Cormorant Technical Note presented in **Appendix D**. Cormorant regularly use such pontoons for resting/roosting in Liverpool and other urban centres – see photograph below of birds using a similar structure in the centre of Bristol in docks outside the MShed (landing stage for passenger ferry).

[20] Liverpool Cruise Terminal Wintering Bird Surveys Final Report APEM Ref P00001343 January 2018

Photograph 1. Cormorants in the busy centre of Bristol

Assessment of the effects on Site integrity

4.15. Cormorant are not a qualifying species for the SPA, rather they are part of the waterbird species assemblage. The overarching conservation objective of the Liverpool Bay SPA is to ensure that the integrity of the site is maintained or restored as appropriate. For each of the qualifying features there are three key conservation objectives. We address each below in relation to the waterbird species assemblage of which cormorant is a part.

4.16. ***The size of the population should be stable or increasing, allowing for natural variability, and sustainable in the long term.*** There is evidence that cormorant numbers are increasing in the Mersey as a result of improved water quality and fish stocks. For example, the Mersey Estuary Conservation Group[21] state:

> *'Numbers of cormorants have increased in our local area of the upper Mersey Estuary at Frodsham / Pickerings Pasture during the last 15 years, presumably because of the number of species and increasing numbers of fish now being recorded in the Mersey. The increase in fish numbers has occurred with the removal, from the river, of much of the industrial pollution which had blighted the area for so many years'.*

4.17. Therefore, given that permanent mitigation will retain appropriate resting and roosting places (ensuring the lasting preservation of one of the constitutive characteristics of the Liverpool Bay SPA that is connected to the presence of cormorant), there are no projected impacts on water quality and fish stocks and the cormorant population is considered stable/increasing on the River Mersey, then favourable conservation status is preserved.

4.18. ***There should be sufficient habitat, of sufficient quality, to support the population in the long term.*** Only a very small part of the SPA habitat suitable for cormorant will be affected and the Development is not expected to impact on other suitable habitat for cormorant within the SPA. The potential impact relates to loss of winter roosting/resting structures – one component of cormorant habitat. A maximum of 12 cormorant were present during the winter of late 2017/18, with up to 6 birds perched on Prince's Jetty. The replacement of the jetty with horizontal suspended deck braces as part of the scheme design, suitable for up to 20 cormorant to rest upon, together with the provision of a permanent pontoon in Princes Half Tide Dock, provides more than adequate mitigation. In addition, it is highly likely that cormorant would roost/rest on other structures within the terminal site. Given cormorant are present mostly in winter, when the terminal is less busy, they are likely to rest/roost upon various walls, structures, vessels and buildings. Given that the existing roosting/resting structures are only a small component of

[21] www.merseyestuary.org/cormorants-on-the-upper-mersey-estuary.html#

the suitable cormorant habitat and that permanent measures are proposed to replace them, the site (Liverpool SPA) will be preserved at favourable conservation status.

4.19. ***Factors affecting the population or its foraging habitat should be under appropriate control.*** As stated above, the population of cormorant is increasing on the Mersey. Foraging habitat consists of the river itself where cormorants are increasing in numbers in winter. Given the size of the Liverpool Bay SPA, it is inconceivable that any surface water run off from the development site would impact the water quality of the SPA and impact cormorant fishing or foraging habitat. The Development is not impacting cormorant foraging habitat and therefore site integrity is not impacted.

4.20. Therefore, we conclude that there will be no impact on SPA site integrity, i.e. there will be no lasting or irreplaceable loss of whole or part of the priority natural habitat (i.e. the Liverpool Bay SPA) from the Development.

4.21. Given the small number of cormorant recorded at the Site, it is considered that the above permanent measures would adequately mitigate for an LSE to cormorant. With the inclusion of these measures, there would therefore be no LSE on European Sites.

Additional Consultation Response

4.22. In their consultation response (21st February 2018; ref: 233344), Natural England suggested the HRA address:

> '*Consideration of appropriate mitigation measures for example, but not restricted to: timing restrictions to reduce disturbance to wintering birds and appropriate piling methodology'*.

4.23. It is not considered appropriate to introduce timing restrictions for the cruise terminal activity in relation to cruise vessels as these will be operational between March and November – generally outside of the wintering bird period. It is noted that the cruise terminal building may be used for other purposes outside of this period, but the impact of such uses in winter is not considered to impact on wintering bird populations, given the above mitigation.

4.24. In terms of 'appropriate piling methodology', this is discussed in detail in Appendix 6.1a of the ES Addendum (fourth issue). This work is subject to a Construction Environmental Management Plan (CEMP); a Framework CEMP is presented as Appendix 6.2a of the ES Addendum (fourth issue). A soft-start piling approach will be implemented in order to reduce potential adverse effects to fish and marine mammals. This involves gradually increasing the force of piling, thereby steadily increasing the sound power levels generated over a period of time. This would alert individuals within the area, without exposing them to more intense sound power levels, and provide an opportunity for them to move away from the noise source. This technique is recommended as best practice by the Joint Nature Conservation Committee for pile driving operations[22] and is considered appropriate for the proposed development.

4.25. During demolition the piles from the existing Princes Jetty will be removed (for the purposes of assessment it has been assumed extraction would be by vibro-extraction although other methods could be deployed such as 'jacking out' or mechanical pulling). The piles for the jetty would be installed using rotary drilling which is less noisy and vibration-inducing than percussive piling.

4.26. In addition, as noise generating pile removal and drilling activity would be limited during each working day and would not occur for extended periods (at least 12 hours) each night, there would be extensive windows of no pile extraction works or drilling activity.

4.27. No significant impacts to SPA/RAMSAR bird species are considered likely from piling: the species most likely to be in the vicinity would be cormorant (if piling occurs in winter) and common tern (if piling occurs

22 Joint Nature Conservation Committee (JNCC). (2010). Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise.

in spring-autumn). Given the habituation of cormorant to noise and disturbance, the expanse of the River Mersey in terms of relocation for fishing/roosting and the localised temporary nature of the works, no impacts are envisaged. Therefore, the piling methodology is considered appropriate and no further mitigation for this aspect is recommended.

5. In-Combination Effects

5.1. The Handbook[23] includes (Section C8), Figure C.8.1 '*Stages 1 and 2: An approach to the in-combination assessment'*. Where it has been ascertained, via Appropriate Assessment that a project would not have an adverse effect on site integrity 'alone' (see para 4.20 above), but could have some adverse effect in combination with other proposed developments, then an Appropriate Assessment of effects in combination should be triggered. However, this Appropriate Assessment of in combination effects should be restricted to other adverse effects (other than the LSE of cormorant roosting/resting features) i.e. those effects in Table 3 which are not considered significant impacts from this Development alone.

5.2. The following schemes have been identified by the Environmental Statement (ES) as possibly resulting in in-combination effects:

- Isle of Man Landing Stage;
- Liverpool City Centre Connectivity Phase 2 Northern Link Road.
- Various Wirral Waters schemes approved 2010: ITC (OUT/11/00645 permission March 2012), Wirral Waters West, Wirral Waters East Float and Wirral Waters Northbank East.
- Liverpool Waters (10O/2424) – approved July 2013.
- Twelve Quays Terminal, Birkenhead, new fixed bridge – approved October 2018 (APP/18/00555).
- The Hive, William Jessop Way (17F/0456) – approved subject to S106.
- The Lexington, William Jessop Way (16F/1370) – permission granted Sep 2016.
- William Jessop House (15F/0560) – registered March 2015.
- Ovatus 1, Leeds Street (17F/0042) – permission granted April 2017.
- Infinity, Leeds Street (17F/0340) – application submitted Feb 2017.
- 30-36 Pall Mall (16F/2634) – application submitted Nov 2016.
- North Point, 70-90 Pall Mall (14F/2543) – on site, completion spring/summer 2018.
- Land to west of Waterloo Road Plot C04 and C06 Central Docks Liverpool Waters (17F/1628) – registered Sept 2017.
- Vacant Land William Jessop Way Liverpool (17F/0913) – approved subject to S106.
- Liverpool Cruise Liner Hotel (19F/1038) – application submitted January 2019.
- Port related activities.
- Liverpool Local Plan.

5.3. **Table 3** above identifies other 'insignificant' adverse effects when the proposed Development is considered alone. **Table 6** below considers these in-combination with relevant projects from the list above. Of the other above schemes, only the Phase 2 Northern Link Road, Wirral Waters sites, Liverpool Waters, Twelve Quays and Isle of Man Landing Stage border the Mersey Estuary and are addressed below. For the remaining schemes, it is considered there are no pathways to impact that could combine with residual or other impacts from the Cruise Liner Terminal Development that could result in impacts to the integrity of the Liverpool Bay SPA site integrity.

5.4. It has generally been assumed that construction activities on the Site and at the in combination schemes would occur simultaneously. However, particularly in the case of outline planning consents, this is unlikely to actually occur.

[23] Tyldesley, D., and Chapman, C., (2013) The Habitats Regulations Assessment Handbook, revised July 2018 edition UK: DTA Publications Ltd

Table 6: Assessment of Potential In-Combination Effects

Type of potential effect	Detail	In combination effects	Conclusion
3. Operational impacts affecting marine environment	Increase in number of vessels impacting water quality/pollution	No other expected increases in vessels from above projects, Isle of Man project expects vessel frequency to remain about the same.	No in combination impact on site integrity.
5. Projects affecting mobile species	Increase in number of vessels affecting foraging terns and gulls or wintering ducks and divers	No other expected increases in vessels from above projects, Isle of Man project expects vessel frequency to remain about the same.	No in combination impact on site integrity.
6. Recreational pressure.	Increase in number of vessels or land based visitors affecting foraging terns and gulls or wintering ducks and divers	No other expected increases in vessels from above projects, Isle of Man project expects vessel frequency to remain about the same. Impacts from land based visitors from Cruise Terminal not likely to increase an recreational disturbance to SPA species as visitors will target Liverpool City centre terrestrial areas.	No in combination impact on site integrity.
7. Projects that would increase the amount of development	Impacts from surface water drainage. Impacts on air quality.	Surface water drainage from Cruise Terminal subject to pollution abatement controls and unlikely to produce significant cumulative impact when taken with other projects. Water quality in the Mersey improving. No major new point source emitters of airborne pollution are proposed on the terminal site. The Development, including any associated road traffic emissions, is predicted to result in a 'negligible' impact at all of the existing sensitive air pollution receptors modelled. Therefore, in-combination effects inconceivable. Any potential impacts to the River Mersey from construction (e.g. demolition dust) would be	No in combination impact on site integrity.

		addressed by a CEMP. The features of the SPA, including those most relevant to the location (foraging common tern and little gull, wintering cormorant) would not be affected. Again, in-combination effects inconceivable. Good practice via CEMPs ensuring that water quality in River Mersey improving, despite continued development.	
14. Disturbance	Construction disturbance from piling. Operational disturbance from increase in number of vessels/visitors.	No significant impacts to SPA bird species are considered likely from Cruise Terminal piling: the species most likely to be in the vicinity would be cormorant (if piling occurs in winter) and common tern (if piling occurs in spring-autumn). Given the habituation of cormorant to noise and disturbance, the expanse of the River Mersey in terms of relocation for fishing/roosting and the localised temporary nature of the works, no impacts are envisaged. Birds using the 'urban' parts of the Mersey are habituated to noise and human activity so unlikely to be any in-combination effects. LCT does not lead to in-combination effects from piling on areas of mudflats where wading birds feed in winter as these areas are too distant. No other expected increases in vessels from above projects, Isle of Man project expects vessel frequency to remain about the same.	No in combination impact on site integrity.

5.6. Further detail on the relevant schemes is set out below.

Liverpool Local Plan HRA

5.7. The draft Liverpool Local Plan HRA does not refer specifically to cormorant, but states:

'Development of ports and docks has the potential to cause disturbance to waterfowl. However, Policy EC8 does not specifically commit to port expansion, or any specific elements thereof, but simply states the general principle that development proposals relating to the port will be supported as long as they are sustainable (which implicitly includes the requirement that they do not adversely affect internationally important wildlife sites). Moreover, the policy explicitly states that any proposals must '… comply with other relevant policies in the Local Plan; include measures to address the potential environmental issues raised by expansion of the Ports, including impact on the adjacent natural … environment, and nationally and internationally important sites …'. As such, it is considered that the references in the Local Plan are sufficient to ensure that the SPA is protected'.

Northern Link Road

5.8. The Phase 2 Northern Link Road provides mitigation measures for breeding and non-breeding birds. Mitigation measures were proposed within the project ecological impact assessment (Amey 2018) and planning consent for the project, subject to conditions, was awarded in April 2018 (Ref 17F/2628). Conditions 4 and 17 contain pre-commencement sub conditions with regards to breeding and non-breeding birds which are:

> *"4. The development shall not commence until a Construction Environmental Management Plan (CEMP) describing how construction will be managed to avoid, minimise and mitigate any adverse construction effects on the environment in accordance with the provisions of the Environmental Statement has been submitted to and approved in writing by the Local Planning Authority. The CEMP must ensure that either any construction activity is timed to take place outside the bird breeding season 31st March to 31st August, or suitable noise and view reducing hoarding is located along the river wall and the West Waterloo Dock wall set back at least 2m from the edge to demarcate the boundary of the works. Furthermore. the CEMP shall provide the following details:*
>
> *III. provision of safe refuges for non-breeding birds during construction;*
>
> *VI. measures to provide resting/roosting opportunities for cormorant;*
>
> *7. The development shall not commence until an Ecological Conservation Management Plan (EcMP) has been submitted to and approved in writing by the Local Planning Authority. The EcMP should describe how construction will be managed to avoid, minimise and mitigate any adverse construction effects on the environment in accordance with the provisions of the Environmental Statement and provide the following details:*
>
> *I. Provision of safe refuges for non-breeding birds in West Waterloo Dock."*

5.9. Mitigation for this scheme was designed to provide three floating islands designed for bird species as follows: positioning two rafts in the southern end of West Waterloo dock and one at the northern extent. These floating islands would have been around 500m from the Cruise Terminal development and would therefore be used by birds that also roost/rest on the Cruise Terminal site.

Wirral Waters

5.10. Wirral Waters ITC included mitigation for birds in the form of a 'minimal bird disturbance zone' (subject to planning condition). This was partly a result of the ITC being the final part of the Wirral Waters (WW) development and so addressing displaced bird species from all WW sites.

5.11. Wirral Waters ITC ES Cumulative Assessment[24] concluded, in relation to bird species that:

> *'….. the loss of roosting features as a consequence of cumulative site preparation, earthworks and construction activities will not represent a significant effect on either individual birds, species populations or over-wintering bird assemblages providing mitigation measures are incorporated. Consequently it is considered near-certain that the cumulative effect on these species, or wider species assemblages, will be not significant. It is considered that populations of overwintering birds within the vicinity of the proposed developments will accommodate this level of cumulative effect'.*

Liverpool Waters

5.12. In terms of Liverpool Waters which includes the north of the Development site and land extending further northwards, the key receptor which is likely to experience a potential in-combination effect is the wintering water bird populations which utilise the Mersey Estuary and are mobile around the estuary. Only low numbers of water birds were found to be present at Liverpool Waters (maximum numbers 5 redshank, 15 oystercatcher and 8 cormorant) and potentially impacted by the proposed Liverpool Waters scheme. The redshank and oystercatcher are considered likely to potentially form part of the Mersey Narrows & North Wirral Foreshore pSPA / pRamsar populations. The cormorant would form part of Liverpool Bay SPA population. Liverpool Waters development included islands or floating pontoons in the northern docks for birds. These are designed for nesting birds in summer and would also serve to cater for resting/roosting birds in winter.

Twelve Quays

5.13. For the new bridge application at Twelve Quays (just over 1km to the SW), the application was approved, with conditions to adhere to a CEMP which includes ecological mitigation.

Isle of Man Ferry Terminal

5.14. The Isle of Man Landing Stage (IoMLS) development is located just to the north of Liverpool Cruise Terminal. The HRA/AA[25] produced for IoMLS concluded that a floating raft, approximately 3m x 3m should provided in Princes Half Tide Dock as permanent mitigation for potentially displaced cormorants during the construction and operation of the development. This raft is scheduled to be installed in October 2019. This forms part of a co-ordinated, strategic approach to cormorant mitigation for developments close to Prince's Half Tide Dock, including IoMLS – see below

Port related activities

5.15. Port related activities (including dredging) are not considered to impact on wintering bird numbers with birds habituated to such activity. Mersey Ports Master Plan[26] outlines a 20-year vision for growth and future developments of the Mersey Ports. It is an indicative framework and has not been subject to HRA. It is therefore not possible to determine in-combination effects.

24 Volume 1 ES West Float, Wirral Waters, International Trade Centre. Peel Land and Property (Ports) Ltd. 2011
[25] Waterman, 2019. Isle of Man Ferry Terminal, Appropriate Assessment, WIE13897-100-2-4-1-HRA-AA, October 2019
[26] Mersey Ports Master Plan, Peel 2011

C02 proposals

5.16. The C02 proposals comprise full planning consent for residential development consisting of 646 apartments (Use Class C3) and 232sqm of commercial space (Potential Use Classes A1, A3, A4, B1, D1 or D2) with associated partial dock infill of West Waterloo Dock, access, parking, servicing, soft and hard landscaping and public open space including a waterside walkway.

5.17. In combination effects have been ruled out (**Table 6** above) apart from potential in combination effects from construction of C02 scheme and Northern Relief Road in terms of noise and piling operations. The C02 HRA states:

> *However, noise and visual disturbance during the dock infilling works has the potential to temporarily displace cormorant from using habitats within the application site. This has the potential to result in minor changes in the distribution of cormorant within the SPA, which could alter the designation status of the waterbird assemblage. In the absence of mitigation, this could result in a 'likely significant effect', particularly when considered 'in-combination' with the potential effects of the northern access road and the Isle of Mann ferry terminal.*

5.18. The C02 HRA suggests four permanent floating pontoons are installed in North Salisbury Dock – to provide mitigation for C02, Isle of Man Ferry Terminal and the Northern Link Road.

5.19. However, since the issue of the C02 HRA, the situation regarding strategic cormorant mitigation has moved on and a co-ordinated, strategic approach to cormorant mitigation for developments close to Prince's Half Tide Dock, including C02, has been developed – see below.

A strategic approach to cormorant mitigation

5.20. In their response dated 18th March 2019[27], Natural England (NE) stated:

> *We are highly encouraged that development teams from a number of projects in the area are working together to provide a combined mitigation pontoon. We have advised that a strategic approach to mitigation would be the most beneficial approach to ensure impacts arising from the number of developments is considered, therefore allowing for more certainty on deliverability of mitigation within a holistic manner. We advise that a strategic mitigation strategy should be provided and ideally in advance of projects coming forward so that the strategy can be agreed and in place, therefore allowing a smooth process through the planning stages.*

5.21. In response to NE's advice, Peel, the site owners and holders of the outline permission have agreed to co-ordinate a strategic approach to cormorant mitigation for Liverpool Cruise Terminal, Isle of Man Ferry Terminal, Northern Relief Road and C02. A new permanent pontoon facility will be provided in Princes Half Tide Dock – see **Figure 4** below.

[27] NE ref 269611

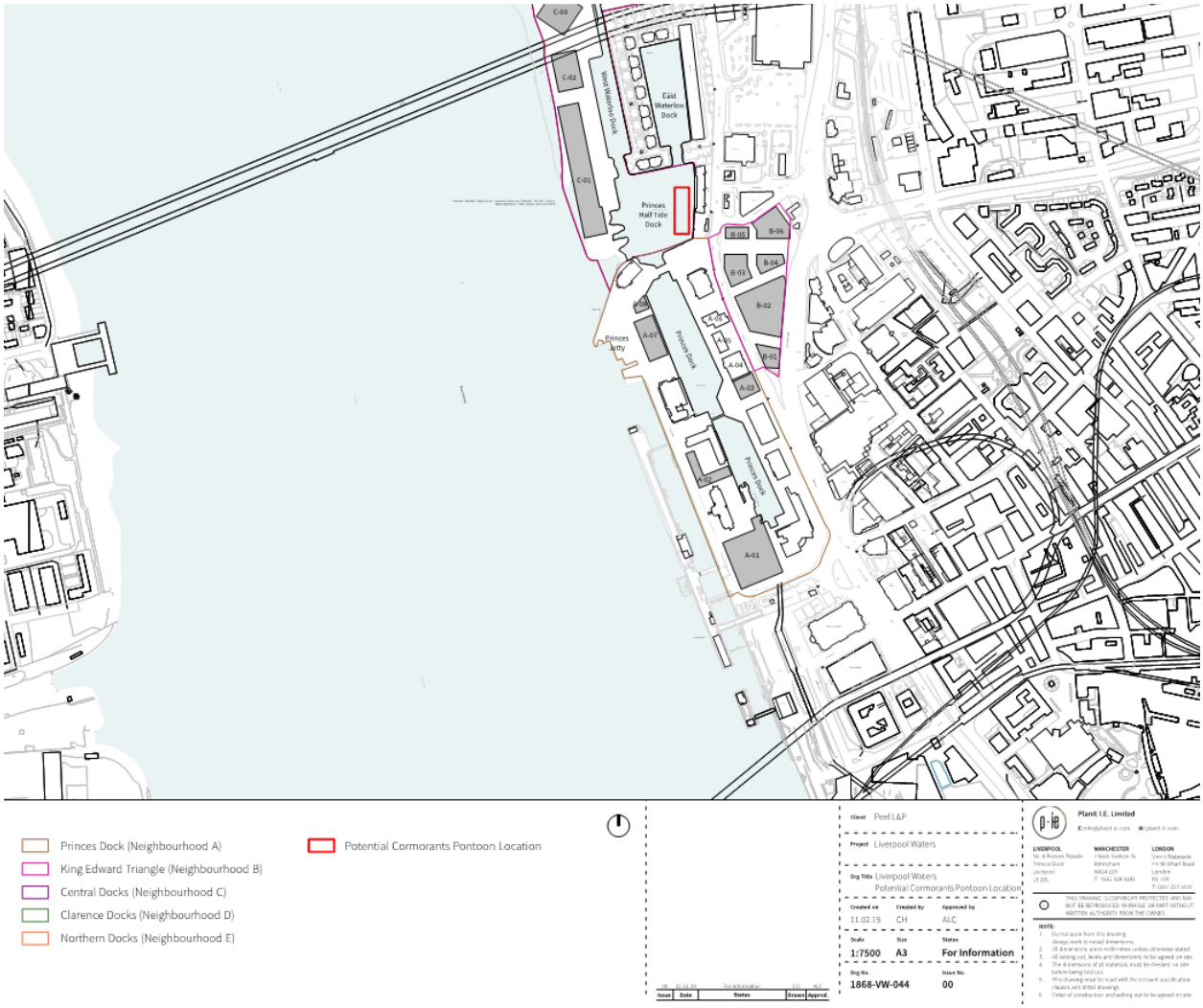

Figure 4: Proposed Mitigation Pontoon Location

5.22. This would comprise up to four individual pontoons (comprising mitigation for the various individual schemes) locked together to provide a larger mitigation resource. The design for the pontoon is as set out in **Appendix D** and the pontoon could be expanded in area as necessary as and when the other nearby schemes are commenced.

5.23. Peel, in association with the individual developers, would oversee Annual Monitoring of the pontoon facility in terms of winter bird monitoring surveys. The facility would be subject to an Adaptive Management Plan (AMP) which would set out any additional actions required for successful mitigation, plus management or maintenance require and respond to additional developments and mitigation measures that may come forward within the vicinity. The monitoring bird survey data would also be inputted into the AMP and acted upon where appropriate. Approval of the AMP is sought from NE. Refer to **Appendix E**: Adaptive Management Plan and **Appendix F**: Liverpool Waters Strategic Ecological Mitigation Plan

In-combination conclusion

5.24. Given the issues and assessment set out in **Table 6** above, it is not considered that there would be an adverse impact on site integrity from in-combination effects.

6. Overall Appropriate Assessment Conclusion

6.1. This HRA Appropriate Assessment has assessed the proposed Liverpool Cruise Ship Terminal Development in terms of any potential impact upon the integrity of relevant European Wildlife Sites and concluded that with the mitigation proposed for cormorant resting and roosting areas there would be no impact upon site integrity, either alone or in combination.

References

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APPENDICES

A. Descriptions of European Sites

Mersey Narrows & North Wirral Foreshore SPA/Ramsar site is 2,079 ha in extent and within 1 km of the Development. It is a marine / coastal wetland with a mixture of intertidal sands / mudflats and saltmarsh as well as manmade coastal brackish / saline lagoons, coastal freshwater lagoons and intertidal marshes. Its bird interest features are non-breeding little gull, breeding common tern, wintering knot and bar-tailed godwit, which occur at levels of European importance. In addition, the site regularly supports 20,000 or more waterbirds, including cormorant, oystercatcher, grey plover, sanderling, dunlin and redshank at nationally important levels during winter.

Liverpool Bay SPA is 252,757.73 ha in extent and the River Mersey section is immediately adjacent to the Development. It is a marine site best described as a sea inlet spanning the coastline from the north west of England and north Wales out into the Irish Sea and was recently extended for feeding terns and gulls to include coastal waters in the Mersey Estuary and intertidal waters in the Dee Estuary. Its bird interest features are red-throated diver (non breeding, winter), little gull (passage/non breeding), common tern (breeding), little tern (breeding) and common scoter (non breeding/winter). It is also recognised for its internationally important assemblage of birds, which are made up mostly of the same non breeding/winter/passage species above plus an additional two species present in numbers exceeding 1% of the GB total: red-breasted merganser *Mergus serrator* and cormorant *Phalacrocorax carbo*.

Mersey Estuary SPA/Ramsar is 5,023 ha in extent and 3.3 km (south east) from the Development. It is a marine / coastal wetland with large areas of saltmarsh and extensive intertidal sands / mudflats. Its bird interest features golden plover, dunlin, pintail, redshank, shelduck during the non-breeding (winter) season and redshank and ringed plover during passage periods (spring / autumn seasons). It is also recognised as a wetland of international importance, by regularly supporting at least 20,000 waterfowl, including curlew, black-tailed godwit, lapwing, grey plover, wigeon, great crested grebe, redshank, dunlin, pintail, teal, shelduck and golden plover.

Dee Estuary SAC, 4.2km (north west) from the Development. The Dee Estuary is designated due to the notable habitats present such as the mudflats / sandflats which are not covered by sea water at low tide, lagoons and the fauna and flora they in turn support.

Dee Estuary SPA/Ramsar, 13.2km to the west of the Development. The Dee is a large funnel shaped sheltered estuary and is one of the top five estuaries in the UK for wintering and passage waterfowl populations. The Dee Estuary supports internationally important numbers of waterfowl and waders, including breeding common and little terns, passage sandwich tern and redshank and large numbers of overwintering waders and ducks.

Sefton Coast SAC, 6.7km to the north of the Development. The site is of special interest for intertidal mud and sandflats, embryonic shifting dunes, mobile dunes, dunes with creeping willow *Salix arenaria*, humid dune slacks, fixed dunes, dune grasslands and dune heath. Small areas of saltmarsh are also present. Its assemblages of vascular and non-vascular plants, the nationally rare grey hair grass *Corynephorus canescens*, nationally scarce liverwort *Petalophyllum ralfsii* and nationally rare moss *Bryum neodamense*, are also of special interest. The site is of special interest for its populations of internationally important wintering waterfowl and its nationally and, in some cases, internationally important populations of individual waders. Its populations of sand lizard *Lacerta agilis*, natterjack toad *Bufo calamita* and great crested newt *Triturus cristatus* are also of special interest, along with the populations of the Red Data Book species, sandhill rustic moth *Luperina nickerlii gueneei*.

Ribble and Alt Estuaries SPA, Ramsar, 6.4km to the north of the Development. The Ribble and Alt Estuaries lies on the coast of Lancashire and Merseyside. It comprises two estuaries, of which the Ribble Estuary is the larger, together with an extensive area of sandy foreshore along the Sefton Coast. It forms part of the chain of western SPAs that fringe the Irish Sea. There is considerable interchange in the movements of wintering birds between this site and Morecambe Bay, the Mersey Estuary, the Dee Estuary and Martin Mere. The site consists of extensive sand- and mud-flats and, particularly in the Ribble Estuary, large areas of saltmarsh. There are also areas of coastal grazing marsh located behind the sea embankments. The intertidal flats are rich in invertebrates, on which waders and some of the wildfowl feed. The larger expanses of saltmarsh and areas of coastal grazing marsh support breeding birds during the summer, including large concentrations of gulls and terns.

B. Historic Trends and Current Pressures for European sites

Liverpool Bay SPA/Ramsar

The main existing environmental pressures on Liverpool Bay SPA/Ramsar comprise:

- disturbance of sediment releasing legacy heavy metal pollution (lead, cadmium, arsenic and other poisons) that is bound into the sediment;
- pollution via rivers and drains by both treated sewerage and untreated runoff containing inorganic chemicals and organic compounds from everyday domestic products;
- pollution via commercial shipping by chemical or noise pollution and the dumping of litter at sea;
- damage of marine benthic habitat directly from fishing methods;
- damage of marine benthic habitat directly or indirectly from aggregate extraction;
- 'coastal squeeze' from land reclamation and coastal flood defences and from erosion and sea level rise;
- loss or damage of marine benthic habitat directly and indirectly (through changed sedimentation/deposition patterns) as a result of navigational dredging in order to accommodate large vessels – e.g. into the ports of Liverpool;
- harm to wildlife (especially birds) or habitat loss due to increasing proposals/demand for offshore wind turbines; and
- pollution, direct kills, litter or loss of habitat as a result of water-based recreation and related development along the foreshore.

Dee Estuary SPA, Ramsar, SAC

The main environmental pressures on the Dee Estuary SPA/Ramsar/SAC comprise:

- overgrazing of ungrazed/little grazed saltmarsh;
- certain recreational activities in sensitive areas at sensitive times such as shell fishing and dog walking;
- water quality threats from ex-industrial usage and agriculture;
- physical loss and alteration of coastal processes due to navigational dredging;
- 'coastal squeeze' from land reclamation and coastal flood defences and drainage used in order to develop coastal land, and from sea level rise;
- introduction of non-native species; and
- risk of excessive abstraction resulting in a decrease in freshwater flows into the estuary, reducing drinking and bathing habitat for birds and increasing the salinity in localised areas.

Mersey Estuary SPA/Ramsar

The main current environmental pressures upon the Mersey Estuary SPA and Ramsar site are considered to be:

- disturbance of sediment releasing legacy heavy metal pollution;

- pollution via rivers and drains by both treated sewerage and untreated runoff containing inorganic chemicals and organic compounds from everyday domestic products;
- pollution via commercial shipping by chemical pollution and the dumping of litter at sea;
- 'coastal squeeze' and physical loss from land reclamation and coastal flood defences and drainage used in order to develop coastal land, and from sea level rise;
- loss or physical damage of marine benthic habitat directly and indirectly (through changed sedimentation/deposition patterns) as a result of navigational or aggregate dredging;
- disturbance to birds from increased recreational pressure (e.g. boat or other recreational activity) and wildfowling;
- introduction of non-native species; and
- selective removal of species (e.g. bait digging, wildfowl, fishing)37

The Mersey Narrows and North Wirral Foreshore SPA/Ramsar

Due to its location at the mouth of the Mersey Estuary and in the Liverpool Bay, this site has been subject to the same changes as described for the Mersey Estuary SPA and Ramsar site, in particular water quality improvements since the 1960s (especially since 1985), and increases in agricultural effluent pollution during this same period. Some of the main current environmental pressures relevant to the nature conservation objectives of the Mersey Narrows and North Wirral Foreshore pSPA / pRamsar site are:

- disturbance of sediment releasing legacy heavy metal pollution (lead, cadmium, arsenic and other poisons) that is bound into the sediment;
- pollution via rivers and drains by both treated sewerage and untreated runoff containing inorganic chemicals and organic compounds from everyday domestic products, which 'may combine together in ways that make it difficult to predict their ultimate effect of the marine environment… Some may remain indefinitely in the seawater, the seabed, or the flesh, fat and oil of sea creatures';
- pollution via commercial shipping by chemical or noise pollution and the dumping of litter at sea;
- damage of marine benthic habitat directly from fishing methods;
- damage of marine benthic habitat along the North Wirral Foreshore directly or indirectly from aggregate extraction, particularly anywhere that dredging may be altering erosion/deposition patterns;
- 'coastal squeeze' (a type of coastal habitat loss) from land reclamation and coastal flood defences and drainage used in order to farm or develop coastal land, and from sea level rise;
- loss or damage of marine benthic habitat directly and indirectly (through changed sedimentation/deposition patterns) as a result of navigational dredging in order to accommodate large vessels – e.g. into the ports of Liverpool;
- harm to wildlife (especially birds) or habitat loss due to increasing proposals/demand for offshore wind turbines; and
- pollution, direct kills, litter, disturbance or loss of habitat as a result of water-based recreation or other recreation activity and related development along the foreshore (Wildlife Trust, 2006);
- introduction of non-native species and translocation; and

- selective removal of species (e.g. bait digging, wildfowl, fishing) (Wildlife Trust, 2006 and Marine Biological Association, 2006).

The Mersey Estuary does have a high load of nutrients mainly from diffuse sources, with levels for phosphate and nitrogen decreasing from point sources. However, recent modelling has shown that due to the natural turbidity of the water, there is only a low risk of excessive algal growth. Given the close hydrological linkage between the Mersey Estuary and the North Wirral Foreshore, this is likely to hold true for this pSPA/pRamsar site.

Ribble and Alt Estuaries SPA, Ramsar

The main environmental pressures relevant to the Ribble and Alt Estuaries SPA/Ramsar comprise:

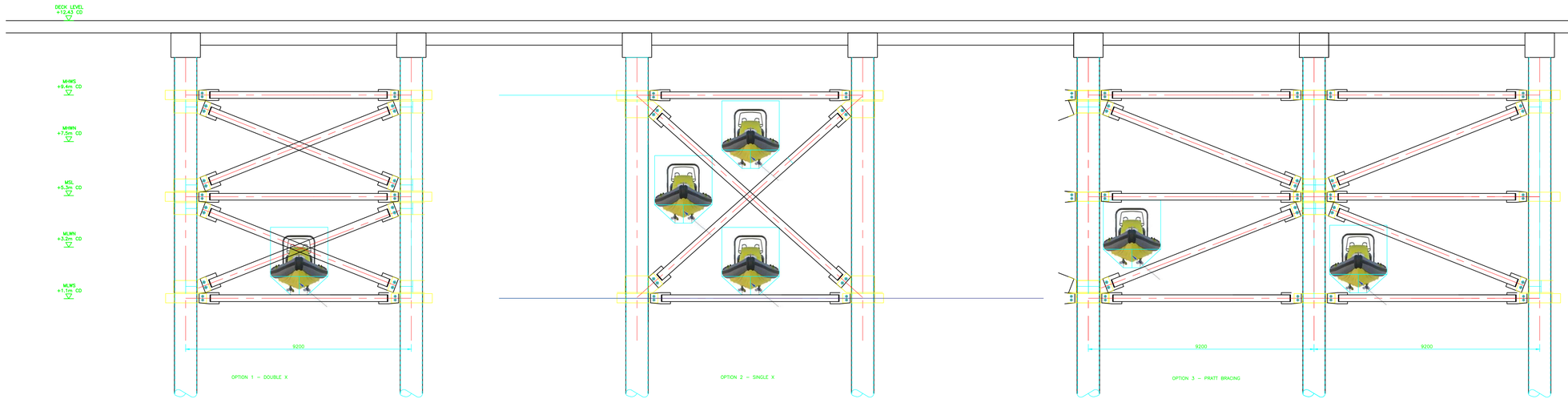
- loss or damage of habitat as a result of increasing off-shore exploration and production activity associated with oil and natural gas;
- over-grazing of the saltmarshes by cattle-farming;
- heavy metal pollution (lead, cadmium, arsenic and other poisons) from either industry or disturbance of sediment (legacy pollution bound into the sediment);
- pollution via rivers by agricultural effluent flowing off fields;
- pollution via rivers and drains by both treated sewerage and untreated runoff containing inorganic chemicals and organic compounds from everyday domestic products;
- damage of marine benthic habitat directly from fishing methods;
- damage of marine benthic habitat directly or indirectly from aggregate extraction;
- ‘coastal squeeze’ from land reclamation and coastal flood defences and drainage used in order to farm or develop coastal land, and from sea level rise;
- harm to wildlife (especially birds) or habitat loss due to increasing proposals/demand for offshore wind turbines;
- pollution, direct kills, litter, disturbance or loss of habitat as a result of water-based recreation or other recreation activity and related development along the foreshore;
- selective removal of species (e.g. bait digging, wildfowl, fishing;
- interruption of dune accretion processes leading to over-stabilisation of dunes;
- spread of rank grasses and scrub, partly caused by a decline in rabbit-grazing, further reducing suitable habitat;
- losses to development, forestry and recreational uses have reduced the area of available habitat;
- fragmentation of habitat leading to isolation of sensitive populations;
- creation of permanent water bodies in the dunes creating conditions for predators of natterjack toads and inappropriate management causing loss of low vegetation structure and open ground used by natterjacks;
- water abstraction, conifers and scrub lower the water table locally and reduces the number of natterjack pools.

Sefton Coast SAC

The environmental issues relating to Sefton Coast SAC comprise:

- the need to reduce the fragmentation of habitats, and the impact of fragmentation, to provide stepping stones for the movement of species;
- the need to counter negative changes to low-nutrient habitats resulting from atmospheric nutrient deposition;
- the need to manage the continuing coastal erosion at Formby Point which leads to a squeeze on habitats;
- the need to consider the potential impact of climate change on shorelines, wetlands and dunes;
- the need to manage abstraction from the underlying aquifer for sources such as golf courses. The aquifer is critical to some features of the site, such as the humid dune slacks and the great crested newts;
- to manage recreational pressures and direct disturbance to qualifying habitats;
- the need to develop and maintain management practices which sustain the conservation value of the area; and
- the need to avoid loss of great crested newt habitat, and habitats being further fragmented by distance or barriers.

C. Horizontal deck brace design



Notes

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL DIMENSIONS ARE MILLIMETRES U.N.O.
3. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM U.N.O.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.

Rev	Description	Date	By / Chk	App

RAMBOLL

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SUSPENDED DECK BRACING OPTIONS

Project No:	Scale (@A1):	Drawn:	Date:
		EL	21/02/18

Drawing No: MR-SK-001

Rev:

21/02/2018 12:19:30

D. Cormorant Technical Note – Ecological Conservation Management Plan

Waterman Infrastructure & Environment Limited
Merchants House, Wapping Road, Bristol, BS1 4RW
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Liverpool Cruise Terminal

Technical Note – Cormorant Mitigation

Date: Date: October 2019

Client Name: Liverpool City Council

Document Reference: WIE12464-100-TN-14-2-2

This document has been prepared and checked in accordance with
Waterman Group's IMS (BS EN ISO 9001: 2015, BS EN ISO 14001: 2015 and BS OHSAS 18001:2007)

Issue	Prepared by	Checked & Approved by
	Niall Machin	Gavin Spowage
Second Issue	Associate Director	Associate Director

1. Introduction

1.1. The shadow Habitat Regulations Assessment (HRA ref WIE12464-100-11-2-3-AA, Waterman January 2019) for the Liverpool Cruise Terminal proposed ecological mitigation for cormorant *Phalacrocorax carbo* in the form of a floating pontoon structure. MEAS and Natural England have advised that the floating pontoon should be a permanent structure. This is secured by a planning condition.

1.2. Small numbers of cormorant (up to 12) were recorded using on-site dockside structures in 2017 winter ornithological surveys. As the scheme will result in the loss of structures, particularly Princes Jetty, used by roosting/resting cormorant during construction, a floating pontoon for roosting/resting cormorant will be installed. To ensure the loss of the jetty is fully mitigated, the floating pontoon will be a permanent installation. The new jetty will also provide cormorant resting/roosting locations.

1.3. This Note sets out further detail on the design and location of the floating pontoon and sits as part of the strategic approach to cormorant mitigation in the wider Liverpool Waters vicinity of which the Cruise Terminal is part.

1.4. A strategic approach to cormorant mitigation within the overall Liverpool Waters area is being coordinated by Arup on behalf of Peel Land & Property (Ports) Ltd. The provisions within this Technical Note are covered by and conform with the overarching strategic approach.

1.5. This Technical Note constitutes an Ecological Conservation Management Plan (ECMP) for cormorants for the Liverpool Cruise Terminal development.

2. Pontoon design and location

Design

2.1. Floating platforms are used by wintering and other bird species, including cormorant, as night time roosts and daytime resting areas. Cormorants utilising such structures have become a feature of many of the UK's urban areas where large bodies of water occur.

2.2. A schematic design is shown as **Figure 1**. This is designed to enable a single 3m by 3m pontoon to be initially delivered by the neighbouring Isle of Man Ferry Terminal scheme in October 2019, with additional pontoons being added to form a larger structure as other nearby developments, including the Liverpool Cruise Terminal come forward.

Individual 3m by 3m pontoon design

2.3. Refer to **Annex A** for proposed pontoon design.

Larger joint pontoon design

2.4. It is known that a larger pontoon resource is required to jointly deliver cormorant mitigation for the Isle of Man Ferry Terminal, Liverpool Cruise Terminal, Northern Relief Road and, potentially, the C02 project. **Figure 1** therefore shows how four 3m by 3m blocks can form one single larger pontoon unit. The final design may instead be a square 6m by 6m arrangement.

2.5. Whilst each individual scheme is expected to deliver appropriate mitigation for roosting/resting cormorant displacement, there is a degree of 'double counting' of the birds involved. In particular, the Isle of Man Ferry Terminal, Northern Relief Road and C02 developments will impact more or less the same group of cormorants that currently rest/roost around West Waterloo Dock/Princes Dock and the dockside structures. The cormorants using land impacted by Liverpool Cruise Terminal just to the south would also interact with the West Waterloo/Princes Dock birds.

2.6. Therefore, it is appropriate for the individual developers to deliver a structure which could support around 15-20 roosting/resting cormorant. The design in **Figure 1** would accommodate upwards of 20 cormorants. It has been agreed that the relevant developers (Liverpool City Council, Isle of Man Government Department of Infrastructure, and Peel Land & Property (Ports) Ltd) will jointly provide this four-pontoon solution. However, a single 3m by 3m pontoon described in **Annex A** has been installed by the Isle of Man Government under marine licence L/2019/00239/1, to meet the requirements of condition 5.2.9 of that licence in advance of the other three pontoons (which can then be attached to the single pontoon when they are installed), as the project timescales for the Isle of Man scheme required the pontoon to be installed and in situ by 17th October 2019 at the latest. That pontoon was installed on 16th October 2019. The date of installation of the second 3m x 3m pontoon for the Liverpool Cruise Terminal is currently unknown.

Maintenance and Monitoring

2.7. The design will have an estimated life of at least 12 years with minimal maintenance. Minimal management is required – just removal of bird droppings once per year (off site, not into the Dock).

2.8. The current pontoon and all subsequent pontoons, including the pontoon installed for the Liverpool Cruise Terminal development, will be subject to an Adaptive Management Plan and annual winter bird surveys. An Adaptive Management Plan has been drafted by Waterman (ref: WIE12464-100-17-2-3) and forms an Appendix to the Liverpool Cruise Terminal CEMP document. The effectiveness of the mitigation (i.e. the pontoon) will be reviewed annually and action taken to ensure appropriate habitat for cormorant is maintained.

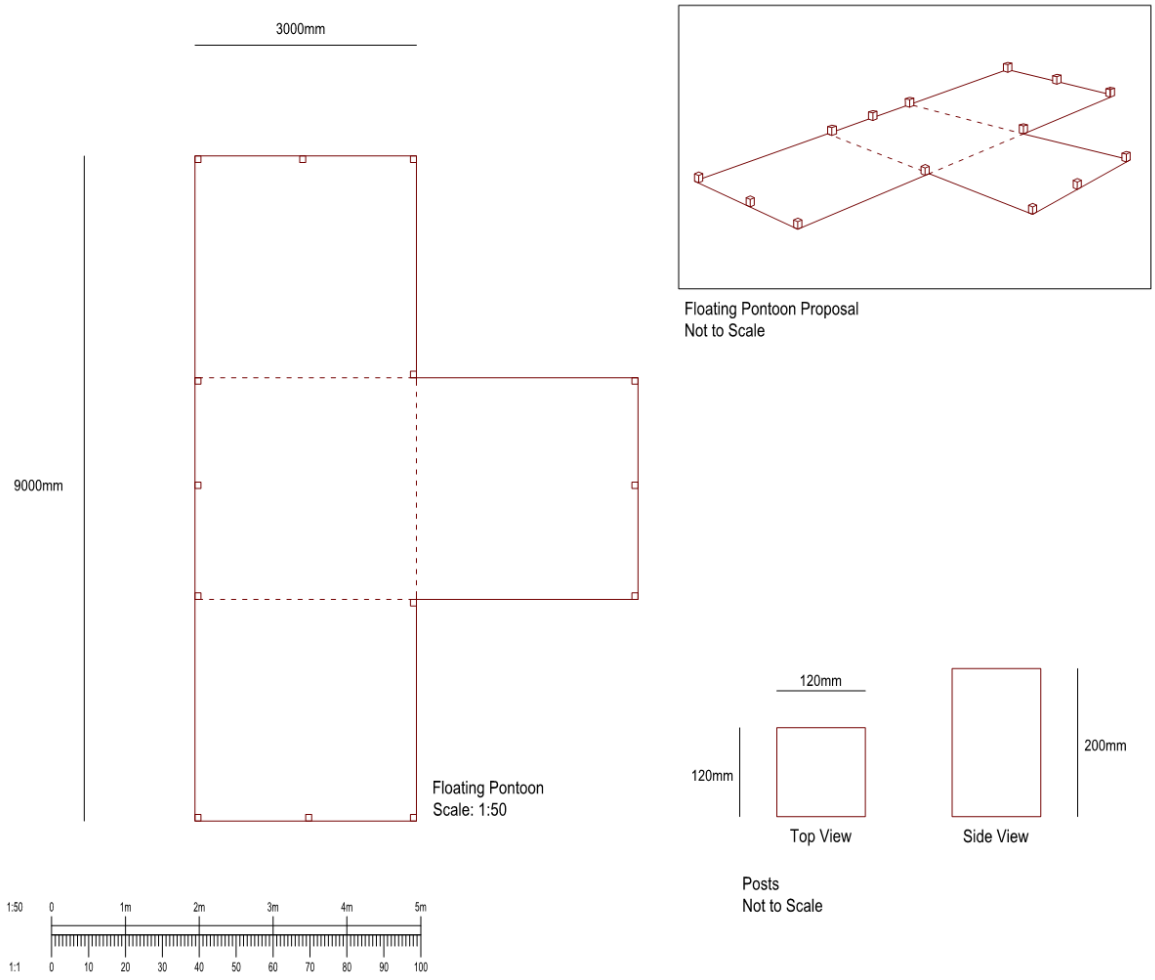

Figure 1: Proposed Cormorant Pontoon Design

Location

2.9. The floating pontoon(s) would be located in the eastern part of Princes Half Tide Dock, see **Figure 2**.

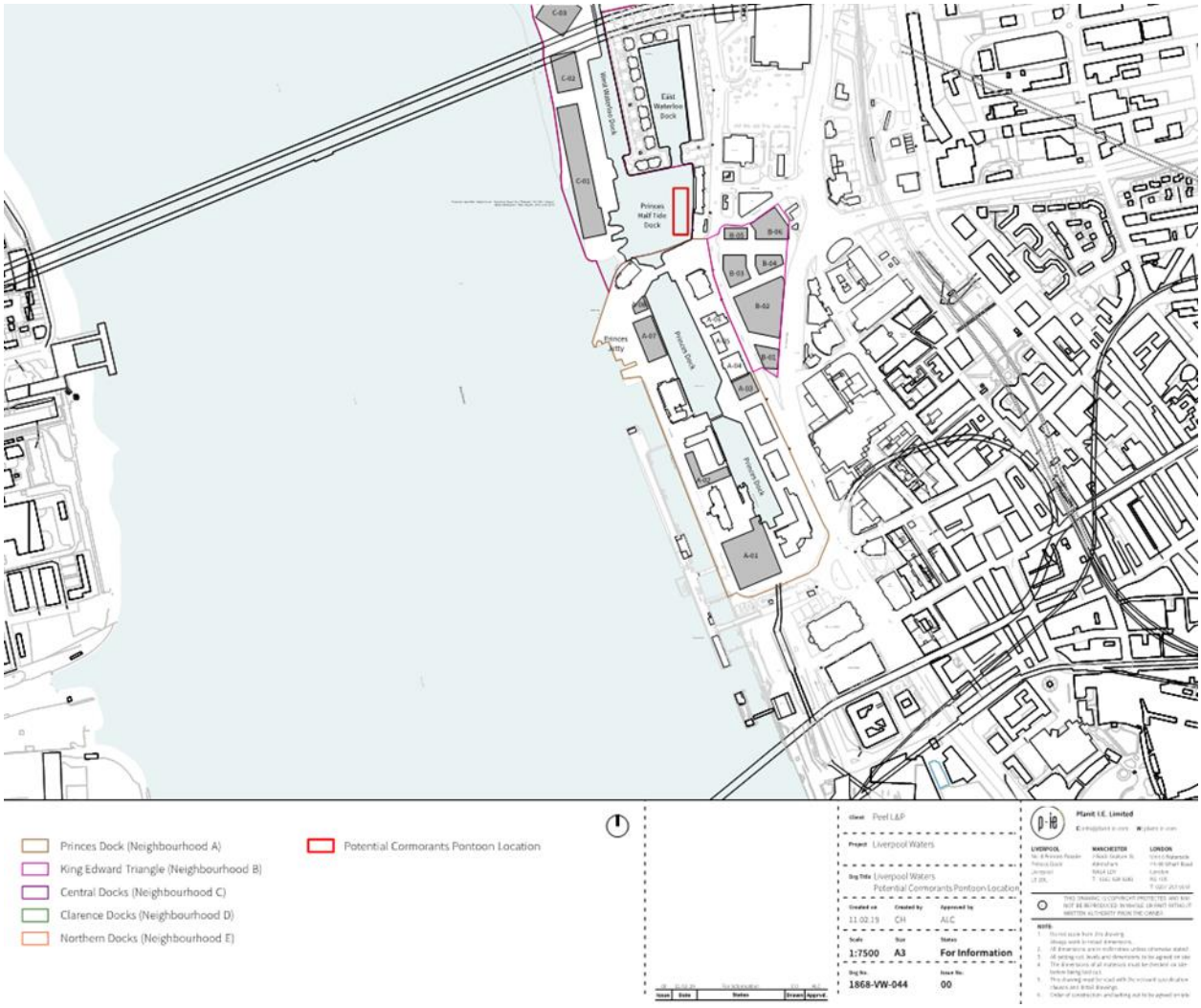

Figure 2: Proposed Cormorant Pontoon Location

3. Strategic approach

3.1. In their comments dated 18th March 2019 relating to the shadow HRA report submitted in support of the planning application for the nearby Isle of Man Ferry Terminal proposed development (ref: 18F/3231), Natural England (NE) stated:

We are highly encouraged that development teams from a number of projects in the area are working together to provide a combined mitigation pontoon. We have advised that a strategic approach to mitigation would be the most beneficial approach to ensure impacts arising from the number of developments is considered, therefore allowing for more certainty on deliverability of mitigation within a holistic manner. We advise that a strategic mitigation strategy should be provided and ideally in advance of projects coming forward so that the strategy can be agreed and in place, therefore allowing a smooth process through the planning stages.

3.2. In response to NE's advice, Peel, the site owners and holders of the outline permission for the Liverpool Waters Masterplan have agreed to co-ordinate a strategic approach to cormorant mitigation for Liverpool Cruise Terminal (LCT), Isle of Man Ferry Terminal (IoM), Northern Link Road (NLR)

and C02. Peel have identified a new permanent pontoon facility to be provided in Princes Half Tide Dock – see **Figure 2** above.

3.3. The final large joint pontoon structure would comprise 4 interlocking units forming a single structure of sufficient size and design to deliver the mitigation for the IoM, LCT, NLR and C02 schemes, i.e. catering for at least 20 cormorants.

3.4. Peel, in association with the individual developers, will oversee the Annual Monitoring of the pontoon facility in terms of winter bird monitoring surveys. The facility will be subject to an Adaptive Management Plan (AMP) which sets out any additional actions required for successful mitigation, e.g. responding to the monitoring in terms of adaptations that may be required to the structure to make it more suitable for cormorant. The AMP will also address management or maintenance requirements and respond to further additions/additional structural elements/habitats should other schemes come forward in the vicinity that require ecological mitigation of this sort.

3.5. The strategic approach to cormorant mitigation within the overall Liverpool Waters area, including the AMP for the cormorant pontoons, is being coordinated by Arup on behalf of Peel Land & Property (Ports) Ltd. The provisions within this Technical Note are covered by and conform with the overarching strategic approach.

ANNEX A

Cormorant Pontoon – Design Basis Statement and Method Statement

REPORT

IOM Ferry Terminal – Bird Pontoon

Design Basis Statement

Client: Sisk

Reference: PB8850-RHD-ZZ-XX-RP-Z-0001

Status: Draft/P02

Date: 30 July 2019

Royal HaskoningDHV

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Document title:	IOM Ferry Terminal – Bird Pontoon
Document short title:	Design Basis Statement
Reference:	PB8850-RHD-ZZ-XX-RP-Z-0001
Status:	P02/Draft
Date:	30 July 2019
Project name:	IOM Ferry Terminal
Project number:	PB8550
Author(s):	Stephen Salmon
Drafted by:	Stephen Salmon
Checked by:	Mike Primrose
Date / initials:	26/07/2019
Approved by:	Alistair Reid
Date / initials:	26/07/2019

Classification
Project Related

Disclaimer

Table of Contents

1 Introduction

The scope of the design comprises 1 No. 3 x 3m pontoon for bird roosting including Cormorants for a 12-year design life. The pontoon will be located in Princes Half-Tide Dock, Liverpool.

The overall design is based on an adaptation of an existing RSPB design, as outlined in the RSPB Design and Management of Rafts notes, by forming the lower section in steel with upper section remaining as per the standard design. The RSPB design notes are included in Appendix A.

2 Key Parameters

2.1 Geometry

The habitat pontoon will be made of 1 No. 3 x 3m unit. The design includes a capability for the addition of further pontoons, linked by shackles.

The freeboard will be approximately 250 to 300mm excluding wind induced heeling effects and maintenance personnel.

The pontoon will be moored in position using chains to anchor blocks installed on the dock bed. This anchoring system will allow movement under wind loading. Given the open water nature of the dock this is not anticipated to present any significant issues.

2.2 Wind

Wind velocities have been extracted from another project undertaken in the area and are listed in Table 1.

Return Period	10minute at +10m	Wind speed at sea level so 30sec gust
1 in 1yrs	20.8	22.8
1 in 10yrs	24.7	27.1
1 in 50yrs	28.5	31.2

Table 1 – Design wind velocities

The loads reported are based on a 250mm freeboard.

2.3 Water Levels

Normal dock water level is around +9.8mCD, the published seabed level in the dock is +0.2mCD giving a water depth of 9.6m.

The existing seabed level is understood to be significantly higher than the above published level, prior to construction the seabed level will be confirmed by hydrographic survey. The anchor assemblies e.g. length and diameter of chains, expected movements, etc. will then be adjusted to suit the seabed level.

The existing seabed level in the dock is not known. Should this be different to that assumed above the chain lengths and reported movements will require recalculating.

2.4 Seabed Composition

The seabed material in the dock is assumed to comprise soft, cohesive material i.e. deposited mud and silt. This is considered suitable for the use of anchor blocks.

2.5 Wave climate

There is no significant wave loading assumed as the dock is enclosed with a limited fetch for locally generated wind waves.

2.6 Live loads

A uniformly distributed load of 0.40kPA and point load of 1.00kN has been assumed. This matches the recommend guidance provided in BS EN 1991-1 Table 6.10 for a Category H roof i.e. not accessible except for normal maintenance and repair.

Ad additional load case of 3 No. persons (equivalent to 0.75kN each) on one side has also been assumed. This allows for 3 maintenance personnel or other unauthorised access.

Cormorants have been proposed as the primary users of the pontoon accessing it by flying. These birds have typical body masses of up to 5.0kg. Consequently, they are not anticipated to have any significant impact on the freeboard or stability of the pontoon. By inspection their live loading is lower than that assumed in the design.

3 Results

To achieve an initial 250-300mm freeboard with all the timber and gravel in-situ 762mm diameter tubes filled with polystyrene is required. The polystyrene will reduce the risk of the pontoon sinking should the tubes be perforated.

These tanks are to act as support for the decking with additional angles to support the planking. The tubes will be sealed with square end plates that will allow welding to the square frame that holds the deck in place.

Diagonal bracing will be attached to the end plates to secure the floatation tanks.

The freeboard and trim of the pontoon is adjustable via the addition and positioning of steel plates on the deck (these will be gravel covered). Freeboard corrections will be achieved by adding the plates at the centre of the pontoon. Trim corrections will be made by adding plates to the edges of the pontoon.

It should be noted that any reductions in freeboard beyond the assumed 250-300mm will have a disproportionate effect on reserve buoyancy due to the tube shape.

3.1 Stability

Full live load
Max total load =0,40kN/m^2 x 3m x 3m = 3.60kN

With this load the freeboard will reduce by 30mm.

With the UDL loading on one side only the heel will be in the region of 1.0° Therefore the unit is deemed stable for the expected use.

Additional point loads
Max total load = 3 x 0.75kN = 2.25kN

With this load the freeboard will reduce by 20mm.

With this loading on one side only the heel will be in the region of 1.2° Therefore the unit is deemed stable for the expected use.

3.2 Anchorage

The anchor assemblies comprise catenary chains attached to sinkers positioned on the seabed. Using a 12.0m length 25kg/m catenary chain the anchor sinkers need to have a submerged weight of 250kg. This is equivalent to a dry concrete mass of 420kg or 280kg of steel.

4 Designers Risk Assessment

No.	Risk	Impact	Mitigation	Residual Risk
1	Floating structure that, though designed for wild life, will occasionally be accessed by people	Instability could result in operative having an unplanned entry to the water.	• Structure designed to have good stability will little tilt when unevenly loaded. • Operatives to wear life jackets when accessing the pontoons. • Operatives to be given adequate training/instruction as to safe working practice. • Hand railing will not be installed as that would negatively impact the purpose of the structure.	Typical risks of working near water. Suitable procedures need to be in place.
2	Floating structure is within an active area	Significant movement of the pontoons could risk other structures within the basin	• Movement kept below reasonable limit for design winds from 1:50year event • Supports on each side to take full wind load therefore there will be share capacity in the perpendicular anchors that will give appropriate safety factor.	Under extreme conditions the anchor blocks could be dragged a short distance on the seabed and may require repositioning
3	Corrosion of floatation tanks	Corrosion could eventually result in a hole in a take that would result in its loss of buoyancy	• Tanks filled with expanding foam such as even with a hole water will not be able to fill the tanks.	Significant areas of corrosion could allow the foam to be damaged and lost. An appropriate inspection regime is recommended
4	Lifting	The pontoon will have to be transferred into the water by lifting on slings.	• Structure kept to minimum weight • Tanks integral part of structure so slings under tanks during lifting not anticipated to put undue stresses into pontoon.	Typical risks of lifting large object into water. Suitable method statements would need to be produced

Appendix A – RSPB Design and Management of Rafts Note

a million voices for nature

Design of management of rafts

Rafts are a useful way of providing island habitat in areas of deep or fluctuating water levels. Their purpose is to improve breeding success by providing areas safe from flooding, disturbance or predation. Rafts are unlikely to attract terrestrial predators and so are useful where islands would be too close to shore for safety. They also provide wildfowl with loafing spots and are often used as resting places by various bird species during the winter.

Main factors to consider when making a raft

There are many conflicting requirements when constructing a nesting raft.

- The ability to float, preferably with the deck just above the water line.
- The ability to rise and fall easily with the water over the maximum flood range.
- Stability, so that the raft is not tipped or spun by current, waves or wind.
- A dry, sheltered nest site, which does not attract the attention of crows or other avian predators. The nest area must be high enough not to be swamped by storm waves.
- Means of access and some protection from waves and current for young birds.
- Harmonious blending with the surroundings if possible.
- Practical factors e.g. water not excessively deep, lake shore accessible by vehicle, for bringing in boat, raft and materials, and for regular maintenance checks.
- On SSSIs, formal consent may be required from NE, SNH or CCW.

Construction

Although rafts vary in character and design, some basic considerations apply to each.

1. - Timber rafts tend to absorb water and sink, although pine or other light wood floats better than heavy timber. In most cases, additional floats must be used if the raft is to last for more than one season.

2. - **Flotation blocks**: Small rafts can be floated with plastic 4.5 litre containers. Slightly larger rafts will stay afloat with 22 litre plastic drums. Rafts in the range of 1.2 - 1.8 m in dimension require closed cell polystyrene blocks, polystyrene scraps, airtight metal drums (including old oil drums). Polystyrene is easily held in place and can be adjusted to achieve right buoyancy. It should be packed into strong polythene to prevent it from breaking up and littering the environment. Metal drums need to be weighted so that they do not float too high. The flotation blocks must be thoroughly cleaned before they are brought to the site to prevent pollution. Annual checks and maintenance is important to ensure that the raft remains secure and firm, and that the flotation devices are not disintegrating or leaking.

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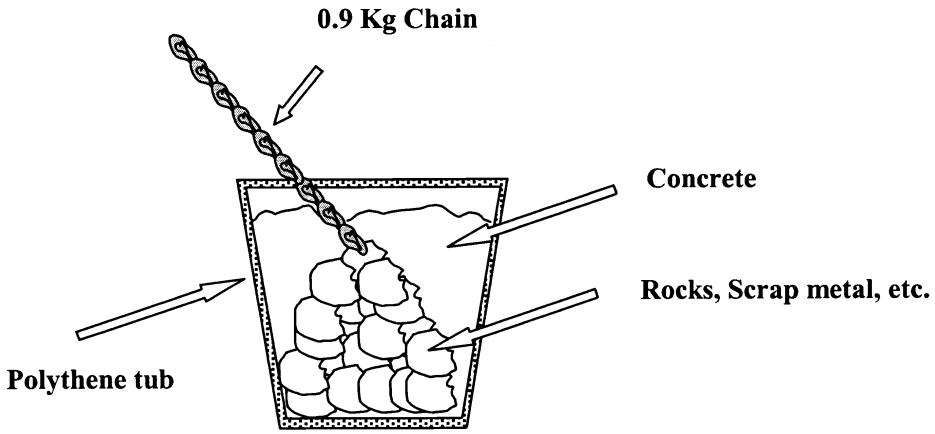
3. - **Anchors:** Two anchors are better than one and should be attached to opposite corners of the raft to keep it from swinging in the wind. Anchor to the bottom, not to the shore, to prevent vandalism and to keep rats or weasels from getting to the raft.
    a. - Anchors can be made from breeze blocks, concrete blocks etc. The wire anchor rope should be tied to a short section of chain or to an eye bolt; for large rafts use 19 mm circumference flexible steel wire rope with a 4 ton breaking strain to ensure that the mooring is secure. An anchor weighing about 50 kg is suitable for most rafts. It can be made in a large polythene garden tub half filled with scrap metal or rocks. Wrap one end of an appropriate length of chain around the scrap and fill the tub with concrete. Once the concrete has set, the anchor can be turned out of the mould and the chain bolted to the raft. Three thickness of heavy gauge (24mm) polypropylene rope can be used instead to save money, especially if the raft is in deep water. Where strong winds or currents are likely, several 50kg anchors may be needed to securely hold a 3m x 2m turned raft.



    b. - Where one large anchor is too cumbersome to manage, a smaller (e.g. 9 litre) container can be used as a mould and concrete sinkers can be cast with holes through their centres. One sinker can be fastened to the end of the wire and others can be threaded on and allowed to slide to the bottom before fixing the other end of the wire to the raft.

4. - Where more than three rafts are to be moored in a string there should be some additional anchor points from the middle rafts to keep the string from sagging before a strong wind and dragging the main moorings.

5. - Various nest boxes and duckling ramps can be added to the raft superstructure depending on the species of birds that the raft is intended for. Duck baskets should be at least 1.2 m apart and facing away from each other. They should be tilted slightly upwards at the front and lined with dead grass or some wood shavings. Baskets should be positioned in early January and left until early September, when they should be taken up, cleaned of nesting material and stored under cover.

Species specifications:

1. - Wader and tern nesting rafts, in most cases, should be bare of vegetation and covered with a material attractive to the intended nesting species.
2. - Wildfowl rafts require more vegetation. Rushes, reeds or small willows are suitable, planted either around the edges or over the deck of the raft leaving pathways to the nest box or central clearing. Plants survive best on raft designs with an open mesh or slatted platform just above the water

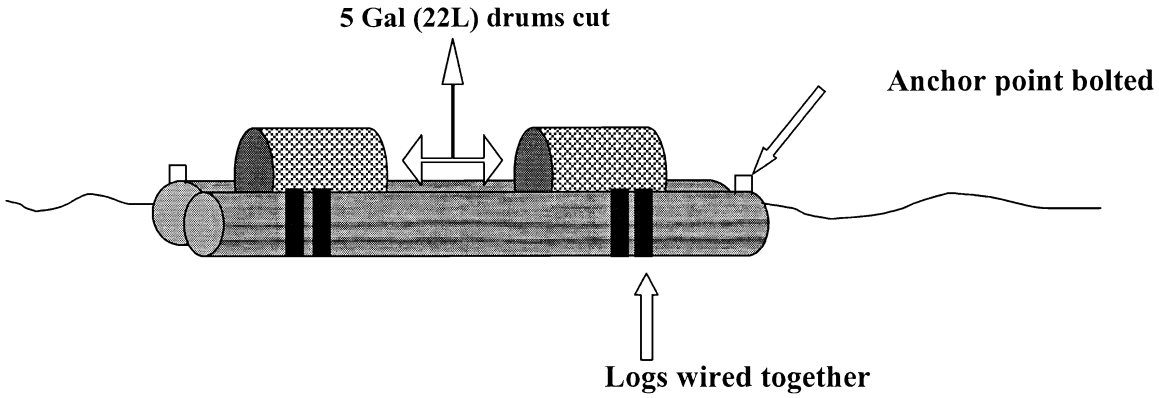
line, covered with moisture-holding mulch in which the plants can root and through which they can reach the water.

Some raft models

The area and water characteristics determine the best design for a raft. Some of the designs used on RSPB reserves are described below as a guide.

Simple log or telegraph pole rafts

Logs from nearby felling operations or used GPO poles are often available free and can be used to provide the basis both for simple rafts and more elaborate designs. Without any additional support, the timbers eventually sink low in the water and sprout a floating garden, which should prove to be attractive to nesting wildfowl if the raft is sited in a calm area.



The standard raft

This raft is made of pressure treated (do not use CCA treated) softwood and is 3 meters square. Design includes chick shelters, a re-entry ramp and an optional security fence. Buoyancy is provided by two high-density polystyrene blocks. Raft is anchored to concrete blocks by a chain attached to a marker buoy. It is covered with gravel and rocks, and any plant growth is removed each winter.

Raft platform:
Mainframe: 100x200mm timber, bolted together in each corner through overlapping ends (two upper, two lower), one top inset 150mm to allow for re-entry ramp. Deck 25x150mm planking, laid on and nailed (75mm galvanized nails) to lower mainframe timbers. Sub frame 50x75mm runners to support flotation and strengthen deck, nailed (150mm nails); main flotation holders/deck support 50x100mm runners; sides 25x150mm planking, nailed flush with top of upper mainframe timbers along the lower sides to hold in gravel etc, and flush with the bottom of the mainframe timbers along the upper sides to hold the flotation devices in place.

Buoyancy:
Blocks of 380x600x2700mm high density polystyrene foam, painted (optional) with BP Aquaseal 44 bituminous paint (as suitable for use inside cold water tanks) to water seal and strengthen the polystyrene; two optional straps per float block, 1,420mm strips of polystyrene webbing (or 50mm chair webbing as a temporary measure, eg during launching) with eyelet holes for nailing to frame. Once in the water, the weight of the raft is sufficient to hold the polystyrene in place without any additional fixings, even in extreme conditions.

Mooring:
Mooring ring bolted through center of mainframe timber (bolt fixed with two nuts so that it can swivel freely), connected preferably to a chain or a 20mm diameter hawser-lay polypropylene rope (which will not rot, but can be chafed), with hard eyes and shackles each end. Tether a 30-inch circumference marker buoy to the raft end of the chain or rope with a length of polypropylene rope to allow the raft to be detached, without having to pull up or lose the anchor.

Anchor:
Multiple small weights (up to $1m^3$ concrete as a total) for ease of transport. Four buckets 250mm high by 300mm diameter of concrete, eyebolt set in centre; weights connected in pairs by shackles to 300mm lengths of chain; fixed to mooring by placing two pairs of weights together with the connecting chains forming a cross, and attaching the mooring rope shackle to the point where the chains cross. Exposed sites where wind and waves are strong may require more anchor weights.

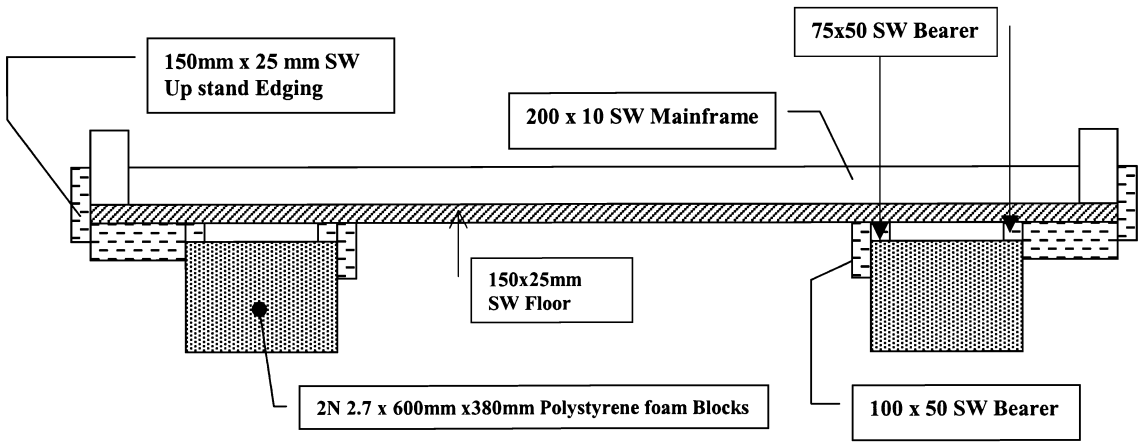
Shelters (to protect from rain):
These comprise 1m long 25x150mm planks located in opposite corners, nailed flat onto end of upper mainframe timber, side plank and 50x75mm end block.

Gravel covering:
Preferably of 15mm-25mm gravel with larger pieces and rocks to provide shelter, and give sufficient weight to push running board down to water level.

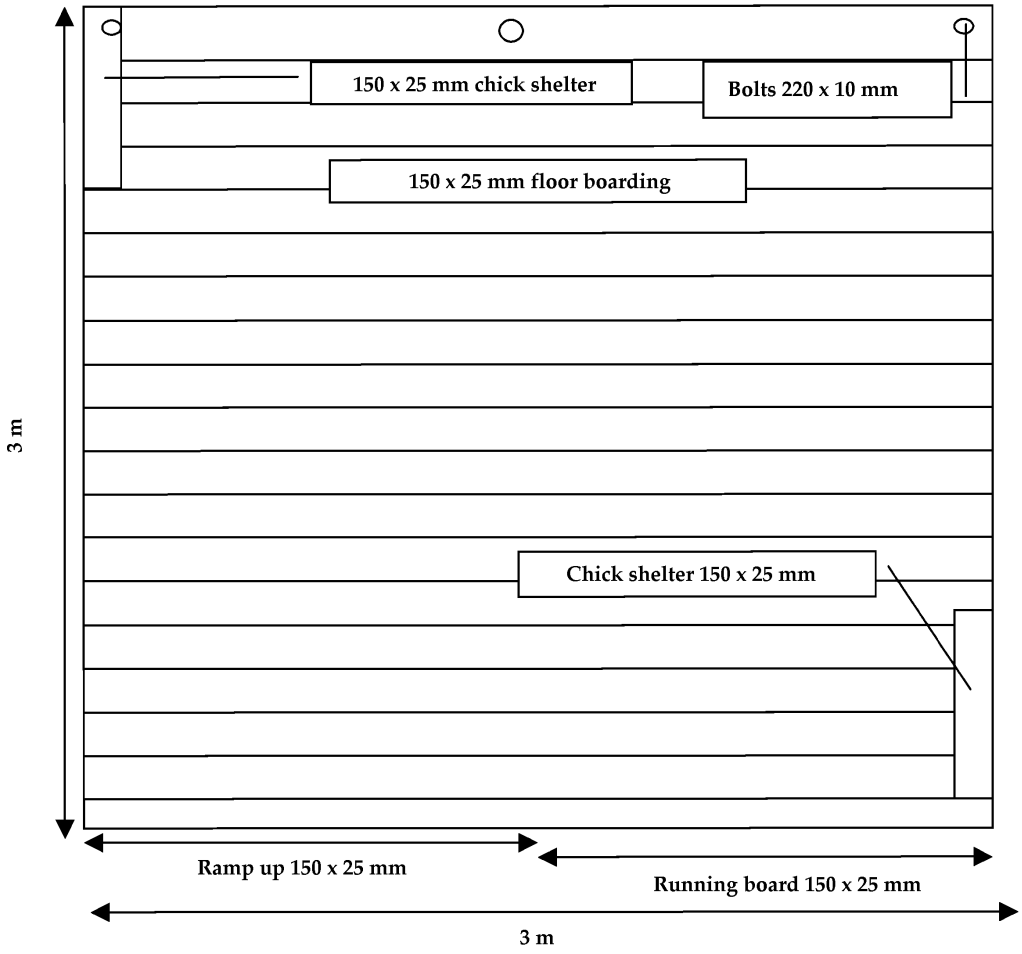
Re- entry system (for chicks falling overboard):
These are located on opposite (lee) side of raft to the mooring ring: running board 3m, 25x150mm plank nailed to bottom of the two lower mainframes. Ramp (1.5m, 25x150mm plank) sloping up to top corner of mainframe, supported by up stand, nailed. Block gap under raft behind ramp with 25x150mm skirt plank.

Optional removable security fence:
These comprise four frames 230mm by 0.3m, made from 50x50mm planks covered with 25mm chicken wire, bolted along each side and fixed at top corners.

Side view



View from above

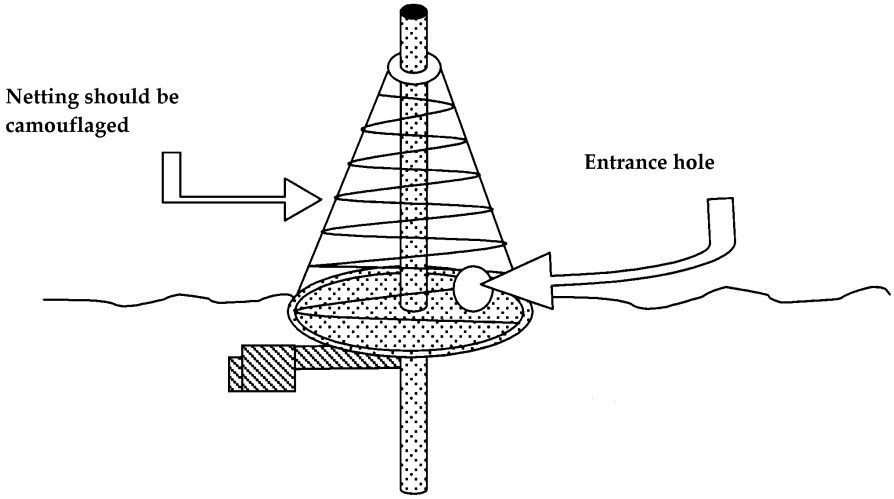


A floating wildfowl nest for use on rivers

This design, successfully used on the Ray, near Oxford, is intended to overcome the problems posed by strong currents, which make it difficult for wildfowl to nest successfully on rivers. Chick survival is best where the floating nest is sited on a quiet backwater with gently sloping banks so that, when a chick leaves the nest, it can get to the shore and climb out despite the current.

1. - Drive a suitable length of 50mm diameter steel pipe into the riverbed to provide an anchor pole on which the floating nest can rise and fall with changes in water level.
2. - Cut out a circular platform from marine plywood and cut a hole in its centre so that it fits over the anchor pipe.
3. - Screw three boards to the circular plywood piece, so that they form an equilateral triangle to make a frame underneath the platform for the floats.
4. - Strap three 4.5 litre plastic or metal tins to the triangular frame, one each side. If metal tins are used, they should be well painted with bitumen paint and coated inside with a spoonful of old engine oil before capping.
5. - Attach three metal struts, evenly spaced, to the edge of the platform, joined at the upper end to a ring that fits over the anchor pipe. This upper ring, with the hole in the platform, forms the bearing on which the nest rises and falls on the pipe.

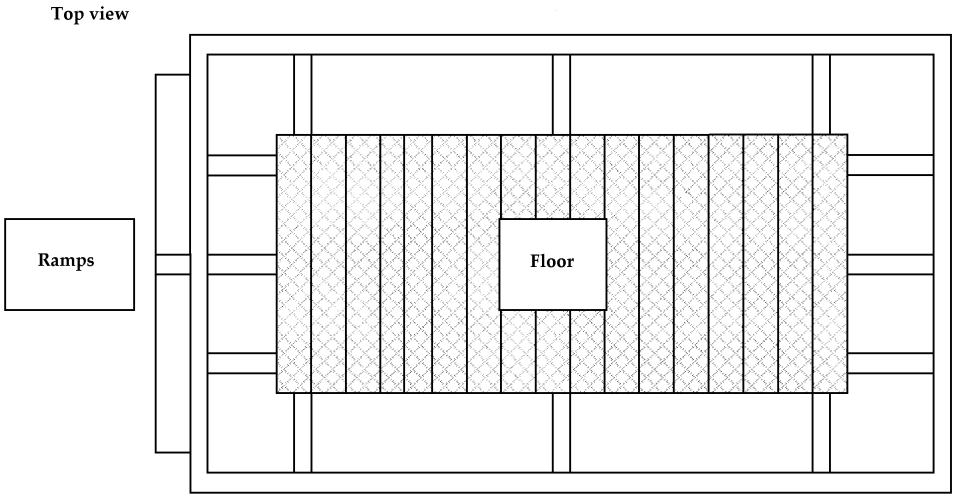
6. - Fasten a conical covering of light but firm netting around the outside of the strut assembly, and use vegetation to provide some shelter. Leave a 150 mm diameter entrance on one side.
7. - Slide the platform down over the pipe. If it tends to spin in the current, attach a rudder to the floats to keep it properly orientated. The entrance hole should be arranged to face the nearest bank.



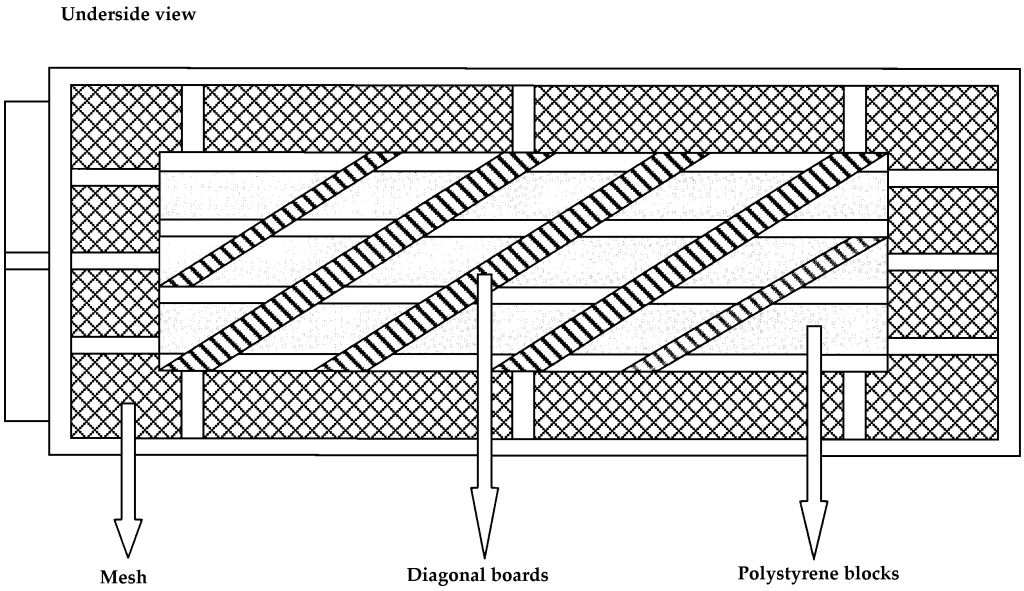
A square raft

This design is popular and has proved to be highly effective and weatherproof. Similar structures are in use in many reserves.

a. - Construct a framework of 25 x 150mm boards or similar. Nail the flooring across the top of the frame leaving the margins open to take vegetation and nail duckling ramps to one end of the raft. Use galvanized nails since they do not rust.



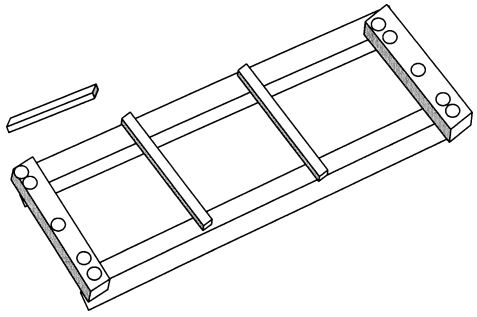
b. Turn the raft over. Staple close-mesh galvanized wire netting across the bottom of the raft, leaving the central part free to hold the flotation blocks.
c. Place 150mm thick polystyrene blocks in the uncovered centre of the frame. Hold the polystyrene in place with diagonal boards nailed across the frame.



d. - Turn the raft right way up. Cut out blocks of rush, willow etc. to fit into the margins of the frame. Fit anchor bolts to two opposite corners. Fix a nesting box or basket if required. You can cover the raft with some gravel. Finally, tow the raft into the position and anchor it firmly.

A heavier variation:

The raft described below is very successful when attracting terns to nest. Bare shingle is required for the nesting, but a completely exposed raft results in high chick mortality. At about one week old, tern chicks leap overboard at the slightest disturbance. This can be prevented by providing them with small shelters to hide underneath.



1. - Drill the sleepers as indicated in the diagram, using a brace and a bit, and bolt them together with eight 250mm coach bolts. Drill and fix anchor bolts in the end sleepers.
2. - Drill and bolt the cross members to the side sleepers. These are required to make a rigid structure and to resist the upward pressure of the floats.
3. - Nail the side battens into position; these help hold the shingle in place.
4. - There are two ways to floor the raft. One is to trap plastic-coated chain link fencing, covered in heavy-duty polythene, under the cross braces. Staple the fencing firmly to the sleepers. Alternatively, nail old garage doors or other suitable sturdy timber to the cross members and spread the flooring with a layer of concrete to help keep the shingle in place.
5. - Float the raft. Unless you have mechanical help, placing approximately 0.8 cubic metres of polystyrene blocks under the raft for flotation will require a number of water-hardy volunteers.
6. - The amount of polystyrene needed varies with the weight of the raft so trials are necessary. Provide some extra flotation to compensate for the shingle, which is added afterwards. The polystyrene stays in place between the sleepers due to its buoyancy and should not need fastening.
7. - Spread a layer of shingle over the flooring.
8. - Fix ramps or walls to the rafts sides, place a shelter on it, tow it into position and anchor it by means of bolts in the end sleepers.

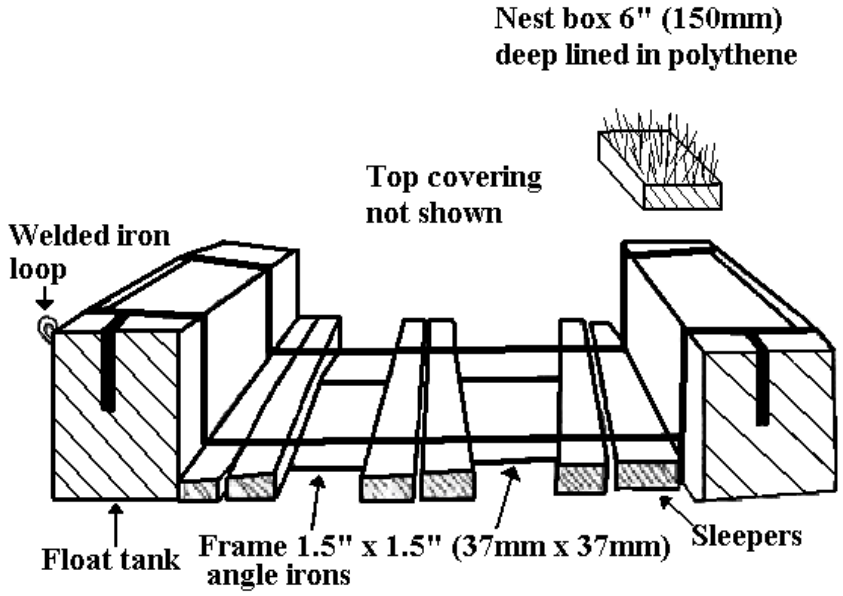
Welded Rafts

These two models were designed for the specific needs of a particular area. They require a great deal of skills and therefore are only suitable if none of the previous ones can be used. The designs shown have proved to have an estimated life of at least 12 years with minimal maintenance. These types depend on availability of suitable welding equipment and skills, and sheet-metal float tanks used by gravel companies for ferrying electrical equipment around wet pits.

Type A
Weld together three float tanks and attach a rim of logs with welded metal straps. To moor the raft, fix a wire anchor rope to a 50 kg scrap iron or concrete anchor. This simple but strong raft gives a surface area of 6.7 square metres. It successfully attracts ducks and geese, but has two disadvantages. It is so buoyant that the nest floats at least a foot above the water so that, unless a ramp is attached to help them, once the chicks leave the raft they cannot return. Soil ultimately dries out or is dislodged and must be replaced at intervals along with fresh vegetation.

Type B
This rather elaborate design features a semi-flexible welded frame, which makes the raft very durable in exposed conditions. The float tanks are the same size as in the previous design; the sleepers are topped with a grid that holds nesting cover.

Construction:
- Weld the frame together and to the float tanks. Weld two anchor bolts to opposite corners.
- Manoeuvre the completed frame into the water.
- Slide the sleepers into position. Leave gaps between the pairs of sleepers so that plant roots can reach the water.
- Cover the top of the frame's central section with narrow-mesh galvanized metal.
- Fix the nesting boxes on top of the floats
- Cover the mesh with mulch or soil and suitable plants. Plant up the nesting boxes.
- Tow the raft into position and anchor from the anchor bolts.



REPORT

IOM Ferry Terminal – Bird Pontoon

Method Statement

Client: Sisk

Reference: PB8850-RHD-ZZ-XX-RP-Z-0002

Status: Draft/P02

Date: 30 July 2019

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Document title:	IOM Ferry Terminal – Bird Pontoon
Document short title:	Method Statement
Reference:	PB8850-RHD-ZZ-XX-RP-Z-0002
Status:	P02/Draft
Date:	30 July 2019
Project name:	IOM Ferry Terminal
Project number:	PB8850
Author(s):	Mike Primrose
Drafted by:	Mike Primrose
Checked by:	Ben Hughes
Date / initials:	25/07/2019
Approved by:	Alistair Reid
Date / initials:	26/07/2019

Classification
Project Related

Disclaimer

Table of Contents

1 Introduction

This method statement relates to the installation of 1 No. floating pontoon in Princes Half-Tide Dock. The pontoon will form part of the Isle of Man Ferry Terminal scheme and wider Liverpool Waters Strategic Ecological Mitigation Plan.

1.1 Site Location

The site is located on the East side of Princes Half-Tide Dock is shown in Photo 1.

Photo 1 – Princes Half-Tide Dock site

The pontoon is to be moored clear of the navigation channel for the Liverpool Canal Link that extends across the West side of the dock. There is therefore no risk to navigation.

2 Pontoon and Anchor Assemblies

The pontoon will comprise a below water level welded steel frame with an above water timber covering (pressure but not CCA treated softwood timber). The design is an adaptation of ‘the standard raft’ described in RSPB document Design and Management of Rafts.

The anchor assemblies comprise steel sinkers and standard anchor chains.

All the above components will be fabricated off-site.

The topside of the pontoon will be covered in a layer of washed gravel.

3 Installation

3.1 Off-Site Fabrication

The pontoon and anchor assemblies will be fabricated off-site and transported to Princes Half Tide Dock by road.

3.2 Survey

A hydrographic survey of the dock will be undertaken to confirm the seabed level which will then allow the final mooring locations to be confirmed. In particular the water depth will allow the sinker positions and weights to be confirmed.

3.3 Lifting into the Dock

The pontoon will be lifted into the dock by a small mobile crane or HIAB, located alongside one of the quay walls.

3.4 Means of Access

A safe means of access between the pontoon and quay will be set up. Operatives working on the pontoon will also wear correct Personal Protective Equipment (PPE) which will include self-inflating life preservers at all times.

3.5 Gravel Placement

The gravel covering to the pontoon topside will be placed by hand and raked level. All gravel will be pre-washed to minimise dust.

3.6 Anchor Assembly Installation

The anchor assemblies will be attached to floatation bags and then be lifted into the dock by the mobile crane or HIAB.

A small craft will then tow each of the anchor assemblies to the anchor locations and release the sinkers. The floatation bags will remain attached to the free end of the mooring chains.

3.7 Mooring into Final Location

The completed pontoon ill then be towed to the final location by a small craft. Each of the free anchor chains will then be attached to the pontoon and the floatation bags removed and retained.

4 Maintenance

The annual maintenance of the pontoon topside is envisaged to be undertaken in-situ. Access to the pontoon will be via a small boat. The pontoon design allows for the maintenance access in terms of flotation and stability.

The anchor assemblies are not envisaged to require maintenance in the 12-year design life.

5 Decommissioning

The decommissioning of the pontoon is envisaged to be undertaken after a period of 12 years.

The pontoon will be disconnected, temporarily positioned against a quay wall and a safe means of access installed using the previously described procedure.

The gravel covering of the topside will be removed by hand and disposed of off-site.

The pontoon will then be disconnected from any further pontoons, if installed, prior to being lifted from the dock by small mobile crane or HIAB.

The pontoon will be then be disposed of off-site with transportation by road.

There are two possibilities envisaged with regards to removal of the anchor assemblies.

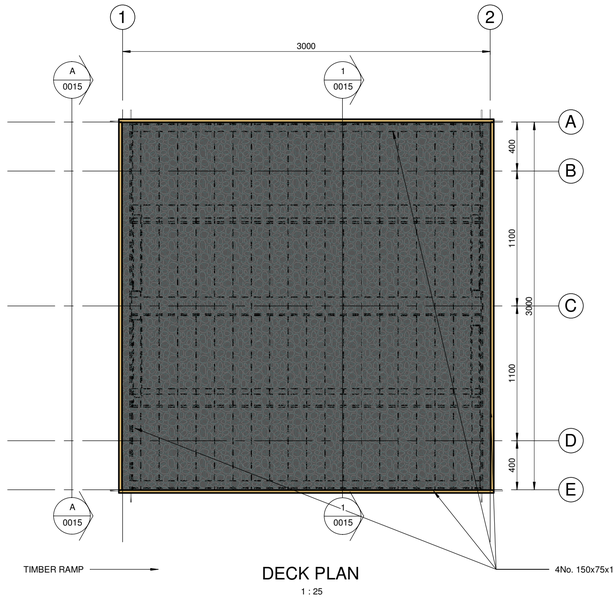
1. The sinkers on the seabed may have embedded into what is assumed to be a soft mud / silt material. If this is the case it is proposed to cut the chains at seabed level. This would leave the sinkers in place as they pose no risk to navigation or to the environment. This will also mitigate the need for any air-lifting or dredging works that would otherwise be required to extract the sinkers.

2. In the event the sinkers remain on the seabed or to a shallow embedment, it is proposed they will be lifted by floatation bag, be towed to near one of the quay walls and be lifted by small mobile crane or HIAB.

In either option the removed elements of the anchor assemblies will be then disposed be of off-site with transportation by road.

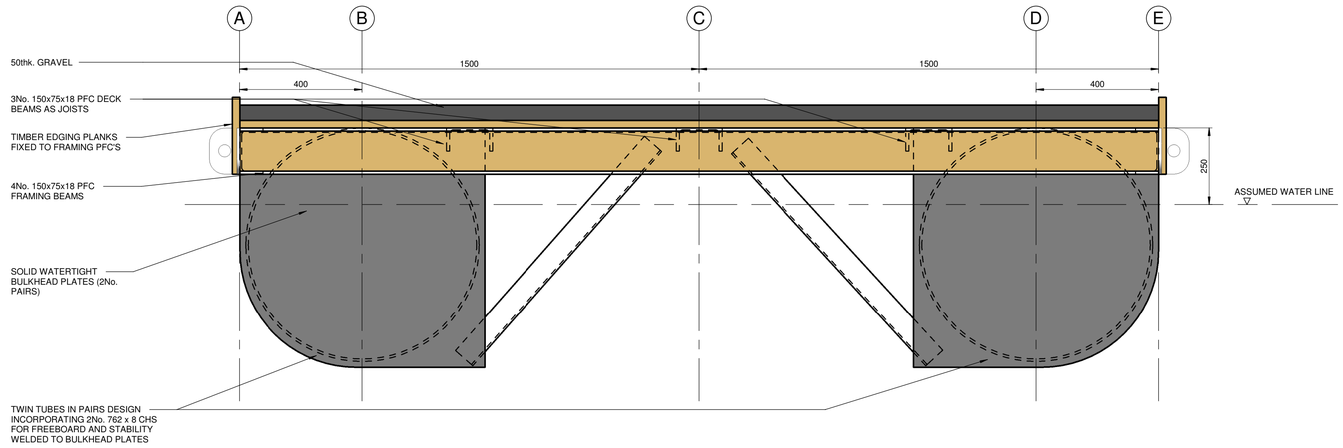
The works in the dock will be undertaken using a diving contractor operating from a quay side.

PB8850-RHD-XX-XX-DR-C-0015



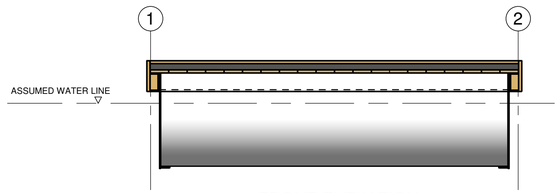
DECK PLAN

1 : 25



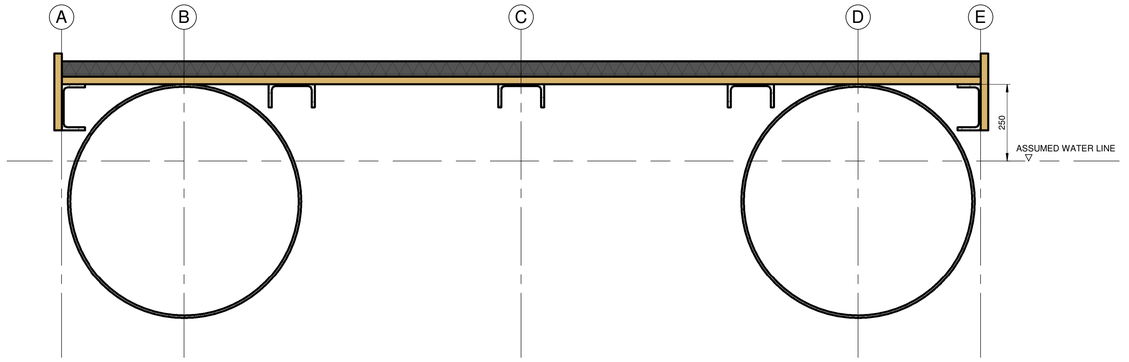
VIEW ON A

1 : 10



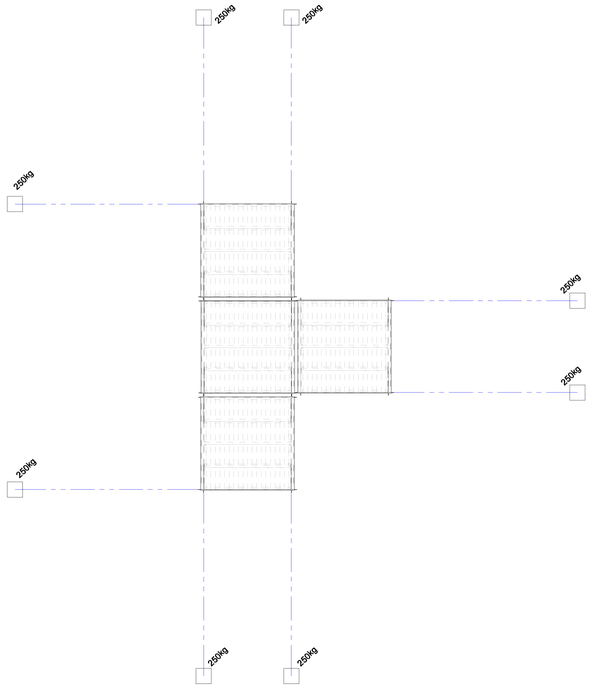
FRONT ELEVATION

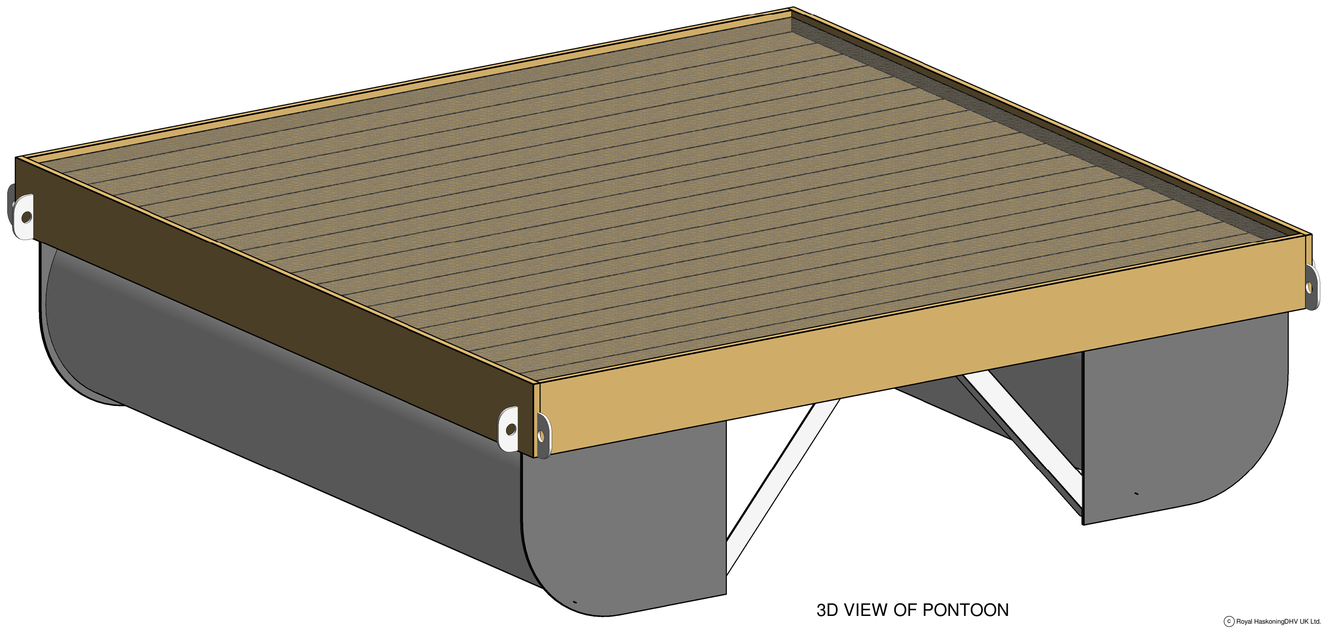
1 : 25



SECTION B-B

1 : 10





3D VIEW OF PONTOON

NOTES

1. THIS DRAWING SHOWS A CONCEPTUAL GENERAL ARRANGEMENT FOR THE PROPOSED COMPENSATORY HABITAT PONTOON.
2. ALL DIMENSION IN MILLIMETERS
3. STEEL S2 75 WITH C5-M DURABILITY HIGH COATING TO BS EN 12944.
4. TUBES TO BE FILLED WITH CUT POLYSTYRENE BLOCKS
5. 8No. ANCHOR BLOCKS AND CHAINS TBC BASED ON FINAL WATER DEPTH.
6. ALL WELDS TO BE 6mm FILLET WELDS.
7. GRAVEL TO BE NOMINALLY 50THK. 20mm SINGLE SIZED PRE-WASHED.

REV	DATE	DESCRIPTION	DRW	CHK	APR
P1.0	12.07.2019	FIRST ISSUE	DD	MP	AR

REVISIONS

CLIENT

BUILDERS SISK CONTRACTORS Established 1859

PROJECT

ISLE OF MAN FERRY TERMINAL

TITLE

PONTOON GENERAL ARRANGEMENT

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DRAWN	CHECKED	APPROVED
DD	MP	AR

DATE	SCALE AT A1	REF.
07/10/19	As indicated	

DRAWING No.	SUITABILITY	REVISION
PB8850-RHD-XX-XX-DR-C-0015	S3	P1.0

E. Adaptive Management Plan (Cormorants)

Liverpool Waters/Docks

Ecology Adaptive Management Plan (Cormorants)

October 2019

Waterman Infrastructure & Environment Limited
Second Floor, South Central, 11 Peter Street, Manchester, M2 5QR, United Kingdom
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Client Name: Liverpool City Council
Document Reference: WIE12464-100-17-2-3
Project Number: WIE12464-100

Quality Assurance – Approval Status

This document has been prepared and checked in accordance with
Waterman Group's IMS (BS EN ISO 9001: 2015, BS EN ISO 14001: 2015 and BS OHSAS 18001:2007)

Issue	Date	Prepared by	Checked by	Approved by
First	July 2019	Niall Machin Associate Director	Gavin Spowage Associate Director	Gavin Spowage Associate Director
Comments		Incorporates conclusions of meeting with Peel, Arup and LCC on 2nd July to agree strategic approach to cormorant mitigation.		
Second	August 2019	Gavin Spowage Associate Director	John Hughes Regional Director	John Hughes Regional Director
Comments		Incorporates monitoring methodology from Arup		
Third	October 2019	Gavin Spowage Associate Director	John Hughes Regional Director	John Hughes Regional Director
Comments		Incorporates Natural England's consultation comments		

Disclaimer

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This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at its own risk.

Contents

1. Introduction

1.1. This Adaptive Management Plan has been produced in response to Natural England's responses to recent planning applications affecting Liverpool Docks, notably the new **Liverpool Cruise Terminal** and the **Isle of Man Ferry Terminal**.

1.2. Waterman Infrastructure & Environment Ltd (Waterman) was commissioned by Liverpool City Council (LCC) and the Isle of Man Government Department of Infrastructure to prepare ecological advice in relation to both the construction of the new Liverpool Cruise Terminal and the Isle of Man Ferry Terminal.

1.3. For the Liverpool Cruise Terminal, this Plan supports the discharge of planning condition 8 (planning application ref: 17O/3230) in relation to minimising the adverse impacts on the population of cormorants *Phalacrocorax carbo* a component species of the bird assemblage feature of Liverpool Bay Special Protection Area (SPA). In relation to Planning Condition 8 and the cormorant Ecological Conservation Management Plan (ECMP), Natural England (NE) have recommended (letter dated 30th May 2019, ref 19DIS/0919) that an Adaptive Management Plan (AMP) is provided:

> *" to set out how monitoring will be undertaken, what additional actions may be required in order to deliver successful mitigation (e.g. movement of the pontoon), and also to consider the long term validity of the mitigation"*

1.4. For the Isle of Man Ferry Terminal, the provision of an Adaptive Management Plan (AMP) has been requested to discharge Planning Condition 26 (planning application Ref: 18F/3231) and the Marine Licence condition 5.2.10 (Marine Licence application Ref: L/2019/00239/1):

> Planning Condition 26 - "*No development shall commence until an Ecological Conservation Management Plan (ECMP) has been submitted to and approved in writing by the Local Planning Authority. The ECMP (…) should (…) include the following details: (..) ii) The provision of an Adaptive Management Plan (AMP) setting out the arrangements for monitoring the usage and effectiveness of the proposed mitigation and arrangements for ensuring any adaptations reasonably necessary to improve the success of the mitigation measures with respect to cormorants will be provided;*
>
> Marine Licence condition 5.2.10 - *"An Adaptive Management Plan (AMP) relating to the Cormorant Mitigation Plan (CMP) must be submitted to MMO prior to the commencement of any activity included with this licence. The AMP must ensure that appropriate monitoring, review and adaptation of the mitigation measures described in the CMP will be provided. This must be submitted at least 6 weeks before the scheduled installation of the pontoon detailed in condition 5.2.9. Monitoring reports must be provided to MMO at the intervals as determined within any agreed AMP.*

1.5. Waterman have produced plans for a permanent floating pontoon to provide roosting/resting opportunity for cormorant: this will be located in Princes Half Tide Dock and be sufficiently large as to provide mitigation for a number of schemes in the docks including Liverpool Cruise Terminal, Isle of Man Ferry Terminal, the Northern Link Road and, potentially, the C02 proposals.

1.6. The design and location details for the floating pontoon are set out in the respective Technical Notes for each of the schemes (WIE12464-100-TN-14-2-2 for Liverpool Cruise Terminal and WIE13897-100-TN-10-2-1 for the Isle of Man Ferry Terminal).

1.7. A strategic approach to cormorant mitigation within the overall Liverpool Waters area is being

coordinated by Arup on behalf of Peel Land & Property (Ports) Ltd. The provisions within this Adaptive Management Plan are covered by and conform with the overarching strategic approach.

1.8. Adaptive Management Plans are tools for improving resource management by learning from outcomes ('learning by doing'), usually through a partnership of stakeholders. This Plan is supported by the following organisations:

- Liverpool City Council
- Natural England
- Merseyside Environmental Advisory Service (MEAS)
- Peel Land & Property (Ports) Ltd
- Isle of Man Government Department of Infrastructure

1.9. The objective of this AMP is to ensure that the proposed cormorant specific mitigation remains valid, appropriate and compliant with the Habitat Regulations throughout the lifetime of the development. The AMP enables co-ordinated, appropriate and timely actions to be implemented in response to potential issues that may arise from other relevant, adjacent developments. This AMP will form part of a strategic and more collective approach to mitigation in the wider area that will be adopted in the long term, as part of other developments that may impact upon the designated sites and their interest features in the vicinity.

2. Cormorant Monitoring Approach

2.1. The pontoons are considered suitable to provide roosting habitat for cormorant in the non-breeding season. Other species, such as herring, lesser-black-backed and black-headed gulls and oystercatcher will use a wide range of roosts and the pontoons also provide suitable habitat for these species.

2.2. In order to determine if and how cormorants are using the new pontoon facility a 5 year programme of annual monitoring will be undertaken. All surveys would be undertaken by an experienced ornithologist and would be coordinated by Arup on behalf of Peel Land & Property (Ports) Ltd. The surveys will be completed as part of Arup / Peel's programme of ecological monitoring of the wider Liverpool Waters site. **However, for the first year, the monitoring would be specific to the mitigation pontoon itself (with any additional data and evidence from the wider survey work used to support the monitoring).**

2.3. The previous bird survey data collected will be used as a baseline to identify if numbers have declined and if any there have been any negative impacts on the populations using the site.

2.4. The monitoring methodology will include four visits per month between September and March inclusive, two during high tide and two during low tide to monitor bird numbers using the rafts and the site. A suitable vantage point will be selected which is safe for the surveyor due to active construction being undertaken on the site, but also allows for a clear sight on the rafts and the wider site area. Both high and low tide surveys will start two and a quarter hours before high/low tide and end a quarter of an hour after high/low tide (i.e. duration of 2.5 hours). Paired visits (high and low tide) will be undertaken on the same day where possible (or if not, consecutive days) during daylight hours.

2.5. Table 1 details the peak numbers (peak number of individuals recorded at one time, seen together) of cormorants using the site over seven months (four surveys per month) during autumn/winter. This shows that only low numbers of individuals are using the area, with a peak count of 14 birds on the 15th November high tide count.

Table 1: Peak cormorant numbers recorded at the Isle of Man Ferry Terminal site during winter and passage 2017-2018[1]

Date	Sept 17	Oct 17	Nov 17	Dec 17	Jan 18	Feb 18	Mar 18
No. of cormorant	4	6	14	4	6	3	4

2.6. The trigger point for the rafts to be revised or relocated will be where the bird monitoring shows that there is a decrease in numbers utilising the rafts or surrounding area. Peak monthly counts for the Site noted an average of just under 6 individuals using the Site. The lowest peak count in any month was three individuals recorded using the Site (in Feb).

2.7. The high and low tide counts covering 28 visits recorded zero cormorants on-site on 3 occasions (2 high and 1 low tide), and only 1 bird on another 4 occasions (2 high and 2 low tide). The lowest sequence was three consecutive visits when six cormorant used the Site (occurred on four occasions).

2.8. The trigger point for initial action of further investigation will be if **no cormorants are using the**

[1] AECOM Isle of Man Ferry Winter Bird Survey March 2018

pontoon in any one month. This is a simple and clear trigger and has been endorsed by Natural England.

2.9. In terms of initial action following the trigger point, the ecologists will make an assessment of likely contributory factors, which would involve (but not be restricted to);

- Studying weather patterns (e.g. has adverse or unseasonable weather impacted numbers?);
- Making a visual inspection of surrounding land and land uses (and making inquiries of relevant authorities) to ascertain if any activities are occurring, or have recently occurred, that may have displaced cormorant (e.g. canoeing, boating, fireworks, dock repair works, building development etc);
- Consulting the local ornithological groups to ascertain if additional information is available on cormorant numbers locally on the River Mersey (increasing or decreasing).

2.10. Where the trigger point occurs, monthly monitoring for the following month will be increased to 6 visits per month to help better understand trends and the causes of the reduction and what further action, if any, may be required.

2.11. Depending on the outcome of action set out in paragraphs 2.09-2.10 above, the project ecologists may also notify LCC where they consider that changes to the rafts may be required (e.g. size, design, location) and also subsequently input into a specification to procure a contractor to make such changes.

2.12. Success of the monitoring programme will be identified where the monthly peak count averages six or more cormorants using the rafts and site during September to March period: this will be assessed by the project ecologists, acting on behalf of the Isle of Man Government Department of Infrastructure and LCC, at the end of the first year of monitoring results to assess the success of the pontoon mitigation (see also 2.20 below). As part of the first year review, we will also undertake a review of annual peak means against the baseline to check there is no downward trend, e.g. if the birds are present but in dwindling numbers.

2.13. Where rafts require relocation as part of the AMP this will be implemented and maintained by Liverpool City Council in collaboration with other interested parties (e.g. Peel; Isle of Man Government Department of Infrastructure), and an amended monitoring period will re-start from when the rafts are moved. Other measures of success would include: target species using the pontoons and not being disturbed e.g. by boat traffic or other human activity; no non-target species recorded to be using the pontoons (e.g. Canada geese); and structural success in terms of the pontoons remaining in place and not having failed e.g. sinking etc.

2.14. Where pontoons or posts are deemed to have failed or require additional maintenance, repair or replacement will be carried out preferably during late winter or early spring before birds start to nest and wintering bird activity is low. Where deemed necessary through monitoring, additional mitigation may be installed, or locations may need to be changed to maximise the effectiveness.

2.15. The results of the 5-year monitoring programme would be written up in an annual report for the client and shared with Natural England and other relevant stakeholders. The annual report would make recommendations about the success of the pontoon in terms of its intended cormorant mitigation role.

2.16. Monitoring of the physical condition of the pontoons will also be undertaken, most likely at the same time as the ornithological surveys. The floating pontoon design is expected to have a

minimum estimated life of 12 years with minimal maintenance. As per RSPB guidance, yearly maintenance of the floating pontoons will be carried out. Resurfacing of the floating islands will be necessary if they are to remain attractive for birds every year. It will also be vital to remove the excess of droppings which can build up over the course of the year.

2.17. Where pontoons are deemed to have failed or require additional maintenance, repair or replacement will be carried out preferably during late winter or early spring before birds start to nest and wintering bird activity is low. Where deemed necessary through monitoring, additional mitigation may be installed, or locations may need to be changed to maximise the effectiveness.

2.18. Further adaptive measures may also be required to minimise disturbance, for example through control of boat traffic.

Programme

2.19. Arup have proposed within their Liverpool Waters Strategic Ecological Mitigation Plan (LW SEMP) Interim Note that the monitoring of the cormorant mitigation pontoons will be included within the annual surveys being undertaken across the entire LW scheme (as included within the LW Neighbourhood Ecological and Biodiversity Strategies (NEBS)). This will include monitoring for wintering/passage birds including high water and low water surveys and also monitoring for breeding birds (e.g. ringed plover, little ringed plover, lapwing) and foraging common tern. The NEBS produced for Central Docks in July 2019 (provided in **Appendix A**) outlines the surveys that will be completed including, duration, timing and methodology.

2.20. However, as stated in para 2.2 above, specific monitoring of the cormorant mitigation pontoon itself would be carried out in Year 1. At the end of Year 1, the monitoring approach and data would be reviewed in terms of the approach to Years 2-5 and how this fits with the wider strategic monitoring and action detailed within the future Liverpool Waters Strategic Environmental Management Plan (SEMP).

2.21. Section 2 of the Central Docks NEBS sets out specific methodologies for the following surveys:

- Section 2.2: Breeding birds, including specifically little ringed plover and black redstart;
- Section 2.3: Wintering and passage bird surveys, including cormorant; and
- Section 2.4: Common tern surveys.

3. Review of Projects

3.1. In tandem with the annual bird surveys, a review of planning applications which may impact upon the docks and cormorant ecology would be undertaken.

3.2. This would include reviewing scheme mitigation plans and reviewing whether the cormorant mitigation installed to date requires any alteration.

4. Adapting the Mitigation

4.1. The Adaptive Management Plan table of issues and responses, set out below, would be maintained. Data from the annual bird surveys and the planning application reviews would be fed into this table and appropriate remedial measures identified and implemented.

4.2. Implementation measures may involve a range of clients/stakeholders, including those signed up to this Plan.

Table 1: Adaptive Management Plan

Issue	Evidence	Remedial action	Timetable	Responsibility
Describe issue, e.g. damaged pontoon side	*Describe evidence, cite source, e.g. winter bird survey (date)*	*e.g. repairs required*	*Date*	*E.g. Liverpool City Council*

4.3. The Adaptive Management Plan will be issued to Natural England on an annual basis for review and approval.

Appendices

Appendix A: Central Docks Neighbourhood Ecological and Biodiversity Strategy

Peel Land & Property (Ports) Ltd.

Central Docks Condition 16

Neighbourhood Ecological and Biodiversity Strategy

0-15-08

Issue | 23 July 2019

Job number 266384-00

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ARUP

Document verification

ARUP

Job title		Central Docks Condition 16			**Job number** 266384-00
Document title		Neighbourhood Ecological and Biodiversity Strategy			**File reference**
Document ref		0-15-08			
Revision	**Date**	**Filename**	Central Docks NEBS.docx		
Draft 1	12 Feb 2019	**Description**	First draft		
			Prepared by	Checked by	Approved by
		Name	Amy Martin/Joseph Shepherdson	Rory Canavan	Rory Canavan
		Signature			
Draft 2	08 Mar 2019	**Filename**	Central Docks NEBS_V2 080319.docx		
		Description	Draft updated following Arup review		
			Prepared by	Checked by	Approved by
		Name	Amy Martin	N/A	N/A
		Signature			
Issue	09 May 2019	**Filename**	Central Docks NEBS_V3 170419.docx		
		Description	Draft updated following comments from Natural England, MEAS and Peel Sustainability Manager		
			Prepared by	Checked by	Approved by
		Name	Amy Martin	N/A	N/A
		Signature			
Issue	23 July 2019	**Filename**	Central Docks NEBS_V5 230719.docx		
		Description	Updated to make reference to the Liverpool Waters SEMP		
			Prepared by	Checked by	Approved by
		Name	Amy Martin	N/A	N/A
		Signature			
				Issue Document verification with document	✓

Contents

Executive Summary

Outline consent for the Liverpool Waters Scheme was granted in June 2013, subject to a total of 77 planning conditions. Condition 16 of the Liverpool Waters Outline Consent (10O/2424) states:

"*Prior to the submission of the first application for any reserved matters approval in each respective neighbourhood, an Ecological & Biodiversity Strategy based on the Principal Application Documents and Detailed Neighbourhood Masterplan that relates to that particular neighbourhood and has regard to the wider application site shall be submitted to and approved in writing by the Local Planning Authority. The strategy shall summarise the means of safeguarding all protected species of relevance and supporting habitats during construction and operation within the respective neighbourhood including consideration of pathways to protected European sites by the following measures:*

i. *The means, method and timeframe for carrying out updated bird surveys and impact assessments for bats and migratory and/or over wintering birds;*
ii. *The methodology and timeframe for carrying out (seasonal) monitoring of fish and other water species within the dock system;*
iii. *Working practices to address phasing of construction, construction vehicles, routing and speed limits during removal of existing buildings, vegetation and other suitable breeding habitats;*
iv. *Details of habitat creation;*
v. *Design of buildings and spaces in terms of layout, design, materials and lighting to avoid creating barriers to bird migration and aviation and reduce risk of bird strikes particularly in relation to tall buildings;*
vi. *Means and methodology for the monitoring and management of water quality within the dock system which shall inform mitigation to safeguard fish and other water species, including the aeration of dock water spaces;*
vii. *Methods for controlling leisure boat activity within the dock system;*
viii. *Methods for controlling gulls and pigeons roosting on buildings;*
ix. *Mechanisms for monitoring and reviewing the effectiveness of agreed ecological and biodiversity mitigation against identified targets and means for enhancing mitigation where those targets are not met; and*

Mechanisms to ensure protection of Sefton Coast SAC (Seaforth Docks to Formby Point) from recreational disturbance overseen by the Liverpool Waters Coordination Panel in accordance with Schedule 6 of this permission."

This document presents the Neighbourhood Ecological and Biodiversity Strategy for the Central Docks Neighbourhood (Neighbourhood C). The strategy relates to the Central Docks Neighbourhood and has regard to the wider Liverpool Waters application site. The strategy summarises the means of safeguarding all protected species of relevance and supporting habitats during construction and operation

within the respective neighbourhood. This includes consideration of impact pathways to European designated sites.

The strategy is intended to provide guidance in relation to ecology and biodiversity for all reserved matters applications within the neighbourhood and addresses Condition 16.

1 Introduction

1.1 Background

This strategy has been produced to discharge a planning condition under Part C of the Liverpool Waters (LW) scheme (Planning Application reference: 10O/2424). The LW scheme, which secured outline consent on the 19th of June 2013, covers an area of 60 hectares of former dockland located along Liverpool's Waterfront. The project will provide a mixed-use development of up to 1,691,100 sqm. The outline planning consent is split into multiple parts:

- **Part A-** Overall Development Quantum and Parameters
- **Part B-** Time Limits
- **Part C-** Information to be submitted prior to the submission of applications for reserved matters approval
- **Part D-** Details to be provided with Reserved Matters Applications
- **Part E-** Compliance Conditions

Across parts A to E there are a total of 76 conditions within the outline consent (originally 77, see s96a section for further details). 16 of these are pre-commencement conditions which therefore require discharging prior to any submission of detailed reserved matters applications (i.e. a specific development plot). These conditions are listed within Part C of the outline consent.

In June 2018, these 16 conditions were discharged for Princes Dock (Neighbourhood A) to allow for reserved matters applications to come forward for development in this neighbourhood alone. Each condition required a strategy to be produced which provided high level information on how specific requirements would be met.

To progress development within Central Docks (Neighbourhood C), Peel Land and Property are seeking to discharge these 16 pre-reserved matters conditions for this neighbourhood. The following strategy sets out the information required to discharge a pre-reserved matters condition for Central Docks, Liverpool Waters.

1.2 Consultees

Where relevant, advisory or statutory consultees have been engaged with during the production of the strategy. Additionally, liaison has taken place across all conditions between other sub-consultants to ensure each condition conforms to all other relevant conditions.

1.3 Standalone Applications

There have been several consents for developments within Central Docks. These developments have come forward as standalone applications and although measures have been considered to ensure general conformity with the outline

consent, they have not directly followed the LW process. Due to the definition of "committed development" only the standalone applications which have commenced on site can be considered and referenced within the condition strategy. For clarity these are:

- C04 – C06 (17F/1628)
- Northern Link Road (17F/2628)

Developments which have been determined but have not commenced:

- Isle of Man (18F/3231)

Developments which are currently being determined for planning are:

- C02 (18F/3247)
- District Heating Network, Phase 1 Part 2 (19F/0079)

As these applications have not been granted consent, they only hold limited weight and are not classed as committed development. Where relevant, these have been considered within the strategy but reference to the original outline consented plots for these emerging developments is still made where needed.

1.4 Part D Conditions

The following strategy has been produced to discharge Part C conditions, as such, it sets a high-level strategy for the Central Docks Neighbourhood. Further detail will be provided through the discharge of Part D conditions '*Details to be provided with Reserved Matters Applications*'. Therefore, Part C conditions will establish the strategy, and Part D conditions will provide further details when reserved matters applications come forward.

1.5 S96a Amendment Application (18NM/2766)

In November 2018, a non-material amendment was consented for the Liverpool Waters Outline Consent. The amendments included:

1. Liverpool Waters Parameter Plan Report (November 2011) to Liverpool Waters Parameter Plan Report (October 2018), where changes within the document include:
    - PP003 Phasing Plan
    - PP004 Development Parcels
    - PP005 Development Plots
    - PP006 Building Heights
    - Illustrative Masterplan
2. **The wording of Condition 3:**

The development hereby approved shall only be implemented in general conformity with the following submitted application documents (The Principal Application Documents):

- Updated Planning Application form (November 2011);
- Statement of Key Development Principles (November 2011);
- LW Parameter Plan Report (incorporating Parameter Plans) (October 2018)
- Design and Access Statement (November 2011);
- Building Characterisation & Precedent Study (November 2011) ("BCPS");
- Public Realm Characterisation & Precedent Study (November 2011) "(PRCPS)";
- Conservation Management Plan for the Protection, Conservation and
- Preservation of Heritage Assets (November 2011);
- Liverpool Waters Indicative Masterplan (October 2011)

Received by the Local Planning Authority on the 8th & 16th December 2011 & October 2018.

3. The wording of condition 71:

No more than 27.24% (460,000sqm) of the entire total consented development floorspace set within the LWOPP shall be erected within Neighbourhoods A, B and C, and no development shall commence in Neighbourhoods D and E, until the Transport Assessment (November 2011) submitted and hereby approved with the application has been reviewed, updated and agreed by the Local Planning Authority in writing and identified measures have been secured to undertake the highway works and public transport enhancements identified as necessary within that updated Transport Assessment in a phased manner in relation to the development as a whole and in accordance with the Highway and Public Transport Enhancement Strategy referred to in Condition 19 and the monitoring and review and enhancement arrangements referred to in Schedule 3 of this permission.

4. The removal of condition 75 of the LW Outline Planning permission

5. The wording of Schedule 3:

The Highway & Public Transport Enhancement Strategy monitoring and review mechanisms referred to in Condition 10 and required in advance of any development in neighbourhoods D and E and anymore development floorspace greater than 27.2% (460,000sqm) of the entire total consented development floorspace within Neighbourhoods A, B and C (or 2021, whichever the earlier) shall identify the range, methodology, format and timetable of travel monitoring. The results of the monitoring shall be submitted annually to the Local Planning Authority commencing concurrently with submission to the Local Planning

Authority of the first Detailed Neighbourhood Masterplan for neighbourhood B, C D or E required by Condition 11.

6. **The wording of Schedule 5:**

- The Pontoon and Princes Jetty shall be provided in conjunction with the development plots set out in the approved Princes Dock Neighbourhood Masterplan (May 2018).
- Central Park shall be commenced at the same time as the start of any construction work to provide buildings in any of development Parcels 3a, 3b, 3c, 3d and 3f.
- Bath Gate will be commenced and completed in conjunction with plot A05 (Plaza 1821).

Where relevant, the strategy will refer to the above amendments.

1.6 Section 96a Amendment Application (April 2019)

An additional non-material amendment has been submitted to Liverpool City Council (application currently pending decision). The amendments include:

1. Liverpool Waters Parameter Plan Report (October 2018) to Liverpool Waters Parameter Plan Report (April 2019), where changes within the document include:
    - PP005 Development Plots
    - PP006 Building Heights
    - PP007 Access and Movement
    - Illustrative Masterplan
2. **The wording of Condition 3:**

The development hereby approved shall only be implemented in general conformity with the following submitted application documents (The Principal Application Documents):

- Updated Planning Application form (November 2011);
- Statement of Key Development Principles (November 2011);
- LW Parameter Plan Report (incorporating Parameter Plans) (April 2019)
- Design and Access Statement (November 2011);
- Building Characterisation & Precedent Study (November 2011) ("BCPS");
- Public Realm Characterisation & Precedent Study (November 2011) "(PRCPS)";
- Conservation Management Plan for the Protection, Conservation and

- Preservation of Heritage Assets (November 2011);
- Liverpool Waters Indicative Masterplan (October 2011)

Received by the Local Planning Authority on the 8th & 16th December 2011, October 2018 and April 2019.

1.7 Site and Scheme Description

1.7.1 Liverpool Waters

Liverpool Waters is a major project involving the regeneration of 60ha of redundant docks in the heart of the city of Liverpool on the eastern bank of the River Mersey. The development is over 2km in length; extending from Princes Dock in the south to Bramley Moore Dock in the north. Virtually the entire Liverpool Waters site comprises reclaimed land which was created to form docks commencing in the late 18th century. Over a third of the Liverpool Waters site consists of docks with open water. By the early 21st century all of the docks were redundant by virtue of the changing nature of the shipping industry.

The Liverpool Waters joint vision (Peel and Liverpool City Council) involves regenerating the historic dockland site to create a world-class, high-quality, mixed-use waterfront quarter in central Liverpool that will allow for substantial growth of the city's economy. The aspirational scheme will create a unique sense of place, taking advantage of the site's cultural heritage and integrating it with exciting and sustainable new development.

The principal proposed land uses at Liverpool Waters will be commercial offices and other business uses, residential development and tourism-related uses. More specifically this includes:

- Residential (about 9000 dwellings)
- Business space, mainly offices.
- Hotel and conference facilities.
- Buildings for assembly and leisure.
- Restaurants, cafes, pubs and wine bars.
- Comparison (non-food) shops serving local needs.
- Community institutions (clinics, health centres, nurseries, schools and places of worship).
- Offices and services in local shopping centres.
- Convenience (food) shops.
- Parking.
- A cruise-liner terminal and an energy centre.
- Servicing.

1.7.2 Central Docks

The Central Docks Neighbourhood will provide a new dynamic urban focus around public open space and the Leeds-Liverpool Canal extension. It is intended to be the business, entertainment and leisure fulcrum of the Liverpool Waters

scheme. There will be significant changes in the south of the neighbourhood including the new Isle of Man Ferry Terminal and cultural buildings. Central Docks is the location of the secondary tall buildings cluster and will also have a new public open space – Central Park. The plots identified for development within the masterplan for the Central Docks Neighbourhood are shown on Figure 1.1.

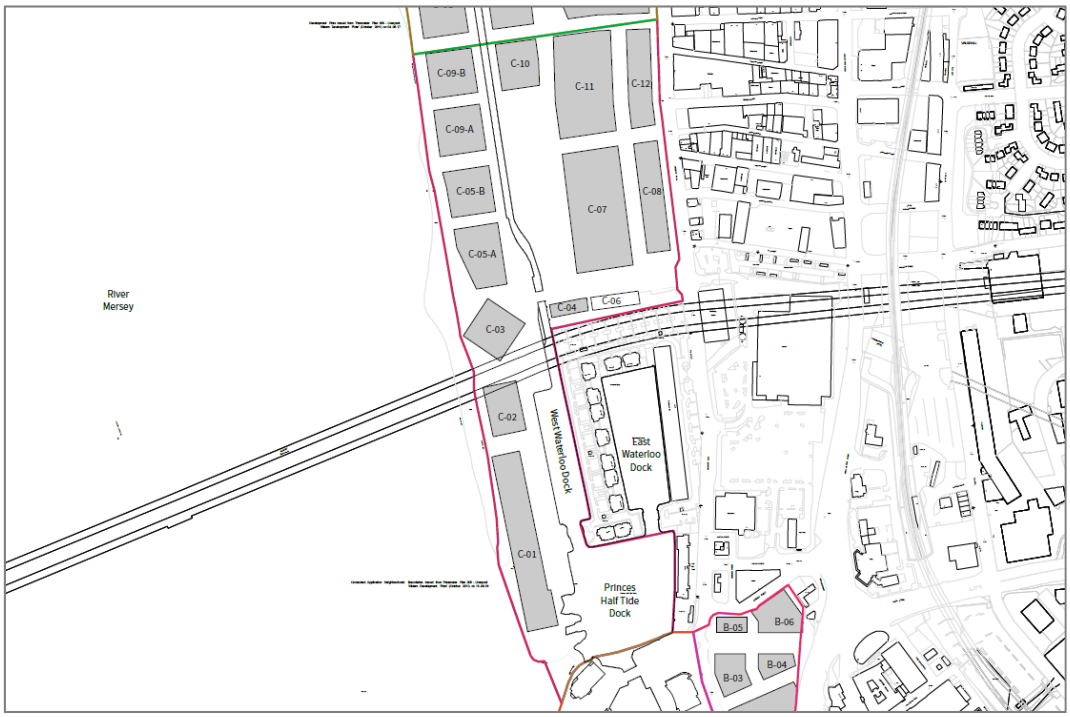

Figure 1.1: Central Docks Development Plots (C-01 to C-12). Image taken from Parameter Plan 005 Liverpool Waters Development Plots. Drg. No. 1868-VW-005 (Planit I.E. Limited, 2018).

Development within Central Docks (Neighbourhood C; Phase 2 of Liverpool Waters) is anticipated to take place over a period of 16 years between 2020 and 2036.[1] The amount of each proposed land use within the Central Docks Neighbourhood was designed to reflect firstly, the character and location of the neighbourhood, secondly the balance considered reasonable between the primary land uses (residential/business/tourism) and finally a reasonable balance of shops, services and other supporting land uses (Table 1.1).

Table 1.1: Proposed land uses at Central Docks.

Proposed Land Use	**Central Docks Neighbourhood**
Residential	2,900 units
Office/Business	165,900 m^2
Hotel/Conference	35,300 m^2
Assembly/Leisure	30,700 m^2
Restaurants/Cafes	11,900 m^2

[1] Planit I. E. Limited (2018) Parameter Plan 003 Liverpool Waters Phasing Plan. Drg No. 1868-VW-013.

Proposed Land Use	Central Docks Neighbourhood
Pubs/Bars	12,600 m^2
Local Shops – Non-food	8,700 m^2
Community	600 m^2
Local Services	2,600 m^2
Local Shops – Food	4,200 m^2
Parking	180,400 m^2
Servicing	17,500 m^2
Cruise Terminal/Other	16,600 m^2

1.8 Part C - Condition 16

Condition 16 of the Liverpool Waters Outline Consent (10O/2424) states that prior to the submission of the first application for any reserved matters approval in each respective neighbourhood, an Ecological & Biodiversity Strategy based on the Principal Application Documents and Detailed Neighbourhood Masterplan that relates to that particular neighbourhood and has regard to the wider application site shall be submitted to and approved in writing by the Local Planning Authority. The strategy shall summarise the means of safeguarding all protected species of relevance and supporting habitats during construction and operation within the respective neighbourhood including consideration of pathways to protected European sites.

Ove Arup & Partners Ltd. (Arup) have been commissioned by Peel Land and Property (Ports) to address Condition 16 by producing the Neighbourhood Ecological and Biodiversity Strategy (NEBS) for Neighbourhood C (Central Dock). Condition 16 consists of ten points which are addressed within the NEBS (Table 1.2).

Table 1.2: Relevant section of the NEBS which address the ten points of Condition 16 of the Liverpool Waters Outline Consent.

Condition 16		Relevant section within NEBS
i.	The means, method and timeframe for carrying out updated bird surveys and impact assessments for bats and migratory and/or over wintering birds.	2.1 to 2.5
ii.	The methodology and timeframe for carrying out (seasonal) monitoring of fish and other water species within the dock system.	2.6
iii.	Working practices to address phasing of construction, construction vehicles, routing and speed limits during removal of existing buildings, vegetation and other suitable breeding habitats.	4.1
iv.	Details of habitat creation.	5
v.	Design of buildings and spaces in terms of layout, design, materials and lighting to avoid creating barriers to bird migration	3.1

Condition 16		Relevant section within NEBS
	and aviation and reduce risk of bird strikes particularly in relation to tall buildings.	
vi.	Means and methodology for the monitoring and management of water quality within the dock system which shall inform mitigation to safeguard fish and other water species, including the aeration of dock water spaces.	2.7
vii.	Methods for controlling leisure boat activity within the dock system.	3.3
viii.	Methods for controlling gulls and pigeons roosting on buildings.	3.2
ix.	Mechanisms for monitoring and reviewing the effectiveness of agreed ecological and biodiversity mitigation against identified targets and means for enhancing mitigation where those targets are not met.	6
x.	Mechanisms to ensure protection of Sefton Coast SAC (Seaforth Docks to Formby Point) from recreational disturbance overseen by the Liverpool Waters Coordination Panel in accordance with Schedule 6 of this permission.	3.4

The NEBS will set out a strategy for the Central Docks Neighbourhood based on the results and mitigation measures included in the Liverpool Waters Environmental Statement (ES) produced for the Outline Consent (WYG, 2011a).[2] It was intended that the mitigation measures would apply to the overall Liverpool Waters development area and therefore are split across each of the neighbourhoods:

- Neighbourhood A – Princes Dock.
- Neighbourhood B – King Edward Triangle.
- Neighbourhood C – Central Docks.
- Neighbourhood D – Clarence Docks.
- Neighbourhood E – Northern Docks.

This Central Docks NEBS will therefore outline methodologies for carrying out updated surveys and the mitigation measures that should be included with the Neighbourhood. A NEBS has already been produced for Princes Dock (Neighbourhood A) (WYG, 2018).[3] This sets out measures for the Princes Dock Neighbourhood however for efficiencies and practicality, also includes measures (e.g. biennial passage/wintering bird surveys) which should be undertaken across the entire Liverpool Waters site as opposed to in isolation at the different neighbourhoods. The Central Docks NEBS therefore incorporates these measures to align with the Princes Dock NEBS, in addition to specific measures for Neighbourhood C. By adopting this joined up methodology there is an opportunity for a strategic approach to be adopted in which the mitigation measures and biodiversity enhancements for the Central Docks Neighbourhood

[2] WYG (2011a) Liverpool Waters Environmental Statement.
[3] WYG (2018) Princes Dock Condition 16 Neighbourhood Ecological and Biodiversity Strategy.

can be considered strategically in respect of ensuring maximum biodiversity benefits across the whole Liverpool Waters scheme.

Part D of the Outline Consent (details to be provided with reserved matters applications) includes Condition 34 – Ecological & Biodiversity Statement (EBS). This states that prior to the commencement of development within any neighbourhood, the approval in writing of the Local Planning Authority (LPA) must be obtained to a detailed EBS based on the NEBS explaining how the specific scheme in that neighbourhood or part neighbourhood will provide for the protection and enhancement of protected species and supporting habitats, including the provision of new and replacement habitats by means of the following:

i. provision of detailed and quantitative surveys to be able to assess in detail any potential impacts of the development upon bats and migratory and/or over-wintering birds;
ii. mitigation to safeguard fish and other water species;
iii. details of habitat creation;
iv. siting and design of replacement roosting sites within Nelson Dock for displaced winter water birds (specifically cormorants);
v. provision and management of new/compensatory habitats;
vi. the design of buildings and spaces based on the Detailed Neighbourhood Masterplan for the land;
vii. for development involving the Hydraulic Engine House, Victoria Clock Tower or the office and workshop buildings south of Collingwood Dock, detailed internal bat surveys;
viii. measures to control leisure boat activity and behaviour within the dock system to minimise disturbance of wildlife within the docks;
ix. measures to discourage gulls and pigeons from nesting/roosting on buildings; and
x. mitigation for any areas affected by invasive, non-native plants and noxious weeds.

The Central Docks NEBS will therefore outline the methodologies, measures and options to allow for the production of detailed plot-specific EBSs for each reserved matters application in order for Condition 34 of the outline consent to be discharged.

1.9 Liverpool Waters Sustainability Principles

Peel Land and Property (Ports) Ltd. (Peel L&P) support the United Nations Sustainable Development Goals (SDGs) and their vision is to encourage the creation of highly sustainable, future-proofed developments (Peel L&P, 2019).[4] Peel L&P have prioritised the four SDGs that are most relevant to their business activities:

- SDG 8 – decent work and economic growth.

[4] Peel Land & Property (Ports) Ltd. (2019). Sustainability 5 Year Business Plan.

- SDG 11 – sustainable cities and communities.
- SDG 12 – responsible consumption and production.
- SDG 15 – life on land.

Based on these SDGs, seven sustainability principles have been developed by Peel L&P. Three of these principles are considered most relevant to this NEBS:

- Principle 3: *Develop highly sustainable and smart built environments* – minimum standards will be BREEAM Very good for commercial buildings and Home Quality Mark for residential buildings. All building development shall achieve a BREEAM Communities rating of excellent.
- Principle 5: *Put more back into the natural environment than is taken out* – ensuring that the development delivers a net gain for biodiversity and natural capital, protects existing habitats and provides benefits for people and wildlife.
- Principle 6: *Support the health and wellbeing of communities by creating beautiful, functional and well-used green public realm* – green infrastructure will be used to cool the microclimate and benefit local air quality, biodiversity and water management as well as to provide character and connectivity for people throughout the neighbourhoods.

2 Update Surveys and Impact Assessments

2.1 Preliminary Ecological Appraisal

Due to the time elapsed between the original ecological surveys and production of the ES for Liverpool Waters, each plot-specific reserved matters application should include a Preliminary Ecological Appraisal (PEA). The PEA should identify key ecological constraints, design options, requirements for further surveys and mitigation measures within each plot. These should subsequently be detailed within the plot-specific EBS.

The PEA should be undertaken in accordance with CIEEM guidelines (CIEEM, 2017).[5] With regards to habitats and vegetation, a PEA should follow the Phase 1 Habitat survey guidelines as set out by the Joint Nature Conservation Committee (JNCC, 2010).[6] The PEA should also conform to the mandatory British Standard BS42020:2013 Biodiversity Code of Practice for Planning & Development.

2.2 Breeding Birds

Thirty-nine breeding bird species were recorded during the initial survey work completed in 2009 for the Liverpool Waters Outline Application.[7] Of these 39 species, 16 were considered to be holding territory on site and nine species were confirmed to have successfully bred within the site boundary. The key species recorded to be holding territory within Liverpool Waters were black redstart *Phoenicurus ochruros*, lapwing *Vanellus vanellus*, skylark *Alauda arvensis*, starling *Sturnus vulgaris*, linnet *Linaria cannabina*, mallard *Anas platyrhynchos*, ringed plover *Charadrius hiaticula*, and swallow *Hirundo rustica*. Species recorded within the Central Docks Neighbourhood in 2009 included lapwing, skylark, linnet and ringed plover. A singing male black redstart was recorded approximately 150m to the north east of Central Docks. Little ringed plover *Charadrius dubius* were not recorded during the breeding bird surveys undertaken in 2009; however they had previously been recorded breeding within the Liverpool Waters site and the habitat remains suitable.

Species specific breeding bird surveys should therefore be undertaken in the Central Docks Neighbourhood. The focus of the surveys should be on Schedule 1 species which are considered to be likely breeding on site. It will be possible to assess all breeding species on site (including those listed above) by undertaking five visits (mid-April – end of June) following the Common Bird Census methodology. In addition to recording the Schedule 1 species, this method would also record species such as skylark, lapwing, linnet, ringed plover and meadow pipit *Anthus pratensis*. For efficiency, and in line with a strategic approach,

[5] CIEEM (2017). Guidelines for Preliminary Ecological Appraisal, 2nd edition. Winchester: Chartered Institute of Ecology and Environmental Management.
[6] JNCC (2010). Handbook for Phase 1 Habitat survey - a technique for environmental audit. Peterborough: Joint Nature Conservancy Council.
[7] WYG (2009). *Liverpool Waters Breeding Bird Survey Report*. Appendix 7.6 of the Liverpool Waters ES (2011).

surveys for breeding bird species should be undertaken across the entire Liverpool Waters site, thereby providing data for applications within all neighbourhoods.

2.2.1 Little Ringed Plover

Annual surveys should be undertaken in the year prior to construction and during the subsequent four years of development at the Central Docks Neighbourhood. The surveys will look to identify whether little ringed plover *Charadrius dubius,* have colonised the vacant plots for nesting and foraging. Ringed plover have previously been recorded breeding within the site; the surveys for little ringed plover should therefore also target ringed plover. The survey data should inform the construction mitigation strategies of the development in Central Docks with the aim of preventing disturbance to little ringed plover and ringed plover nest sites.

The surveys should be undertaken by a suitably qualified ecologist and follow the methodology described below. Following the first five years of monitoring, the requirement for continued breeding plover surveys should be reviewed. If appropriate, the frequency of surveys should be reduced to biennial surveys throughout the development of the Liverpool Waters site.

Methodology

The methodology for the little ringed plover survey should be based on the 2007 British Trust for Ornithology (BTO) Breeding Plover Survey (Burton & Conway, 2008).[8] The survey should comprise a transect survey along a pre-defined route around the Central Docks Neighbourhood. The survey should be undertaken between 08:30 and 18:00 and note any little ringed plover (and ringed plover) heard singing, calling, and those identified visually. In addition, any nests observed should be recorded to estimate the number of breeding pairs. Three survey visits should be undertaken between 15 April and 15 July. To reduce bias on the survey data, the transect route should be walked in the alternative direction for each survey. Appropriate field maps should be annotated to show the location of any little ringed plover that are heard or seen; the standard two letter BTO species and activity codes should be used on all surveys (BTO, 2019).[9]

Timing/Weather Conditions

- The survey should consist of at least three visits with one visit between 15 April to 15 May, one visit between 15 May to 15 June, and the third visit between 15 June and 15 July.
- Surveys should be undertaken between 08:30 and 18:00 and last for the duration of time it takes to comprehensively complete the transect route.
- Surveys will avoid poor weather.

[8] Burton, N. H. K. and Conway, G. J. (2008). *Assessing population of breeding ringed plovers in the UK between 1984 and 2007.* Report to the Joint Nature Conservation Committee. BTO Research Report No. 503. Thetford: British Trust for Ornithology (BTO).
[9] BTO (2019). Standard naming and coding of species and subspecies regularly found in Britain and Ireland. Available at https://www.bto.org/about-birds/birdfacts/british-list

Impact Assessment

A breeding plover impact assessment should be undertaken for each new reserved matters application in the Central Dock Neighbourhood, using data collected on the surveys. The impact assessment should be included in the plot specific EBS for submission to the LPA.

The breeding plover impact assessment should follow the same assessment methodology prescribed in the Liverpool Waters ES,[2] and should cover remediation, construction and operational phases of the development. Should the assessment identify that significant impacts on little ringed plover are likely for a particular development, appropriate mitigation measures should be identified. Mitigation measures may include the incorporation of working windows or buffer zones to restrict the impact of potentially disturbing activities on little ringed plover (and ringed plover). In addition, there may be a requirement to provide alternative nesting habitat, where possible.

2.2.2 Black Redstart

As per the NEBS for Princes Dock, annual surveys for black redstart, should be undertaken in the year prior to construction and during the subsequent four years of development at the Central Docks Neighbourhood. The surveys should set out to identify whether black redstart have colonised the existing buildings and/or are using any of the vacant plots for foraging. The survey data should inform the construction mitigation strategies for the new buildings with the aim of preventing disturbance to new black redstart nest sites. The surveys should be undertaken by a suitably qualified ecologist. The methodology for undertaking the survey should closely follow that outlined in Bird Monitoring Methods (Gilbert *et al*., 1998);[10] this may need to be modified slightly to ensure it is site specific. Following the first five years of monitoring, the requirement for continued black redstart surveys should be reviewed. If appropriate, the frequency of surveys should be reduced to biennial surveys throughout the development of the Liverpool Waters site.

Methodology

As identified in the NEBS for Princes Dock, the survey should comprise a transect survey along a pre-defined route around the Central Docks Neighbourhood. Surveys should be undertaken at dawn, and will note any black redstart heard singing, calling, and those identified visually. Five survey visits should be undertaken between mid-April and the end of June. To reduce the bias on the survey data, the transect route should be walked in the alternative direction for each survey. Appropriate field maps should be annotated to show the location of any black redstart that are heard or seen; the standard two letter BTO species and activity codes should be used on all surveys.[9]

[10] Gilbert, G., Gibbons, D. W., and Evans, J. (1998). *Bird Monitoring Methods – a Manual of Techniques for Key UK Species*. RSPB.

Timing/Weather Conditions

- The surveys should consist of a least five fortnightly visits from mid-April to the end of June.
- Surveys should commence early morning (in the hours after sunrise) and last for the duration of time it takes to comprehensively complete the transect route.
- Surveys will avoid cold, wet and windy conditions.

Impact Assessment

As per the NEBS for Princes Dock,[3] a black redstart impact assessment should be undertaken for each new reserved matters application in the Central Docks Neighbourhood, using data collected on the surveys. The impact assessment should be included in the plot-specific EBS for submission to the LPA.

In line with the NEBS for Princes Dock, the black redstart impact assessment should follow the same assessment methodology as set out in the Liverpool Waters ES,[2] and should cover remediation, construction and operational phases of the development. Should the assessment identify that significant impacts on black redstart are likely for a particular development, appropriate mitigation measures should be identified. Mitigation measures may include the incorporation of working windows or buffer zones to restrict the impact of potentially disturbing activities on black redstart. In addition, there may be a requirement to provide alternative nesting habitat.

2.3 Passage/Wintering Birds

2.3.1 Wintering Bird Surveys

Wintering bird surveys should be undertaken in the year prior to construction and during the subsequent four years of development within the Central Docks Neighbourhood; this data will highlight if there is a need to revise mitigation strategies in relation to disturbance of wintering bird roosts. For efficiency and in line with a strategic approach, surveys for passage/wintering species should be undertaken across the entire Liverpool Waters site, thereby providing data for applications within all neighbourhoods. The surveys should be undertaken by suitably qualified ecologists following the methodology described below.

Following the first five years of monitoring, the requirement for continued annual wintering bird and passage surveys should be reviewed; a decision as to the required survey effort should be made based on the results. If appropriate, wintering and passage bird surveys should be reduced to biennial; data from biennial surveys should inform reserved matters application in the docks that are yet to be developed. Based on the review, fully developed neighbourhoods may be excluded from future survey efforts; therefore, reducing the scope of surveys as the neighbourhoods are developed.

Methodology

The survey methodology proposed is based on the BTO's Wetland Bird Survey (WeBS) (BTO, 2017[11]) however utilises a transect rather than dividing the site into blocks. Surveys should consist of a transect with predefined vantage points in each waterfront neighbourhood. The transects should be undertaken by two suitably qualified ecologists. Appropriate field maps should be annotated to show the bird species, high band, flight line and direction; the standard two letter BTO species and activity codes should be used on all surveys.

Target species for wintering bird and passage surveys should comprise waders, wildfowl, gulls & terns, cormorant, grey heron and raptors. All other species, including BoCC Red and Amber list passerines (song birds) should be recorded as incidental species. Surveys should be written up as a factual report; highlighting flight lines, key roosting locations, and any potential breeding activity of target species (early March onwards) within the Liverpool Waters scheme.

Timing/Weather Conditions

- High water surveys should be undertaken between September and March (inclusive) and comprise a minimum four-hour watch period per survey.
- In line with the NEBS produced for Princes Dock, high water surveys should be undertaken during the four hours preceding high tide.
- Low water surveys should be undertaken between September and March (inclusive) and comprise of a minimum four-hour period per survey.
- Low water surveys should be undertaken during the two hours preceding low water and two hours after.
- Surveys should be undertaken in a range of weather conditions, although times of restricted visibility and particularly harsh weather will be avoided.

Impact Assessment

The Liverpool Waters ES identified the presence of a small roost for oystercatcher *Haematopus ostralegus*, and redshank *Tringa totanus*, in Waterloo Dock.[2] Redshank and oystercatcher are components of the water bird assemblage (non-breeding) of the Mersey Narrows and North Wirral Foreshore Special Protection Area (SPA). The potential loss of this roost should be assessed in the context of the European site to determine whether this would result in a likely significant impact.

In line with the NEBS for Princes Dock, an impact assessment for water birds should be undertaken for each new reserved matters application in the Central Dock Neighbourhood, using data collected on the surveys. The impact assessment should be included in the plot specific EBS for submission to the LPA.

In accordance with the NEBS for Princes Dock, the water bird impact assessment should cover remediation, construction and operational phases of the development. It should follow the same assessment methodology as set out in the

[11] BTO (2017). *Wetland Bird Survey – Survey Methods, Analysis & Interpretation*. Thetford: BTO.

Liverpool Waters Ecology and Nature Conservation ES chapter and should include a Habitats Regulations Assessment (HRA) of Likely Significant Effect (LSE) for each of the Natura 2000 sites that may be affected by the development. Assessments should include all of the following sites, in addition to any proposed, new or extensions to current sites which may be designated subsequently:

- Liverpool Bay SPA;
- The Mersey Narrows and North Wirral Foreshore SPA/Ramsar;
- Mersey Estuary SPA/Ramsar;
- Ribble & Alt Estuaries SPA/Ramsar;
- Sefton Coast Special Area of Conservation (SAC);
- The Dee Estuary Ramsar;
- Dee Estuary SPA;
- Dee Estuary SAC; and
- Martin Mere SPA and Ramsar.

As with the NEBS for Princes Dock, the impact assessment should reference the most recent surveys, the baseline bird report for Liverpool Waters, the subsequent monthly update reports produced by WYG between October 2013 and April 2014, and the TEP assessment of the docks for qualifying features of Natura 2000 sites (TEP, 2015).[12] Impact assessments should also utilise any additional data and evidence available from standalone applications. Should the assessment identify that significant impacts on water birds are likely for a particular development, appropriate mitigation measures should be identified. Mitigation measures may include the incorporation of working windows or buffer zones to restrict the impact of potentially disturbing activities on water birds. In addition, there may be a requirement to provide alternative roosting habitat. Any mitigation proposed should be in accordance with the Liverpool Waters Strategic Ecological Mitigation Plan (SEMP) which is currently being developed at the time of writing this NEBS.[13]

2.4 Foraging Common Tern

2.4.1 Common Tern Survey

Surveys for foraging common tern *Sterna hirundo,* should take place in the Central Docks Neighbourhood in the year prior to construction and during the subsequent four years following development of the neighbourhood. The surveys should be undertaken by a suitably qualified ecologist and should follow the methodology described below. Following the first five years of monitoring, the requirement for continued surveys should be reviewed on the basis of the survey results and, if appropriate, the frequency of the surveys reduced.

[12] TEP (2015). Assessment of Supporting Habitat (Docks) for Use by Qualifying Features of Natura 2000 Sites in the Liverpool City Region. Available at http://www.meas.org.uk/media/5279/4157005-assessment-of-supporting-habitat-liverpool-docks-excl-drawings-aug-2015.pdf

[13] Arup (2019) Liverpool Waters Strategic Ecological Mitigation Plan – Interim Note.

Methodology

There is no standard methodology available for foraging common tern within Bird Monitoring Methods.[10] Similar to the Princes Dock NEBS,[3] the following shore-based survey approach is proposed to assess foraging common tern. This approach was outlined in Parson *et al.* (2015)[14] and was designed for little tern *Sternula albifrons*. Surveys for common tern foraging should be carried out by four surveyors, one located in each of the waterfront neighbourhoods. Surveys should be carried out from a vantage point which allows observation of the docks and coastal strip along the Mersey. Appropriate field maps should be annotated to show the flight lines of observed common terns, including their height, direction and foraging activity. The survey should also record breeding behaviour as observed.

Survey results should be written up as a factual report, highlighting flight lines, key foraging locations and any breeding locations for common tern within the Liverpool Waters Scheme and adjacent coastal strip.

Timing/Weather Conditions

- A total of 30 hours of survey effort should be completed between April and August (inclusive).
- Survey effort should be evenly spread across the five-month survey period and comprise approximately two-hour watches, with three watches completed in each month.
- The surveys should be undertaken under a variety of tidal states and times of day to reduce sampling bias.
- The surveys should be undertaken in a range of weather conditions, although times of restricted visibility and particularly harsh weather will be avoided.

Impact Assessment

An impact assessment for common tern should be undertaken for each new reserved matters application in the Central Dock Neighbourhood; the reserved matters applications should incorporate the data recorded within the surveys and any other data collected from standalone applications. The impact assessment should be included in the plot specific EBS for submission to the LPA.

The impact assessment for common tern should cover remediation, construction and operational phases of the development and should include a HRA for Liverpool Bay SPA and Mersey Narrows and North Wirral Foreshore SPA. Impact assessments should reference the baseline reports for Liverpool Waters, in addition to the monthly update reports produced by WYG between October 2013 and April 2014. The impact assessments should also reference the TEP study

[14] Parsons, M., Lawson, J., Lewis, M., Lawrence, R. & Kuepfer, A. (2015). Quantifying foraging areas of little tern around its breeding colony SPA during chick-rearing – JNCC Report No. 548. Available at http://jncc.defra.gov.uk/pdf/Report_548_web.pdf

assessment of supporting Habitat (Docks) for Use by Qualifying Features of Natura 2000 Sites in the Liverpool City Region.[12]

2.5 Bats

Bat activity transect surveys were undertaken at Liverpool Waters by WYG in 2009.[15] Observed levels of bat activity were considered to be low with only 1-2 common pipistrelle bats recorded during each of the three visits undertaken. No bats were recorded within Central Docks and no buildings within Central Docks were recorded to have suitability for roosting bats. The waterfront dock basins were noted to be particularly exposed to the prevailing winds along the River Mersey and the habitats sparse of vegetation. It was concluded that the habitat was of poor suitability for foraging bats.

2.5.1 Preliminary Bat Roost Assessment

Very few buildings remain within Central Docks however there are some industrial units located to the west of Waterloo Road (approximate grid reference SJ33609151). Where a reserved matters application proposes demolition of any existing structures, a bat roost suitability assessment should be undertaken to determine presence/likely absence of roosting bats and to assess the potential of the structure to be used for roosting. This should be carried out by a suitably qualified ecologist in line with current guidance (Collins, 2016).[16] Structures should be searched for signs of bat presence including:

- bat droppings;
- scratch and grease marks;
- live or dead bats; and
- noises of bats calling from within the roost.

In addition, features searched for on structures should include:

- missing mortar; and
- any cracks or gaps at least 10mm in size.

Following this inspection, the structure should be assigned a level of suitability to support roosting bats at different times of year: high, moderate, low or negligible. If the structure is identified to have suitability for roosting bats, further surveys may be required.

Timing/Weather Conditions

Bat roost suitability assessments may be undertaken at any time of year under any weather conditions, providing the weather conditions do not affect the ecologist's

[15] WYG (2009). *Liverpool Waters Bat Survey Report*. Appendix 7.5 of the Liverpool Waters ES (2011).
[16] Collins, J. (ed) (2016). *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn). The Bat Conservation Trust: London.

ability to carry out the survey effectively and safely e.g. not during heavy rain or high winds.

2.5.2 Bat Activity Surveys

Structures confirmed as roosts during the preliminary bat roost assessment, or those assessed as having low, moderate or high bat roost suitability may require further activity surveys to determine the presence/likely absence of bats and characterise roosts (identify species, numbers, access points, timing of use etc.). Surveys should take the form of dusk emergence/dawn re-entry surveys and should be undertaken following current guidance.[16]

Dusk emergence/dawn re-entry surveys involve ecologists visiting at dusk or dawn to listen/record and watch for bats emerging or returning to roosts. The number and timing of visits required depends on the suitability of the structure being surveyed:

- Confirmed/High – three separate survey visits required between May and September with at least two visits in May to August. At least one dusk emergence and one dawn re-entry survey, the third visit may be either dusk or dawn.
- Moderate – two separate surveys (one dusk emergence and one dawn re-entry) required between May and September with at least two visits in May to August.
- Low – One dusk emergence or dawn re-entry survey required between May and August.

Timing/Weather Conditions

Surveys should be taken between May and August/September (see above). The sunset temperature must be above 10°C and no rain or strong winds.

2.5.3 Bat Impact Assessment

Any reserved matters applications which affect structures with potential to be used by roosting bats should include an impact assessment within the plot-specific Ecological and Biodiversity Statement. If any significant impacts during remediation, construction or operation are considered likely, then appropriate mitigation should be identified. This may include application for a bat mitigation licence from Natural England if any roosts and to be disturbed or destroyed.

2.6 Aquatic Species

Surveys for aquatic species were not undertaken within the dock system as part of the survey work undertaken to inform the ES (WYG, 2011).[2] As stated in the Princes Dock NEBS,[3] an initial baseline assessment should therefore be undertaken within the Central Dock system prior to the start of construction. An ongoing programme of monitoring should then be undertaken annually throughout

the development. The surveys should follow the same methodology as included within the Princes Dock NEBS (Table 2.1).

Table 2.1: Methodology for carrying out monitoring of fish and other water species within the dock system.

Survey	Methodology
Baseline	
Phytoplankton survey	Appropriate UKAS accredited methodology.
Fish survey – hydroacoustic and netting	Duncan, A. and Kubecka, J. (1993). *Hydroacoustic methods of fish surveys*. National Rivers Authority R&D Note 196. Fyke net surveys.
Benthic macroinvertebrate survey of dock floor	Samples to be collected using a suitable grab. Samples to be taken from Princes Half Tide Dock, West Waterloo Dock, and the linear waterway to the north of West Waterloo Dock. Minimum of 18 sampling sites. Also, baited traps to be used at a minimum of nine locations to quantitatively sample mobile species. Samples to be processed following Worsfold & Hall (2010).[17]
Benthic invertebrate survey of dock walls	Wall scrape samples to be taken following Worsfold (1998).[18]
Monitoring	
Annual surveys to monitor benthic invertebrates, algae, phytoplankton and zooplankton species.	As above for baseline surveys, unless subsequent improvement to accepted methodologies during development lifespan.
Annual fish survey if low fish population is identified during baseline to monitor improvements. Otherwise no further monitoring except in exceptional circumstances e.g. pollution incident.	As above for baseline surveys, unless subsequent improvement to accepted methodologies during development lifespan.

2.6.1 Invasive Non-Native Species

Marine Invasive Non-Native Species (INNS) such as the tunicate *Styela clava*, are known to be present within the docks in Liverpool (Davis et al., 2007).[19] There is high potential for other marine non-native species to be present in the docks, spread both by natural vectors or via vessels and their ballast/bilge water. If any INNS are recorded within Central Docks during the initial baseline or any subsequent monitoring, an appropriate method statement or management plan

[17] Worsfold, T.M. & Hall, D.J. (2010) *Guidelines for processing marine microbenthic invertebrate samples: a Processing Requirements Protocol: Version 1.0, June 2010.* Unicomarine Report. Available at http://www.nmbaqcs.org/media/1175/nmbaqc-inv-prp-v10-june2010.pdf
[18] Worsfold, T.M. (1998). *Sampling of cryptofauna from natural turfs (flora or fauna) on hard substrata. Version 1 of 26 March 1998*. In: Biological monitoring of marine Special Areas of Conservation: a handbook of methods for detecting change. Part 2. Procedural guidelines, ed. By K. Hiscock. Peterborough: Joint Nature Conservation Committee.
[19] Davis, Martin H., Lützen, Jørgen and Davis, Mary E (2007). *The spread of Styela clava Herdman, 1882 (Tunicata, Ascidiacea) in European waters.* Aquatic Invasions (2007) Volume 2, Issue 4: 378-390

should be implemented during construction to avoid promoting the spread of these species. Method statements or management plans should also be considered in relation to operational requirements, for example should there be a change in usage or activities within Central Docks waters post-development.

2.7 Water Quality

2.7.1 Monitoring

Part vi. Of Condition 16 requires details of the means and methodology for the monitoring and management of water quality within the dock system. This should inform mitigation to safeguard fish and other water species, including the aeration of dock water spaces. The surveys should follow the same methodology as included within the Princes Dock NEBS (Table 2.1).

An initial baseline characterisation survey of the dock system should be undertaken prior to the start of construction. This should include:

- Water quality sampling at several locations within Princes Half Tide Dock, West Waterloo Dock and the waterway to the north of West Waterloo Dock. Parameters to include dissolved oxygen, pH, conductivity, salinity, biochemical oxygen demand, ammonia, nutrients, heavy metals and organics likely to include poly-aromatic hydrocarbons and TBT.
- Sediment quality sampling for sediment oxygen demand, metals, pH and redox potential.
- Bathymetric survey for sediment depth.

An ongoing monitoring programme should be implemented during construction to monitor the above parameters including biochemical oxygen demand, ammonia and nutrients. This should be completed monthly in the first instance however the frequency may reduce over time, depending on the results.

Reports on water quality monitoring should be provided to the Environment Agency, MEAS and The Canal & River Trust. The Principal Contractor should rectify any issues identified during monitoring and implement measures to prevent further impacts arising.

2.7.2 Management Plan

As included in the NEBS for Princes Dock (WYG, 2018[3]), an appropriate water quality management plan should be developed and implemented by the Principal Contractor during the development of Central Docks. This should be produced following the results of the initial baseline assessment and will likely include measures such drainage system investigation to identify pollution risk and/or aeration of dock spaces.

3 Mitigation Through Scheme Design

3.1 Bird Strike Mitigation

Central Docks is the location of the secondary tall buildings cluster with five high-rise (>45m) buildings to be developed. Despite this, previous surveys within Liverpool Waters have found that the majority of birds follow either the River Mersey or the dock system rather than the land which has been allocated for development.[12,20] Nevertheless, the development of the tall buildings cluster within Central Docks has the potential to increase the risk of bird strike.

Measures to reduce the risk of bird strike should be designed into all tall buildings within Central Docks, particularly those with large areas of reflective glass on the northern and southern aspects. This should incorporate day and night time mitigation measures and should be incorporated into the plot-specific EBS required for each reserved matters application under Part D, Condition 34 of the Liverpool Waters outline consent. As is included in the Princes Dock NEBS (WYG, 2018[3]), all reserved matters applications for buildings over five storeys high, or where there are low existing light levels, should consider the requirement for a lighting plan. The design of any ancillary structures of high-risk buildings should also consider the requirement of similar mitigation.

Potential mitigation measures to reduce bird strike which may be included at Central Docks include (US Fish and Wildlife Service, 2016[21]):

- Reducing strikes with glass:
    - Patterning
    - Fritting
    - UV Patterned Glass
    - Screens
    - Netting (mesh size <1.3cm)
    - Architectural features e.g. overhangs, awnings and louvres
- Lighting plan to reduce lighting during bird migration periods (mid-August to mid-November and March to mid-May):
    - Avoid unnecessary lighting including perimeter lighting.
    - Operating lights to be designed so that light levels (brightness) are as low as possible.

[20] Vantage point surveys undertaken by WYG in 2009/2010, 2013/2014.
[21] US Fish and Wildlife Service (2016). *Reducing bird collisions with buildings and building glass best practices*. Falls Church, Virginia: Division of Migratory Bird Management. Available at https://www.fws.gov/migratorybirds/pdf/management/reducingbirdcollisionswithbuildings.pdf

  - Consider use of motion sensors in public areas (where health & safety considerations allow).
  - No upward lighting – lights to be fitted with hoods or louvres to avoid lighting skywards.
  - Height of lighting columns to be reduced/limited to reduce spillage.
  - Building occupants to be made aware of measures to reduce risk of bird strike e.g. use of shades/blinds and turning off lights when not in use.

- Landscaping design should:
  - avoid creating linear features which may funnel birds towards glass features;
  - consider pedestrian and vehicle approaches to buildings to avoid potential for flushing of birds e.g. from trees or shrubs towards glass buildings; and
  - avoid placement of interior planting in close proximity to windows to avoid creating the impression of continuing vegetation.

3.2 Control of Gulls and Pigeons

All buildings within the Central Docks Neighbourhood should incorporate measures to dissuade nesting and roosting of gulls and feral pigeons, appropriate to the design and function of the building. Each reserved matters application should include details of consideration with designed-in measures to be prioritised over additional measures such as spikes, wires or netting. Applicants should consider the implications of installing such measures in also reducing the availability of habitat for other key bird species including cormorant *Phalacrocorax carbo*. Any measures installed must also have regard to appropriate licensing requirements in respect to the protection of breeding birds under the Wildlife and Countryside Act 1981 (as amended).

Suitable designed-in measures include:

- Minimise flat roofs or replace with pitched roofs (over 25 degrees).
- Where flat roofs are required consider incorporation of roof gardens so human disturbance may deter nesting. Additional dissuasion measures may be required in certain locations.
- Avoid interruptions in the roof plane, e.g. skylights, or utilise additional dissuasion measures.
- Avoid roof overhangs with ledges below or incorporate a minimum ledge slope of 45 degrees or additional dissuasion measures.

Additional dissuasion measures which may be considered include:

- Spikes – can be effective on ledges if spaced appropriately however if used on roofs requires complete covering and therefore there is an associated visual impact.
- Wires – may be aligned in parallel rows on flat roofs or ledges to dissuade roosting (ineffective against nesting). Preferable over netting as avoids snagging of other bird species and may be less visually intrusive).
- Netting – requires careful consideration due to potential negative visual impact; difficulty to correctly install and maintain; and potential for individuals to become snagged due to inappropriate mesh size.
- Effective management of litter and waste – avoid accumulations and consider nuisance bird species in design of street furniture, e.g. litter bins.

It is not recommended that measures such as plastic bird of prey decoys, noise emitting devices or wind-driven moving structures are utilised as they are less effective and may have a negative impact on local nesting species, in particular peregrine *Falco peregrinus*.

Additional mitigation measures may be required for priority bird species which will also be deterred by the methods outlined above. All reserved matters applications should consider appropriate inclusion of integrated roosting features for species such as cormorant.

3.3 Control of Leisure Boat Activity

Due to the location of the Central Docks Neighbourhood within close proximity to sites designated for significant water bird populations, the impact of increased boat traffic should be considered within the environmental assessment and Habitats Regulations Assessment accompanying each reserved matters application. The assessments should incorporate survey/monitoring data of SPA species in order to ensure the appropriateness of mitigation measures.

Boats currently access Princes Half Tide Dock, West Waterloo Dock and the waterway to the north of West Waterloo Dock via the Liverpool Canal Dock link. This is accessed from the north from the Liverpool to Bootle stretch of the canal via Stanley Dock.

Impacts from increased boat traffic will require appropriate mitigation to ensure impacts on SPA qualifying species utilising the docks (e.g. cormorant) are avoided. In addition increased boat traffic has the potential to undermine the effectiveness of mitigation measures such as floating pontoons.

Measures to limit boat activity may include restricting traffic in certain seasons or to certain times of the day or year. Additionally, the implementation of a lane or one-way system may help to control traffic.

3.4 Recreational Disturbance

Point x. of Condition 16 requires '*mechanisms to ensure protection of Sefton Coast SAC (Seaforth Docks to Formby Point) from recreational disturbance*

overseen by the Liverpool Waters Coordination Panel in accordance with Schedule 6 of this permission'.

It is proposed that 2,900 residential units will be created within the Central Docks Neighbourhood. There is the potential that residents may travel to Sefton Coast SAC (approximately 5.9km to the north), Ribble and Alt Estuaries SPA/Ramsar (approximately 5.3km to the north) and Mersey Narrows and North Wirral Foreshore SPA/Ramsar (0.9km to the west across the River Mersey) for recreational purposes. This may affect the designated sites either alone, or in-combination with other developments.

A public open space will be created within the Central Docks Neighbourhood – Central Park. It is envisaged that this will be used for recreation which may reduce visits to the European sites. Recreational disturbance effects at Sefton Coast SAC were screened out within the Liverpool Waters HRA (WYG, 2011b)[22] as *"the primary movements of end users will be contained within the footprint of the development and its immediate surrounds."* However, since the Liverpool Waters outline consent was granted, a number of statutory designations have changed (e.g. Mersey Narrows and North Wirral Foreshore SPA and Liverpool Bay SPA). There is also further evidence and understanding of the impacts of visitor pressure on the designated sites (Natural England, 2015).[23]

Recreational pressure, including vehicular access and dog-fouling, is recognised in the formal statutory European Site Conservation Advice Packages for Sefton Coast SAC (Natural England, 2019[24]) which can be assessed as a Medium-High risk to qualifying features of the European site. Recreational pressure is also highlighted in the draft Liverpool Local Plans HRA as a Likely Significant Effect (LSE) (AECOM, 2017).[25] Public access/disturbance is confirmed as an issue in the Site Improvement Plans for Ribble and Alt Estuaries SPA, Sefton Coast SAC and Mersey Narrows and North Wirral Foreshore SPA.

All reserved matters applications for plots within Central Docks should include consideration of recreational pressure within HRA for Sefton Coast SAC, Ribble and Alt Estuaries SPA, Mersey Narrows and North Wirral Foreshore SPA. All future applications should ensure that they provide sufficient information to satisfy further tests of the Habitat Regulations (as required).

All developments should include a commitment to adhering to the objectives of the Visitor Management Strategy (VMS) which is currently being considered to provide a strategic approach to mitigation across the Liverpool City Region (LCR). The Liverpool City Region has commissioned a wider strategic approach to visitor and recreation pressure management; this is to be referred to as the 'Liverpool City Region European Sites Recreational Mitigation and Avoidance

[22] WYG (2011b). Liverpool Waters Habitats Regulations Assessment Screening Report for Proposed Liverpool Waters Scheme. Liverpool: WYG.
[23] Natural England (2015). *Mersey Narrows and North Wirral Foreshore Sites of Special Scientific Interest - Investigation into the impacts of Recreational Disturbance on Bird Declines*. Natural England Commissioned Report NECR201.
[24] Natural England (2019). *European Site Conservation Objectives: Draft Supplementary advice on conserving and restoring site features. Sefton Coast Special Area of Conservation (SAC) Site Code: UK0013076.* York: Natural England.
[25] AECOM (2017). *Liverpool Local Plan Habitats Regulations Assessment*. Liverpool: AECOM.

Strategy'. This work may help inform the delivery of visitor and recreation mitigation to protect European Sites within the City Region. This work is currently ongoing and no firm proposals have been proposed or agreed.

As stated in the NEBS for Princes Dock (WYG, 2018), reserved matters applications which come forward prior to the adoption of the LCR Mitigation and Avoidance Strategy should consider how recreational pressure will be assessed (and potentially mitigated for) as a result of the development. Condition 34 of Part D of the outline consent will ensure that the developer provides sufficient information to assess potential impacts through further surveys and HRA. More certainty over what mitigation (if any) would be required will be able to be provided at this stage. Applicants should include additional mitigation/preventative measures capable of being incorporated into the proposals and/or scheme design that will avoid and/or mitigate recreational pressures on the European sites and any functionally linked habitat. There should be a clear distinction within the reserved matters application documents (e.g. EBS) between those parts of the development which are essential features/characteristics, and those which are proposed as mitigation/preventative measures designed to protect European sites.

Examples of mitigation/preventative measures that may be included (as appropriate to the development of plots):

xi. Design and management of additional public open space outside the proposed development boundary to encourage use away from the European sites (e.g. Central Park).

xii. Restrictions on the number of apartments allowed to keep dogs.

xiii. Provision of information in sales packs, informing residents of the presence and importance of the European sites, and how they can help protect them including an outline 'responsible user code.'

xiv. Contributions to develop a visitor/householder 'responsible coast user code' including encouragement of visits to non-sensitive locations.

xv. Contributions to improving and/or managing access to and/or within the internationally important nature sites including financial contributions.

xvi. Contributions to increase recreation management including location-specific interventions e.g. wardening, signage, path management and habitat management, including financial contributions.

xvii. Contributions to non-sensitive locations in order improve sites to provide greater visitor enjoyment in order to reduce visits to European sites.

Any mitigation proposed should be in accordance with the Liverpool Waters SEMP.[26]

[26] Arup (2019) Liverpool Waters Strategic Ecological Mitigation Plan – Interim Note.

4 Construction Phase Mitigation

4.1 Construction Working Practices

4.1.1 Removal of Existing Buildings and Vegetation

The existing buildings, structures, hardstanding and ephemeral vegetation within the Central Docks Neighbourhood offer suitable nesting habitat for birds. Consequently, projects should demonstrate that breeding birds have been considered in their planning application. To limit disturbance to nesting birds, it is recommended that intrusive works such as vegetation clearance and demolition works are undertaken outside of the bird nesting season (March-August), where possible.

Where it is not possible to undertake intrusive works outside of the nesting season, a suitably qualified Ecological Clerk of Works (ECoW) should undertake a nesting bird check prior to the commencement of works on site. Should an active nest be identified, the ECoW should advise on a suitable species-specific working method and exclusion zone to limit disturbance and avoid damaging nests. The recommended working method may vary depending on the species and the nature of planned works.

4.1.2 Construction Vehicles, Routes and Speed Limits

As a precautionary measure, construction should be undertaken outside of the bird nesting season (March – August inclusive). Where this is not possible, an ECoW will be required to undertake a nesting bird check to ensure nests will not be damaged as vehicles move across the site. As per the NEBS for Princes Dock, vehicle routes and speed limits may need to account for nests.[3] The EcOW should advise the appropriate distance for vehicle traffic to keep from nests.

Wintering bird surveys were undertaken across the entire Liverpool Waters site during the 2018-2019 season (October to March). The reporting of the surveys was not yet published at the time of writing this NEBS, however cormorant, shelduck *Tadorna tadorna*, ringed plover *Charadrius hiaticula*, and oystercatcher have been recorded on site, among other common species. The numbers of cormorant recorded on site is considered to represent a significant proportion of the SPA population (i.e. >1%). Construction vehicle routes and speed limits should therefore be developed based on the data collected during the 2018/2019 surveys along with data collected previously across Liverpool Waters and for standalone applications. Any mitigation should be outlined in detail in the Construction Environmental Management Plan (CEMP) for the individual reserved matters through Condition 39 of the Liverpool Waters outline consent. Any mitigation proposed should be in accordance with the Liverpool Waters SEMP.[26]

The Liverpool Waters ES identified the presence of a small roost for oystercatcher and redshank in West Waterloo Dock. A restricted speed limit should therefore be stipulated for construction vehicles moving around this dock and should be

included within the CEMP. The ECoW may also recommend a speed limit during the nesting bird season (March – August inclusive).

4.1.3 Protection of Roost Sites of Wintering/Passage Birds

In 2011, WYG identified no significant aggregations of water birds associated with the Central Docks Neighbourhood; although, surveys by Arup in the 2018/2019 wintering season, have recorded SPA qualifying species such as cormorant on site.

Consequently, any developments in the Central Docks Neighbourhood, and elsewhere in the Liverpool Waters Scheme, which have the potential to result in increased water bird disturbance should consider, within its supporting environmental assessment and associated HRA, the impact of disturbance on features of all designated sites.

Disturbance pathways through the development of plots within the Central Docks Neighbourhood are likely to be associated with increased noise and visual effects and disturbance to available habitat for roosting and foraging. Impacts resulting from disturbance and interruption of flight paths and shading from buildings should also be considered. Mitigation should be identified through the updated impact assessment and/or the HRA. Any mitigation deemed necessary should be in accordance with the Liverpool Waters SEMP.[26] It should be outlined in detail in the CEMP for the individual reserved matters through Condition 39 of the Liverpool Waters outline consent.

Noise Disturbance Mitigation

Individual developments in the Central Docks Neighbourhood will require piling; this activity has the potential to extend the noise disturbance outside of the Central Docks Neighbourhood and may have potential effects on water birds using other docks within the vicinity. Therefore, effects on water bird roosting and foraging will be extended outside of the Central Docks Neighbourhood and will cover the entirety of the Liverpool Waters Scheme. For each development where piling is required, mitigation should be identified and implemented where appropriate. Any mitigation proposed should be in accordance Liverpool Waters SEMP.[26]

Noise disturbance mitigation measures should be included within the CEMP to reduce the effect of noise disturbance on birds. For Central Docks, these may include the following:

- Adherence to the guidelines set out in The Code of Practice for Noise and Vibration Control on Construction and Open Sites, 2009 and subsequent updates.
- The use of rotary piling method.
- Selection of quietest working equipment available.
- Positioning equipment behind physical carriers, i.e. temporary hoarding.
- Provision of lined and sealed acoustic covers for noisy equipment.
- Directing noise emissions away from plant, including exhausts or engines away from sensitive locations.

- Ensuring that regularly maintained and appropriately silenced equipment is used.
- Maintaining a no idling policy.

It is therefore recommended that the above guidance is followed for each development requiring piling; however, a noise impact assessment should still be undertaken for reserved matters applications through Condition 47 of the Liverpool Waters outline consent to determine whether additional mitigation, such as restrictions on the time of year i.e. a working window, is required.

An in-combination assessment should be undertaken within any HRA coming forward for reserved matters applications. This should consider the impacts of noise disturbance (amongst other impacts) from additional developments within the site, therefore looking at the cumulative and in-combination impacts, which may require additional or adapted mitigation.

Visual Disturbance Mitigation

Developments around West Waterloo Dock and Princes Half Tide Dock will require screening in relation to water birds. In both docks, screening should only be placed at ground level, this will block sight lines to the busiest area of the construction sites (i.e. where most operative and vehicle movements are likely to be concentrated). The developments should also be screened to prevent windblown litter entering the docks.

5 Habitat Creation

5.1 Bird Nesting/Roosting Features and Foraging Habitat

In accordance with the Sustainability Principles described in Section 1.9, developments should be striving towards biodiversity enhancement and net gain. Wherever possible, any opportunity to develop ecological connectivity within the neighbourhood and the wider Liverpool Waters scheme should be considered. To enhance the ecological value of the Central Docks Neighbourhood, buildings within the neighbourhood should incorporate features for the following bird species.

5.1.1 Black Redstart

During the breeding bird surveys undertaken in 2009 one singing black redstart was recorded singing south of Stanley Dock (WYG, 2009).[27] In 2015 and 2016, WYG undertook peregrine surveys close to Stanley Dock (north of Central Docks) and also recorded black redstart. To create a cohesive enhancement plan across the Liverpool Waters Scheme, as per the NEBS for Princes Dock, it is recommended buildings within the Central Docks Neighbourhood consider the inclusion of a green roof specifically designed for black redstart, where appropriate and viable.

Green Roof

Although the term green roof is used throughout this NEBS, roof habitat designed specifically for black redstart should contain a high proportion of sparsely vegetated areas which is more typical of brown roofs.

Green roofs should incorporate the following specification:

- relatively small areas of very sparsely vegetated rubble or rocky terrain incorporating hibernacula for invertebrates;
- still or slow-moving water; and
- nearby nest boxes.

An ornithologist should be involved in the design process to ensure specific ecological requirements for black redstart are met through the design process. Developments should also consider the compatibility of green roofs with the need to exclude gulls and pigeons as outlined in Section 3.2.

Detailed guidance on green roofs is provided by the greater London Authority (GLA) publication, Living Roofs and Roofs (GLA, 2008).[28] Guidance on creating

[27] WYG (2009). *Liverpool Waters Breeding Bird Survey Report*. Liverpool: WYG. Included as Appendix 7.6 of the Liverpool Waters ES.
[28] Greater London Authority (2008). Living Roofs and Walls Technical Report: Supporting London Plan Policy. GLA, London.

habitat specifically for black redstart is also detailed in the guidance produced by the Greater Manchester Biodiversity Project (GMBP, 2008).[29]

Nest Boxes

In addition to providing green roofs, nest boxes specifically designed for black redstart are also recommended. Suitable next boxes include:

- Schwegler 2HW (externally fixed); and
- Schwegler 1HE (integrated).

Due to the presence of peregrine falcon within the area, consideration should be required as to which plots will be most suitable for black redstart nest boxes. A suitably qualified ecologist should advise on the installation of nest boxes within each plot during production of the EBS.

5.1.2 Peregrine

Peregrine falcon thrive in urban environments due to their capacity to hunt a diverse range of species. It is not considered appropriate to incorporate nest boxes for black redstart (prey) and peregrine falcon (predator) in the same area. Consequently, consideration may be required as to which plots will be most suitable for peregrine nest boxes. A suitably qualified ecologist should advise on the installation of nest boxes within each plot during production of the EBS. Dixon & Drewitt (2012) provides further guidance on the provision of artificial nest sites for peregrine on built structures.[30]

5.1.3 Swallows and Swifts

The Central Docks Neighbourhood should also consider the inclusion of swallow and/or swift boxes in buildings to the north of the Kingsway Tunnel. Where provided, it is recommended that a minimum of three boxes should be considered to be installed per building, to replicate a colonial nesting situation. Any boxes installed should be sited at least 5m above ground, with clear adjacent airspace so birds can access them in high-speed direct flight. A suitably qualified ecologist should advise on the installation of nest boxes. It may be necessary to utilise a lure whereby calls of nesting swifts may be played to attract individuals and increase the likelihood of establishing a colony.

5.1.4 Replacement Roosting Habitat for Water Birds

As per the NEBS for Princes Dock, it is acknowledged that Condition 34 of the planning decision notice for the Liverpool Waters development specifies that replacement roosting sites are only required for Nelson Dock; due to the relatively high number of roosting cormorants, recorded by WYG in the Liverpool Waters

[29] Greater Manchester Biodiversity Project (GMBP) (2008). *Make Room for Black Redstarts: A species action plan for Greater Manchester*. GMBP: UK.
[30] Dixon, N and Drewitt, E. (2012). *A 15-year study of the diet of urban-nesting Peregrines.* Devon Birds.

Wintering and Passage Bird Report (WYG, 2011c).[31] Replacement habitat for roosting water birds was not proposed for the docks in the Central Docks Neighbourhood. However, due to the findings of more recent surveys which have recorded significant numbers of cormorant,[12] and the extension of Liverpool Bay SPA which now includes cormorant as a qualifying species, the requirement for mitigation will need to be revised.

The specification for suitable water bird habitat should be based on the results of the first annual passage and wintering bird survey and foraging common tern survey. Based on the information collected during the 2018/2019 wintering bird surveys, SPA species such as cormorant have been recorded within the site. Appropriate mitigation such as floating pontoons will therefore be required. The results of the surveys will be used alongside other data to produce a Liverpool Waters Strategic Ecological Mitigation Plan (SEMP) which will examine data in the context of extant and likely reserved matters applications across the entire Liverpool Waters Scheme, and identify areas where mitigation is needed.[26] The SEMP will be submitted to the LPA for approval. In line with the NEBS for Princes Dock, it is proposed that all of the mitigation features specified are delivered in areas managed by the landowner.

A cohesive approach across all neighbourhoods is required for this type of mitigation; reserved matters applications elsewhere within the Liverpool Waters scheme may result in significant impacts on water bird habitats, which cannot be mitigated for locally, therefore, mitigation may need to be implemented within adjacent neighbourhoods to maximise the overall effectiveness. However, mitigation measures should also be submitted as part of reserved matters applications and approved and discharged through Condition 34 of the outline consent for each detailed plot when additional surveys are undertaken to provide further information. Any mitigation proposed should be in accordance with Liverpool Waters SEMP.[26]

5.2 Bat Roosting Features

Although no bat roosts or buildings with bat roost suitability were identified within Central Docks during the surveys undertaken (WYG, 2009),[15] there is an opportunity to enhance the site for bats through the installation of artificial roosting features. Central Docks may be considered to be the neighbourhood with the most potential to be utilised by bats in the future due to the proposed Central Park which should provide suitable foraging habitat.

A total of nine bat boxes should therefore be installed on buildings in proximity to Central Park. Two bat boxes should be installed onto the southern facing aspect of the building on Plot C-10, where possible. It is recommended that the boxes are positioned on the southern face of the building, above 4m height. It is recommended that bat boxes are to be considered to be integrated into the walls for longevity, however they may also be fixed to the external walls.

[31] WYG (2011c). *Liverpool Waters Wintering and Spring Passage Bird Survey Report*. Liverpool: WYG.

The additional bat boxes should be positioned on the buildings on Plots C-05-A, C-05-B, C-09-A, C-09-B, C-07 and/or C-11, where possible. The boxes should be positioned south-west through to south-east where possible, however the western aspects of the buildings along the River Mersey should be avoided due to exposure to the prevailing weather.

The details of locations and types of boxes should be included within the plot-specific EBS to be provided as part of the reserved matters applications.

5.3 Landscape Planting

Public open space is proposed at Central Park along with additional areas of planting within the majority of development plots. Landscaping design should be detailed within the plot-specific reserved matters applications. Landscaping should include native species which attract invertebrates and therefore provide a food resource for bats. This includes native nectaring species; alternatively, suitable high nectaring non-native species may be considered to augment native species planting.

5.3.1 Tree Planting

Tree planting in areas of public open space should aim to create potential green corridors through the neighbourhood for bats and breeding birds, whilst avoiding funnelling birds towards reflective glass surfaces (Section 3.1). The landscaping within individual plots should tie in to corridors created in the public open space and develop a green network of potential wildlife corridors throughout the development. The habitats developed within each neighbourhood should also seek to link into adjacent neighbourhoods to maximise corridors and increase permeability throughout the entire Liverpool Waters scheme.

Where possible the planting interval for trees should be such that the canopies of adjacent trees are within at least 5m of one another when mature or the spaces between the trees should be bridged by suitable planting for bats. As stated in Princes Dock NEBS (WYG, 2018), it is recommended that the priority (broad) habitat ‘Broadleaved mixed and yew woodland’’ which is listed in the Natural Character Area (NCA) profile for Merseyside Conurbation (Natural England, 2013) is referenced as the basis of tree planting schemes. Suitable species include wild cherry *Prunus avium*, alder *Alnus glutinosa*, Blackthorn *Prunus spinosa*, elder *Sambucus nigra*, goat willow *Salix caprea*, hawthorn *Crataegus monogyna*, oak *Quercus* sp., field maple *Acer campestre*, silver birch *Betula pendula*, hazel *Coryllus avellana* and rowan *Sorbus aucuparia.*

5.3.2 Additional Shrub and Herbaceous Planting

The planting mix should attract a range of invertebrate species and provide an important foraging resource for breeding birds and bats. The formulated planting mix should encompass a range of sequential flowering and fruiting species which provide foraging resources for site fauna at different times of year.

Landscaping of public open space and within individual plots should include additional areas of shrub and herbaceous planting, including both annuals and herbaceous perennials. The planting mix should aim to attract a range of invertebrate species and support pollinator species.

Although native species are preferred, non-native plants, provided they are not invasive, can assist in providing nectar sources throughout the year. Examples of such species are listed in the Royal Horticultural Society (RHS) publication Plants for Pollinators – Garden Plants (RHS, 2011).[32]

[32] RHS (2011). Plants for Pollinators – Garden Plants. Available at https://www.rhs.org.uk/science/pdf/conservation-and-biodiversity/wildlife/plants-for-pollinators-garden-plants.pdf

6 Post-Construction Monitoring and Management

Details of post-construction monitoring and management should be specified within the EBS for each plot and submitted with the reserved matters application. An outline of what should be included within the Central Docks Neighbourhood is provided below.

6.1 Aquatic Monitoring

The results of the construction phase monitoring detailed in Sections 2.6 and 2.7 should be used by the applicant/developer to inform the monitoring programme required during the operational phase for aquatic species (including invasive non-native species) and water quality. The requirements of the ongoing monitoring should be discussed and agreed with Natural England, MEAS, the Environment Agency and Canal and Rivers Trust prior to completion of construction.

6.2 Ecological Mitigation

6.2.1 Bird Strike Mitigation

Routine Management

The bird strike prevention measures should be part of the fabric/fixtures/fittings of the building therefore should require little management outside of that covered by routine building maintenance. Management of any installed features should follow the manufacturer's recommendations.

Monitoring

Bird strike monitoring should be carried out in the first year after construction by owners/occupants of any buildings over five storeys high. This should take the form of monitoring surveys and occupant reports.

Monitoring of bird strike fatalities involves a systematic search for carcasses of birds which have collided with the building. Most bird strike collisions occur in the morning between 7am and 11am although they can happen at any time. Scavengers such as gulls, crows, cats and foxes learn where collisions happen frequently therefore it is important to survey regularly and as close as possible to peak collision time. It is proposed in the Princes Dock NEBS (WYG, 2018)[3] that monitoring surveys should be undertaken based on the methodology set out in the American Bird Conservancy (ABC) advice note (2015).[33] This is also proposed for Central Docks as set out below:

- Representatives should be chosen from each building to carry out the monitoring, for example a member of maintenance staff.

[33] ABC (2015). *Monitoring buildings for bird collisions*. Virginia: American Bird Conservancy.

- The monitoring period should be 12 months, where possible, to include one winter and one spring migration.
- Monitoring should take place on three days per week, between 8am and 10am.

Monitoring staff should initially be trained in conducting searches by a suitably qualified ecologist who may also be on hand to assist with subsequent identification of carcasses, e.g. by emailed photographs. The monitoring route should be devised during the training and should include every façade with windows, including along green roofs, and if possible, setbacks and other roof terraces. A map of the monitoring route should be created for reference, and the route should be subdivided into segments, with each change in façade structure and orientation assigned a segment number.

At the designated times, monitoring staff should conduct a careful search, looking within 10m of the building, with a special emphasis on landscape planting and other objects such as street furniture, as injured birds may seek shelter near those objects. After each segment, staff should record the date, time, number of birds found, their species and their status (dead, alive, or injured). If possible, photographs and specimens should be collected. It is important to record the search, even if no birds are found as this may be used as evidence for the effectiveness of installed mitigation.

All building occupants should be informed of the monitoring, so that their own efforts do no complicate the data e.g. maintenance staff should be instructed not to sweep up any carcasses when they are not engaged in monitoring.

The monitoring strategy and data collected should be continually reviewed in consultation with the ecologist to determine whether any adjustments to the methodology or mitigation are required. This should take place initially after 3 months and then quarterly until the end of the 12-month monitoring period. A monitoring report should be produced by the ecologist at the end of the monitoring period to summarise the findings and include any further enhancements of mitigation and monitoring, as required.

A system should also be set up whereby building occupants are encouraged to report any bird strikes. This should be included in the Welcome Pack for owners/tenants and supported by posters displayed on information boards to alert occupants to the risk of bird strike and the routine monitoring programme. Any occupant reports should be reviewed and included within the results of the monitoring report.

Remedial Management

The monitoring report should examine the locations of bird strikes in relation to mitigation features. Where relevant, areas of the building which may be more prone to bird strike should be highlighted and if appropriate further mitigation should be recommended. The monitoring report should be discussed with the building owner and additional monitoring undertaken if required. If additional mitigation is installed, then a further 12-month round of monitoring should take place to assess its effectiveness.

6.3 Control of Gulls and Pigeons

Routine Management

Ideally, issues with gulls/pigeons should be designed out without the need for additional control/dissuasion measures. However, if installed appropriately, little management should be required on control/dissuasion measures outside of that covered by routine building maintenance. Management of any installed features should follow the manufacturer's recommendations.

Monitoring

Monitoring for breeding is proposed where control/dissuasion measures are installed on buildings. A representative from the building should be chosen to carry out the monitoring following training by a suitably qualified ecologist. Searches should be undertaken at least twice per year, during May and June for the lifetime of the building. All potential nesting surfaces, such as ledges, flat roofs and roof terraces, should be inspected from the ground, with binoculars, and from within the buildings, where access allows. The locations of any gull or pigeon nests should be recorded on a map.

Remedial Management

Where significant numbers of nesting gulls and pigeons (more than two gull or five pigeon nests) are recorded, then the building owner should consult an appropriate contractor to identify suitable additional measures to dissuade/exclude birds during the following breeding season. Any additional exclusion measures should be installed by a suitably qualified contractor.

6.4 Habitat Creation

Where appropriate, buildings within the Central Docks Neighbourhood, should consider the incorporation of the following habitat creation measures:

- green roofs and black redstart nest boxes;
- swallow boxes;
- peregrine boxes;
- bat boxes; and
- landscape planting for bats and invertebrates.

As per the NEBS for Princes Dock,[3] routine management, appropriate monitoring and provisions for remedial management are set out below. Where mitigation for water birds is provided on the basis of the passage and wintering bird surveys, these should also be included within the monitoring programme. Monitoring and remedial management measures will be dependent on the type(s) of mitigation features implemented. Further details on the requirements of monitoring of mitigation measures should be provided with reserved matters applications and should be provided to the LPA for approval prior to installation. An Adaptive Management Plan should be produced with any SPA bird mitigation package developed. This is to ensure appropriate monitoring is undertaken and the mitigation is adapted if required to ensure the best success possible for SPA birds.

Any mitigation, management and monitoring proposed should be in accordance with the Liverpool Waters SEMP.[26]

6.4.1 Green/Brown Roofs and Black Redstart Boxes

Routine Management

Once fully established, green roofs designed specifically for black redstart require limited management. Occasional weeding may be required, should robust species establish.

Monitoring

Green roofs should be inspected twice per year to ensure they continue to meet the original specification. Inspections should be made by a suitably qualified landscape contractor and/or an ecologist. It should be ensured the roofs remain sparsely vegetated with an exposed substrate, e.g. rubble or rocky terrain.

The black redstart nest boxes should be inspected annually to ensure they remain fit for purpose. Inspections should be made from the ground using binoculars outside of the bird nesting season (September – February); where unable to ascertain the condition of nesting boxes, a closer inspection should be undertaken using an appropriate access system (September – February).

Following the completion of a green roof, two black redstart surveys should be undertaken in accordance with the survey methodology outlined in Section 2.2.2, in addition, a roof level survey should be undertaken (following the below methodology). To make efficiencies by avoiding the duplication of survey effort, the data collected during the biennial black redstart surveys should be used for monitoring; this is only possible where a full breeding season has passed between completion of the green roof and the survey. The second survey should be carried out five years after the completion of the green roof.

The roof level survey should comprise a two-hour vantage point survey, with the aim of observing whether black redstart are utilising the green roof for foraging and/or nesting. The roof level survey should be completed following the ground-level survey or independently, depending on whether data from the biennial surveys are used for the ground-level element.

Remedial Management

As per the NEBS for Princes Dock, remedial management of any created green roof features would be dependent on the system chosen; management would likely be limited to re-establishing flora which has failed. If required, maintenance of the green roof would be undertaken by a suitably experienced contractor. Any nest boxes which are deemed to have failed should be replaced between September and February (inclusive).

6.4.2 Swallow Boxes

Routine Management

Once erected, swallow boxes should not require any routine management.

Monitoring

The condition of swallow nest boxes should be inspected from the ground using binoculars, approximately every five years.

Remedial Management

Any nest boxes which are deemed to have failed structurally, should be replaced between September and February, using an appropriate access system.

6.4.3 Bat Boxes

Routine Management

Once erected, bat boxes should not require any routine management.

Monitoring

Bat boxes should be monitored by a suitably licensed bat worker in years two, five and ten post-installation. The monitoring survey may be done from a Mobile Elevation Work Platform (MEWP) or similar, where possible, in order to inspect the boxes for signs of use. Where this is not possible activity surveys (dusk emergence/dawn re-entry) may be required to assess presence/likely absence of bats.

Remedial Management

If any bat boxes are recorded to have failed, or require maintenance/cleaning, this should be undertaken under the supervision of a licensed bat worker between November and February (inclusive).

6.4.4 Landscape Planting

Routine Management

A Landscape Management Plan (LMP) should be produced for each plot-specific reserved matters application and should cross-reference the plot-specific EBS. Routine management will likely comprise weeding, pruning and replanting as appropriate to the species mix and layout/design.

Monitoring

Landscape planting should be assessed annually during maintenance visits to determine the success/establishment of planting and whether it meets the original specification.

Remedial Management

The overall aim should be as set out in Section 5.3, to provide a scheme that is beneficial to bats and invertebrates. The initial requirement for remedial management should be determined by the Landscape Architect and set out in the LMP. This should be reviewed by the landscape contractor during their annual inspections. If significant remedial management is required, an ecologist should be consulted to ensure that proposed replacement is appropriate.

7 Summary

7.1 Pre-Construction/Construction Phase Surveys and Impact Assessment – Condition 16: Parts i, ii and vi

7.1.1 Birds

- Annual surveys for breeding little ringed plover, breeding black redstart, passage/wintering birds and foraging common tern should be undertaken in the year prior to construction and during the subsequent four years of development at the Central Dock Neighbourhood. Following the first five years of monitoring, the requirement for continued surveys should be reviewed.
- The results of the bird surveys should be used to produce updated impact assessments for each reserved matters application, to be submitted to the LPA through an Ecological and Biodiversity Statement.

7.1.2 Bats

- Where a reserved matters application proposes demolition of any existing structures, a bat roost suitability assessment should be undertaken.
- Structures confirmed as roosts during the preliminary bat roost assessment, or those assessed as having low, moderate or high bat roost suitability may require further activity surveys to determine the presence/likely absence of bats and characterise roosts.
- Any reserved matters applications which affect structures with potential to be used by roosting bats should include an impact assessment within the plot-specific EBS. If any significant construction or operational impacts are considered likely, then appropriate mitigation should be developed.

7.1.3 Aquatic Species

- Initial baseline characterisation surveys should be undertaken for phytoplankton, fish, benthic macro-invertebrates and benthic invertebrates.
- Annual surveys (spring and autumn) should be undertaken to monitor benthic invertebrates, plus surveys for algae, phytoplankton and zooplankton species.
- If the baseline survey indicates a low fish population is present, surveys should be undertaken to monitor improvements.
- If the surveys identify marine INNS, methodologies should be developed to avoid them being spread because of works within the docks.

7.1.4 Water Quality

- Initial baseline characterisation survey of the dock system is to be undertaken prior to the start of construction to include water quality

sampling, sediment quality sampling and bathymetric survey for sediment depth.
- Ongoing monitoring to be undertaken during construction to monitor the above parameters including biochemical oxygen demand, ammonia and nutrients.
- Appropriate water quality management plan to be developed and implemented by the Principal Contractor during development.

7.2 Mitigation Through Scheme Design – Condition 16: Parts v, vii, viii & x

7.2.1 Bird Strike Mitigation

- The design of tall buildings within the Central Docks Neighbourhood, particularly those with significant quantities of reflective glass, should incorporate measures to mitigate the risk of bird strike.
- Plot-specific details of measures to reduce bird strike should be included within the EBS for each reserved matters application.

7.2.2 Control of Gulls and Pigeons

- All buildings must incorporate measures to dissuade nesting and roosting of gulls and feral pigeons, appropriate to the design and function of the building.
- Each reserved matters application should include details of consideration with designed-in measures to be prioritised over additional measures such as spikes, wires or netting. This should be detailed within the plot-specific EBS.

7.2.3 Control of Leisure Boat Activity

- Any development which has potential to result in increased boat traffic should consider the impact of the increased boat traffic on features of designated sites.
- Bird populations at Central Docks should be monitored on an annual basis. The surveys should be used to develop a leisure boat activity mitigation strategy, where required.

7.2.4 Recreational Distrubance

- All reserved matters applications should include HRA information for all Natura 2000 sites which may be impacted by the proposed scheme, including through recreational disturbance.
- All developments should include a commitment to adhere to the objectives of relevant Visitor Management Strategies (VMS).
- Reserved matters applications which come forward prior to the adoption of the VMS should consider how recreational pressure will be assessed (and potentially mitigated for) for the development.

7.3 Construction Phase Mitigation – Condition 16: Part iii

7.3.1 Removal of Existing Buildings and Vegetation

- The removal of existing buildings, structures, hardstanding and ephemeral vegetation should be undertaken outside of the breeding bird season, where practicable.
- Where this is not practicable, a suitably qualified ECoW should conduct a check for nesting birds prior to commencement of works.

7.3.2 Construction Vehicles, Routes and Speed Limits

- Construction vehicle routing and speed limits should take account of nesting birds (advised by ECoW) and SPA birds.
- A speed limit should be implemented on vehicles travelling adjacent to West Waterloo Dock due to the potential for roosting redshank and oystercatcher.

7.3.3 Roost Sites of Wintering Birds and Passage

- Any development which has the potential to result in increased disturbance of water bird roosting sites should consider the impacts on features of all designated sites.
- Bird populations should be monitored on an annual basis; a scheme-wide mitigation strategy should be developed.
- For each development where piling is required, appropriate mitigation should be identified and implemented, where appropriate.
- Measures to reduce the impacts of noise disturbance during construction should be included within a CEMP.
- Visual disturbance mitigation should be installed for the developments around West Waterloo and Half Princes Dock.

7.4 Habitat Creation – Condition 16: Part iv

7.4.1 Black Redstart

- Buildings within Central Docks should consider the inclusion of a green roof designed for black redstart.
- Where green roofs are provided, black redstart nest boxes should also be included on the same building.
- Additional mitigation options for black redstart should also be considered to include brown walls and a mosaic of green/brown roofs and walls.

7.4.2 Peregrine

- Due to the potential for conflict between black redstart and peregrine, consideration may be required as to which plots will be most suitable for peregrine nest boxes.

7.4.3 Swallows and Swifts

- The inclusion of swallow and/or swift nest boxes should be considered on buildings, where appropriate. Where provided, a minimum of three boxes should be installed per building.

7.4.4 Replacement Roosting Habitat for Water Birds

- Due to the findings of more recent surveys which recorded 12 cormorant in Princes Half Tide Dock and the extension of Liverpool Bay SPA which now includes cormorant as a qualifying species, the requirement for mitigation may need to be revised within Central Docks.
- The specification for suitable water bird habitat should be based on the results of all surveys undertaken to date across Liverpool waters including standalone applications.
- The results of the surveys will be used alongside other data to produce a Liverpool Waters Strategic Ecological Mitigation Plan (SEMP). A cohesive approach across all neighbourhoods is required for this type of mitigation.

7.4.5 Bat Roosting Features

- A total of nine bat boxes are to be installed on buildings in proximity to Central Park. Two bat boxes should be installed on the southern-facing aspect of the building on Plot C-10.
- The additional bat boxes should be positioned on the buildings on Plots C-05-A, C-05-B, C-09-A, C-09-B, C-07 and/or C-11.
- The specific details of locations and types of boxes should be included within the plot-specific EBS to be provided as part of the reserved matters applications.

7.4.6 Landscape Planting

- Landscaping design should be detailed within the plot-specific reserved matters applications.
- Landscaping should include native species which attract invertebrates and therefore provide a foraging resource for bats. This includes native nectaring species; alternatively, suitable non-native species may be considered to augment native species planting.
- Tree planting in areas of public open space should aim to create potential green corridors through the neighbourhood for bats and breeding birds, whilst avoiding funnelling birds towards reflective glass surfaces.

- Habitats to be developed within individual plots should link to the wider neighbourhood which in turn should seek to link into the other neighbourhoods of Liverpool Waters.

7.5 Post-Construction Monitoring and Management – Condition 16: Part ix

7.5.1 Aquatic Monitoring

- The results of the construction phase monitoring should inform the monitoring programme required during the operational phase.

7.5.2 Bird Strike Mitigation

- Bird strike prevention measures should be integrated into buildings where possible, consequently this should form part of routine building maintenance.
- Bird strike monitoring should be carried out in the first year after construction by owners/occupants of any buildings over five storeys high. This should take the form of monitoring surveys and occupant reports.
- The monitoring strategy and data collected should be continually reviewed in consultation with the ecologist to determine whether any adjustments to the methodology or mitigation are required.

7.5.3 Control of Gulls and Pigeons

- Issues with gulls/pigeons should ideally be designed out without the need for additional control/dissuasion measures. However, if installed appropriately, little management should be required outside of routine building maintenance.
- Monitoring is proposed where control/dissuasion measures are installed: at least twice per year during the lifetime of the building.
- Any additional exclusion measures required as a result of the monitoring should be installed by a suitably qualified contractor.

7.5.4 Green/Brown Roofs and Black Redstart Boxes

- Where provided, green roofs should be inspected at least twice per year to determine whether they continue to meet their original specification.
- Black redstart nest boxes should be inspected annually between September and February (inclusive). Any nest boxes that have failed structurally should be replaced.
- Two black redstart surveys should be undertaken on the completion of the green roof. The surveys should comprise a ground level survey and a roof level survey.
- In order to maximise efficiencies by avoiding the duplication of survey effort, the data collected during the biennial black redstart surveys should

be used for monitoring. However this is only possible where a full breeding season has passed between completion of the green roof and the survey. The second survey should be carried out five years after the completion of the green roof.

7.5.5 Swallow and Swift Boxes

- Where provided, swallow and swift boxes should be inspected every five years.
- Any nest boxes that have failed structurally should be replaced between September and February.

7.5.6 Bat Boxes

- No routine management should be required.
- Bat boxes should be monitored by a suitably licensed bat worker in years two, five and ten post-installation.
- If any bat boxes are recorded to have failed, or require maintenance/cleaning, this should be undertaken under the supervision of a licensed bat worker between November and February.

7.5.7 Landscape Planting

- Landscape Management Plan (LMP) to be produced for each reserved matters application, cross-referencing to the plot-specific EBS.
- Landscape planting should be assessed annually during maintenance visits.
- If significant remedial management is required, an ecologist should be consulted to ensure that proposed replacement is appropriate.

This document provides guidance to be used in relation to ecology and biodiversity for all reserved matters applications within the Central Docks Neighbourhood. The document addresses all parts of Condition 16 and therefore should discharge this condition.

Appendix B: Approval correspondence

From:	Yeomans, Amanda <Amanda.Yeomans@naturalengland.org.uk>
Sent:	20 October 2019 12:37
To:	Gaskell-Burnup, Melissa
Cc:	Jones, Peter; Lara Russo; Gavin Spowage; Leigh, Angela
Subject:	IoM discharge of Conditions- NE final advice
Attachments:	294701 MMO IoM discharge of conditions 18102019.pdf; RE: Isle of Man Ferry Terminal (9/DIS1988).

Dear Melissa,

cc. Peter Jones for awareness- NE will provide you a separate letter for completeness.

Please see attached Natural England's final advice in respect to the AMP for the Isle of Man Ferry Terminal. We have advised one minor amendment to the trigger point for further investigation and this has been accepted by the consultants (email chain attached for info). We provide the advice attached on the basis that the amendment will be completed and a final version of the AMP circulated. Please let me know if I need to upload this onto MCMS, however I can only see a consultation for the VR and not the discharge of conditions now.

We welcome all the work and commitment shown by the consultants on the AMP and ensuring that appropriate measures are in place and look forward to seeing the outcome of the mitigation and monitoring.

Apologies for the time taken in providing you this final advice, this has been due to time out of the office over the past week. If you need anything further please don't hesitate to get in touch.

Kind regards, Amanda

Amanda Yeomans

Senior Specialist, Ports, Estuaries & Tidal Lagoons / Senior Adviser Cheshire to Lancashire Coast & Marine

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Please note my week is split between two roles with my usual working pattern as follows:

Monday to Wednesday *- Senior Specialist, Ports, Estuaries*

Thursday, Friday*- Senior Adviser Cheshire to Lancashire*

www.gov.uk/natural-england

We are here to secure a healthy natural environment for people to enjoy, where wildlife is protected and England's traditional landscapes are safeguarded for future generations.

In an effort to reduce Natural England's carbon footprint, I will, wherever possible, avoid travelling to meetings and attend via audio, video or web conferencing.

Date: 18 October 2019
Our ref: 294701
Your ref: MLA/2018/00536/1

Customer Services
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T 0300 060 3900

Melissa Gaskell-Burnup
Marine Management Organisation (MMO)

BY WESBITE ONLY

Dear Melissa,

Consultation: *Consultation 5*. Isle of Man Ferry Terminal - Discharge of Condition 5.2.10- *Revised documents*
Location: Princes Half Tide Dock, Liverpool Waters, Liverpool

Thank you for your consultation on the discharge of condition 5.2.10 under Marine Licence reference L/2019/00239/2 for the development of the Isle of Man Ferry Terminal. The advice contained within this letter refers to the updated Adaptive Management Plan (AMP) (version 5 dated October 2019). Natural England received this document via email direct from Waterman Infrastructure & Environment Limited on 10 October 2019.

Natural England previously provided advice to the MMO and additional comments direct to Waterman Infrastructure & Environment Limited ('Watermans') to assist with the production of a revised version of the AMP. The updated version of the AMP has taken into consideration Natural England's most recent comments and advice dated 7 October 2019 (provided to MMO and LPA via email on 10 October 2019).

We would firstly like to welcome and acknowledge the additional work and time commitment that the applicants have undertaken to update the AMP in ensuring that appropriate detail has been provided.

In our opinion the document clearly demonstrates a commitment to undertake monitoring for the mitigation measures through the first year of the development, in the absence of an agreed wider strategic mitigation plan. Further review and monitoring will then be picked up through a future agreed strategic approach as part of the Liverpool Waters Strategic Ecological Management Plan. Natural England will provide further advice to the Local Planning Authority (LPA) and the landowners on the SEMP in due course.

The AMP provides set trigger points at which an action will be required. These resulting actions are presented so that there is a clear mechanism for further investigation and potential re-design/movement considerations. Natural England further advise that for simplicity the trigger point for initial action of further investigation should be if no cormorants are using the pontoon in any one month, this is a simple measure that can be quickly identified. We have provided this comment directly to Watermans via email on 18 October and received confirmation that this approach would be adopted. Therefore, the advice within this letter is based on a further amendment to section 2.8 being completed and a final version of the AMP circulated to the regulators (and Natural England).

We appreciate that the purpose of the AMP is to set out adaptive measures and therefore will rely on the outcome of the monitoring undertaken to determine the particular actions required and this is recognised within the document. We advise that if a trigger point is encountered during the monitoring, that the relevant authorities are notified (i.e. MMO/LPA) and Natural England can offer further advice.

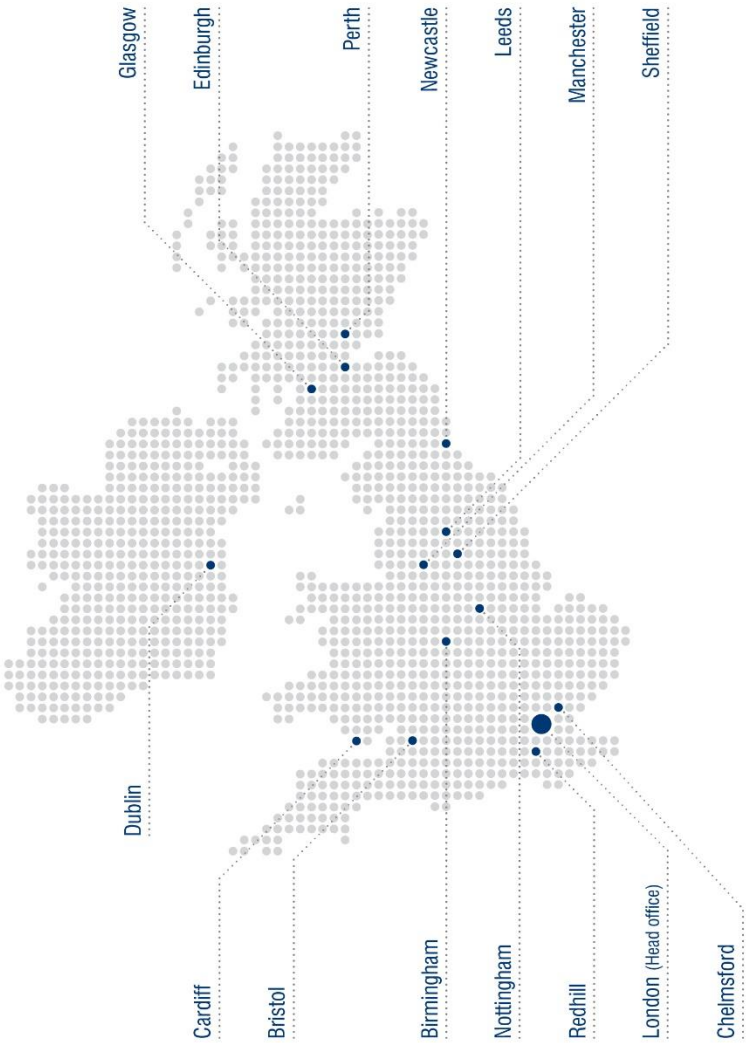
Overall the document provides a clear framework for monitoring the mitigation measures implemented at the Isle of Man Ferry development, in our opinion the document provides the level of detail required at this time, therefore we are content should the MMO discharge condition 5.2.10 on the Marine Licence.

If you have any queries relating to the advice in this letter please contact me on the details below.

Yours sincerely

Amanda Yeomans
Senior Specialist / Senior Adviser Coast and Marine
Cheshire to Lancashire Area Team
Amanda.Yeomans@naturalengland.org.uk

UK and Ireland Office Locations



F. Liverpool Waters Strategic Ecological Mitigation Plan (SEMP) – Interim; Arup, July 2019

Technical Note

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Project title	Liverpool Waters	Job number	266384-00
cc	Philip Jones Ian Ford Paul Grover	File reference	0-15-08
Prepared by	Amy Martin Joseph Shepherdson	Date	5 July 2019
Subject	Liverpool Waters Strategic Ecological Mitigation Plan – DRAFT Interim Note V3		

1 Introduction

Ove Arup & Partners Ltd. (Arup) were commissioned by Peel Land & Property (Ports) Ltd. in May 2019 to produce a Strategic Ecological Mitigation Plan for Liverpool Waters (LW). The LW scheme, which secured outline consent (10O/2424) on 19 June 2013, covers an area of 60 hectares of former dockland located along Liverpool's Waterfront.

In their response to standalone applications and the first reserved matters application under the Liverpool Waters outline consent (18RM/1554), Merseyside Environmental Advisory Service (MEAS) and Natural England (NE) have requested that an overarching strategic mitigation plan should be developed to cover all the neighbourhoods within LW. Arup arranged a meeting 23 April 2019 with NE, MEAS, Peel and Liverpool City Council (LCC) to agree a proportional and beneficial approach for producing a strategic mitigation plan for Liverpool Waters.

The aim of this interim note is to provide outline summary details of the strategic mitigation that, following consultation and further surveys for breeding birds and common tern (to be completed in August 2019), will be further detailed within the Liverpool Waters Strategic Ecological Mitigation Plan (LW SEMP). The LW SEMP is an opportunity to provide clear direction to developments coming forward to ease the planning process for future applications. The LW SEMP will be based on survey data collected across Liverpool Waters and will take the form of a comprehensive written document with associated drawings. It will include:

- *Visual and noise disturbance mitigation measures for SPA birds during remediation, construction and operation.*
- *Replacement roosting habitat (temporary and permanent) for SPA birds, particularly cormorant.*
- *Mitigation for potential recreational disturbance at European sites.*
- *Monitoring Requirements and Adaptive Management Plan.*

The SEMP provides an opportunity for each application to demonstrate how they comply giving more certainty in gaining permissions for their proposals. This will also ensure developments are HRA compliant and working towards a holistic approach within the overarching Liverpool Waters scheme

2 Natura 2000 Sites

The LW scheme is located in proximity to a number of designated and Natura 2000 sites:

- Liverpool Bay SPA;
- The Mersey Narrows and North Wirral Foreshore SPA/Ramsar;
- Mersey Estuary SPA/Ramsar;
- Ribble & Alt Estuaries SPA/Ramsar;
- Sefton Coast Special Area of Conservation (SAC);
- The Dee Estuary Ramsar;
- Dee Estuary SPA;
- Dee Estuary SAC; and
- Martin Mere SPA and Ramsar.

The SPA and Ramsar sites are designated for their wintering, passage and breeding waterbird assemblages. The SACs are designated for coastal/estuarine habitats including mudflats, dunes, and saltmarsh. Further detail on the designations is provided as Appendix A of this interim note.

3 Ornithology

It was identified during production of the EIA for the LW outline consent (10O/2424) that the docks and waterfront areas within the LW site may provide supporting functional habitat (feeding and roosting) for birds from the above internationally important sites. Ornithological surveys were therefore undertaken and have been supplemented by further surveys as part of the discharge of conditions for the LW outline consent, and for standalone applications within the LW scheme. Surveys which have been undertaken to date include:

- WYG (2009) – Breeding and Wintering Bird Surveys undertaken for Liverpool Waters Outline Application Environmental Statement.
- TEP (2015). Assessment of Supporting Habitat (Docks) for Use by Qualifying Features of Natura 2000 Sites in the Liverpool City Region.
- AECOM (2018). Isle of Man Ferry Terminal Wintering Bird Surveys.
- APEM (2018). Liverpool Cruise Terminal Wintering Bird Surveys.
- AMEY (2018). LCCC P2 – Northern Link Road Wintering Bird Survey Report.
- APEM (2018). LCCC P2 – Northern Link Road Breeding Bird Survey Report.
- Arup (2019). Liverpool Waters Passage and Wintering Bird Surveys.

In addition, surveys are currently underway in 2019 for breeding birds and foraging common tern across the LW site.

During the surveys undertaken to date, several species which are either qualifying species of the SPA/Ramsar sites or component species of the overall assemblage, have been recorded utilising habitats within the LW site. During the 2018/2019 surveys undertaken by Arup, eight species recorded on site were listed as qualifying species on the citation of nearby statutory designated sites; redshank *Tringa totanus*, oystercatcher *Haematopus ostralegus*, red-breasted merganser *Mergus serrator*, turnstone *Arenaria interpres,* cormorant *Phalacrocorax carbo*, shelduck *Tadorna tadorna*, ringed plover *Charadrius hiaticula*, and lesser black-backed gull *Larus fuscus*.

Significant numbers of the Liverpool Bay SPA population of cormorant have been recorded during the surveys. In 2018/2019 the peak count of cormorant was 33 which represents 4.5% of the SPA population (732 individuals). In addition, two red breasted merganser were recorded which represents approximately 1.5% of the Liverpool Bay SPA population (132 individuals).

Fifty-six shelduck were recorded at low water in March 2019, this represents >1% of the Mersey Estuary SPA and Ribble & Alt Estuaries SPA populations.

Potentially significant numbers of ringed plover were recorded on site over winter 2018/2019. Ringed plover is listed (on passage) on the Mersey Estuary SPA and Ribble & Alt Estuaries SPA. However, ringed plover has also been recorded breeding within the Central Docks area in 2019 along with lapwing which are listed on the assemblage of Mersey Estuary SPA.[1]

Lesser black-backed gull (breeding) is listed as a qualifying species on Ribble & Alt Estuaries SPA and have been recorded breeding within the site; however further survey results are required from the 2019 breeding bird surveys to determine if this constitutes a significant number of the SPA population.

To date, during the 2019 surveys, foraging common tern *Sterna hirundo*, (listed during breeding season on Mersey Narrows & North Wirral Foreshore SPA/Ramsar and Dee Estuary SPA/Ramsar) have been recorded out in the River Mersey but not utilising habitats in proximity to the Liverpool Waters site.

3.1 Potential Impacts

Due to the presence of significant numbers of SPA bird species at Liverpool Waters, there is the potential for negative impacts through the development of the scheme. These impacts would be generated through visual and noise/vibration disturbance which may cause displacement of individuals. There will also be a loss of habitat for roosting and breeding birds through demolition/removal of existing structures and loss of brownfield habitat.

3.2 Strategic Mitigation

3.2.1 Construction Related Disturbance

A Construction Environmental Management Plan (CEMP) will be required for each development within Liverpool Waters. As a minimum this will include:

[1] Email Communication from RSK/ADAS who are currently undertaking breeding bird surveys at Liverpool Waters (June 2019).

- Dust management plan detailing the measures to mitigate the indirect impacts of dust created during site preparation and construction.
- Measures to reduce visual and noise impacts including installation of hoarding prior to construction. This will include all areas located adjacent to sensitive ecological areas: the River Mersey and the open dock waters, e.g. Princes Dock, West Waterloo Dock, Princes Half Tide Dock, East Waterloo Dock, Salisbury Dock, Nelson Dock, Trafalgar Dock, Collingwood Dock and Bramley Moore Dock. Works adjacent to Leeds Liverpool Canal will also incorporate the use of hoarding. Screening should only be placed at ground level, this will block sight lines to the busiest area of the construction sites (i.e. where most operative and vehicle movements are likely to be concentrated). The developments will also be screened to prevent windblown litter entering the docks.
- Vehicle routing and speed limits.
- Construction activities will be limited to the daytime with no night working to reduce the use of lighting. Any task lighting required during this time will be directed away from the River Mersey, dock waters and canal, and will be switched off overnight if possible.
- Lighting plan detailing any areas which may be impacted and measures proposed to mitigate.
- Surface water run-off and potential siltation and/or pollution of the adjacent drainage system during site preparation and extraction will be mitigated by the implementation of best practice pollution prevention measures.

Any developments that require piling will require additional mitigation measures to be included within the CEMP to reduce the effect of noise disturbance on birds. These will include the following:

- Adherence to the guidelines set out in The Code of Practice for Noise and Vibration Control on Construction and Open Sites, 2009 and subsequent updates.
- The use of rotary piling methods.
- Selection of quietest working equipment available.
- Positioning equipment behind physical carriers, i.e. temporary hoarding.
- Provision of lined and sealed acoustic covers for noisy equipment.
- Directing noise emissions away from plant, including exhausts or engines away from sensitive locations.
- Ensuring that regularly maintained and appropriately silenced equipment is used.
- Maintaining a no idling policy.

Due to the presence of breeding species on site, including ringed plover, lapwing and lesser black-backed gull, any intrusive works including site/vegetation, ground works or demolition will be undertaken outside of the bird nesting season (March-August), where possible. Where this is not possible, a suitably qualified Ecological Clerk of Works (ECoW) will undertake a nesting bird check prior to the commencement of works on site. Should an active nest be identified, the ECoW will advise on a suitable species-specific working method and exclusion zone to limit disturbance and avoid damaging nests. The recommended working method may vary depending on the species and the nature of planned works.

3.2.2 Replacement Habitat

3.2.2.1 Floating Pontoons

To compensate for the loss of roosting habitat for non-breeding species including cormorant, several permanent pontoons will be established in the following docks (Drawing 3.1):

- Sailsbury Dock – four pontoons.
- Nelson Dock – two pontoons.
- Collingwood Dock – two pontoons.
- Princes Half Tide Dock – four pontoons.

The pontoon structures will be designed by an engineer in consultation with an ecologist. Positioning rafts in clusters will enable a greater number of birds to roost in one area communally. They will include a deep gravel cover, kick boards, cormorant perches, internal compartmentalisations and chick refuges. The design of the pontoons will be based on RSPB guidance on Design and Management of Rafts (Appendix B). Pontoons will be attached to the dock floor or positioned using anchors. The latter approach will allow the pontoons to be re-located should this be required. The pontoons will be positioned to allow for minimal disturbance through construction and leisure boat traffic. Measures to limit boat activity may be required in certain locations including restricting traffic in certain seasons or to certain times of the day or year. Additionally, the implementation of a lane or one-way system may be required to help control traffic.

The pontoons are considered suitable to provide roosting habitat for cormorant in the non-breeding season. Gulls, red breasted merganser and oystercatcher will use a wide range of roosts and the pontoons also provide suitable habitat for these species. In the breeding season the pontoons will provide suitable nesting habitat for a variety of species such as lesser black-backed gull, ringed plover, lapwing shelduck and red-breasted merganser.

Prior to the installation of the permanent pontoons, three temporary pontoons have been installed within West Waterloo Dock to provide mitigation for developments in the interim (Drawing 3.1). Once the permanent pontoons are installed within Princes Half Tide Dock, consideration will be given as to whether the temporary pontoons may be relocated to provide permanent mitigation in another dock.

3.2.2.2 Roosting Posts

In addition to the pontoons four permanent posts will be installed in Trafalgar Dock (Drawing 3.1).

The design/installation of posts will be determined by the engineer in consultation with the ecologist.

The pontoons and posts will be installed within the docks a minimum of two weeks prior to construction within proximity to the dock.

It is the aim that on completion of the development, cormorant and other species will use the roof structures of new developments as roosting sites in addition to the permanent artificial roosts.

3.2.2.3 Brown Roofs

Brown roofs will be installed on buildings across Liverpool Waters to further compensate for the loss of brownfield habitat suitable for use by breeding species included on the assemblages of the Natura 2000 sites such as lapwing, ringed plover, turnstone, oystercatcher and redshank. Brown roofs have been incorporated within the Neighbourhood Ecological and Biodiversity Strategies (NEBS) for Princes Dock[2] and Central Docks[3] with the aim of replacing brownfield habitat for black redstart *Phoenicurus ochruros*. It is anticipated that this design will also provide suitable habitat with minimal human disturbance for other breeding species.

The brown roofs will consist of very sparsely vegetated rubble or rocky terrain incorporating hibernacula for invertebrates and still or slow-moving water (where possible). An ornithologist will be involved in the design process to ensure specific ecological requirements for target species are met through the design process.

It is considered that brown roofs are suitable on plots with maximum building heights up to 45m. Across each neighbourhood, this includes the approximate plot areas below:

- Northern Docks: approximately 32,470m^2.
- Clarence Dock: approximately 9,960m^2.
- Central Dock: approximately 32,090m^2.
- Princes Dock and King Edward Triangle: approximately 25,800m^2.

Based on the area of suitable plots available for installation of brown roofs, the minimum area of brown roof that will be included within each neighbourhood is below:

- Northern Docks: 1600m^2
- Clarence Dock: 500m^2
- Central Dock: 1600m^2
- Princes Dock and King Edward Triangle: 1300m^2

4 Recreational Disturbance

Recreational disturbance to internationally protected coastal sites is an issue across the Liverpool City Region. This pressure is a particular issue through in-combination effects, for example additional housing may result in additional recreational visits, and therefore increase disturbance at the coastal designated sites. Residential development is proposed across the Liverpool Waters site and therefore strategic mitigation is required to reduce the potential for impacts on Natura 2000 sites.

Recreational pressure, including vehicular access and dog-fouling, is recognised in the formal statutory European Site Conservation Advice Packages for Sefton Coast SAC (Natural England, 2019[4]) which can be assessed as a Medium-High risk to qualifying features of the European site. Recreational pressure is also highlighted in the draft Liverpool Local Plans HRA as a Likely

[2] WYG (2018). Princes Dock Condition 16 Neighbourhood Ecological and Biodiversity Strategy.
[3] Arup (2019). Central Docks Neighbourhood Ecological and Biodiversity Strategy.
[4] Natural England (2019). *European Site Conservation Objectives: Draft Supplementary advice on conserving and restoring site features. Sefton Coast Special Area of Conservation (SAC) Site Code: UK0013076.* York: Natural England.

Significant Effect (LSE) (AECOM, 2017).[5] Public access/disturbance is confirmed as an issue in the Site Improvement Plans for Ribble and Alt Estuaries SPA, Sefton Coast SAC and Mersey Narrows and North Wirral Foreshore SPA.

All reserved matters applications within LW will include consideration of recreational pressure within HRA for Sefton Coast SAC, Ribble and Alt Estuaries SPA, Mersey Narrows and North Wirral Foreshore SPA.

The Liverpool City Region (LCR) has commissioned a wider strategic approach to visitor and recreation pressure management; this is to be referred to as the 'Liverpool City Region European Sites Recreational Mitigation and Avoidance Strategy'. This work may help inform the delivery of visitor and recreation mitigation to protect European Sites within the City Region. This work is currently ongoing and no firm proposals have been proposed or agreed.

Prior to the adoption of the LCR Mitigation and Avoidance Strategy the LW SEMP will consider how recreational pressure will be assessed (and potentially mitigated for) as a result of the increase in residential properties across the whole LW development. Mitigation/preventative measures capable of being incorporated into the proposals and/or scheme design that will avoid and/or mitigate recreational pressures on the European sites and any functionally linked habitat will be set out in detail within the LW SEMP.

Examples of mitigation/preventative measures that may be included:

i. Design and management of additional public open space outside the proposed development boundary to encourage use away from the European sites.

ii. Restrictions on the number of apartments allowed to keep dogs.

iii. Provision of information in sales packs, informing residents of the presence and importance of the European sites, and how they can help protect them including an outline 'responsible user code.'

iv. Contributions to develop a visitor/householder 'responsible coast user code' including encouragement of visits to non-sensitive locations.

v. Contributions to improving and/or managing access to and/or within the internationally important nature sites including financial contributions.

vi. Contributions to increase recreation management including location-specific interventions e.g. wardening, signage, path management and habitat management, including financial contributions.

vii. Contributions to non-sensitive locations in order improve sites to provide greater visitor enjoyment in order to reduce visits to European sites.

5 Adaptive Management Plan

Annual monitoring of wintering birds, breeding birds, aquatic species and water quality will be undertaken in line with the NEBS for each neighbourhood. Monitoring of all mitigation will also be implemented and may be undertaken at the same time as other ornithological surveys.

[5] AECOM (2017). *Liverpool Local Plan Habitats Regulations Assessment*. Liverpool: AECOM.

Technical Note

266384-00 5 July 2019

The floating pontoon design included in Appendix B is expected to have a minimum estimated life of at least 12 years with minimal maintenance. As per RSPB guidance, yearly maintenance of the floating pontoons will be carried out. Resurfacing of the floating islands will be necessary if they are to remain attractive for birds ever year. It will also be vital to remove the excess of droppings which can build up over the course of the year.

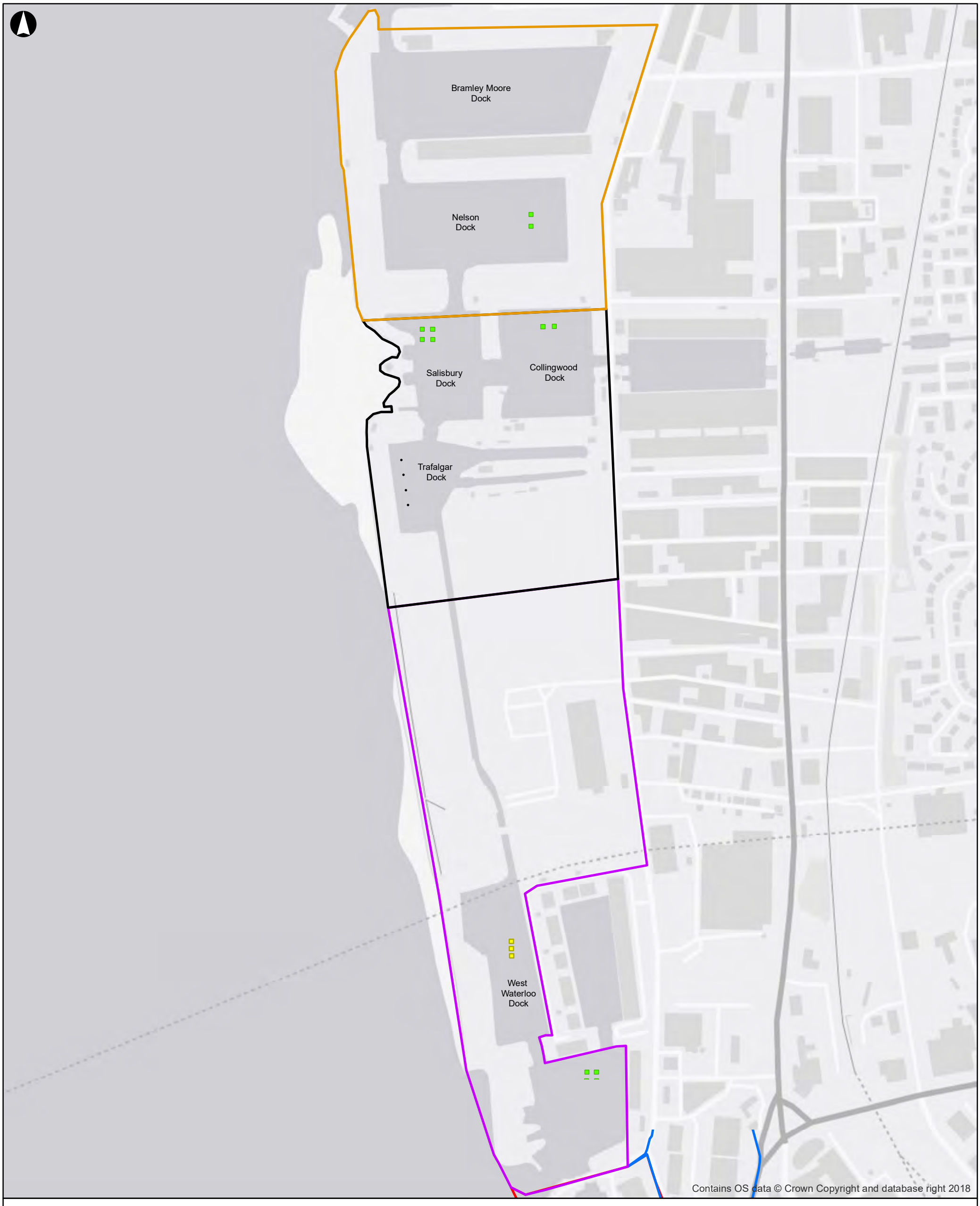
Where pontoons or posts are deemed to have failed or require additional maintenance, repair or replacement will be carried out preferably during late winter or early spring before birds start to nest and wintering bird activity is low. Where deemed necessary through monitoring, additional mitigation may be installed, or locations may need to be changed to maximise the effectiveness. Further adaptive measures may also be required to minimise disturbance, for example through boat traffic.

Further details on all mitigation, monitoring and adaptive management will be included within the LW SEMP, following consultation and agreement with relevant parties and completion of the 2019 breeding bird/foraging common tern surveys.

DOCUMENT CHECKING

	Prepared by	Checked by	Approved by
Name	Amy Martin	Rory Canavan	Rory Canavan
Signature			

A3



Legend

- Cormorant Posts
- Temporary Pontoon
- Permanent Pontoon
- King Edward Triangle
- Princes Dock
- Northern Docks
- Clarence Docks
- Central Dock

Issue	Date	By	Chkd	Appd
P2	04-07-19	JS	AM	RC

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Client
Peel Land & Property (Ports) Ltd

Job Title
Liverpool Waters

Metres
0 60 120 240

Drawing 3.1
Liverpool Waters Strategic Ecological Mitigation Plan

Scale at A3
1:5,000

Job No	Drawing Status
266384-00	Issue

Drawing No	Issue
3.1	P1

MXD Location

Appendix A

Designated Site Information

Site	Approx. distance Liverpool Waters	Principle citations/designations
Liverpool Bay SPA	Adjacent to the west	Encompasses marine areas supporting large aggregations of wintering red-throated diver *Gavia stellata* and common scoter *Melanitta nigra* as well as important marine foraging areas of little tern *Sterna albifrons* breeding within the Dee Estuary SPA, and foraging areas of common tern *Sterna hirundo* breeding at the Mersey Narrows & North Wirral Foreshore SPA. Qualifying features: - Red-throated diver in non-breeding season. Annex 1 species – 6.89% of GB population. - Little gull *Hydrocoloeus minutus* in non-breeding season. Annex 1 species. - Common scoter in non-breeding season. Regularly occurring migratory species – 10.31% of NW European population. - Waterbird assemblage. - Little tern in breeding season. Annex 1 species – 6.84% of GB population. - Common tern breeding season. Annex 1 species – 1.80% of GB population.
Mersey Narrows & North Wirral Foreshore SPA	1km west	The Mersey Narrows and North Wirral Foreshore comprises intertidal habitats at Egremont foreshore, man-made lagoons at Seaforth Nature Reserve and extensive intertidal flats at North Wirral Foreshore. Egremont is most important as a feeding habitat for waders at low tide whilst Seaforth is primarily a high-tide roost site, as well as a nesting site for terns. The most notable feature of the site is the exceptionally high density of wintering turnstone *Arenaria interpres*. This site qualifies under **Article 4.2** of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species: redshank *Tringa totanus* and turnstone. The site also qualifies under **Article 4.2** of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl.
Mersey Narrows & North Wirral Foreshore Ramsar	1km west	The site comprises intertidal habitats at Egremont foreshore on the south bank of the Mersey, man-made saline and freshwater lagoons at Seaforth on the north bank and the extensive intertidal flats at North Wirral Foreshore. Egremont is most important as a feeding habitat for waders at low tide whilst Seaforth is primarily a high tide roost site. The two areas are separated by approximately 2km and have a constant exchange of bird populations. North Wirral Foreshore supports large numbers of feeding waders at low tide and also includes important high tide roost sites. It is an area of intertidal sands and mudflats with embryonic saltmarsh. The site qualifies under Criterion 4 because it regularly supports important numbers of non-breeding little gull and common tern. The site qualifies under Criterion 5 because it regularly supports 20,000 or more waterbirds including cormorant *Phalacrocorax carbo*, oystercatcher *Haematopus ostralegus*, grey plover *Pluvialis squatarola*, sanderling *Calidris alba*, dunlin *Calidris alpina*, and redshank. The site qualifies under Criterion 6 because it regularly supports 2.4% of the *islandica* subspecies W Europe/Waddensea/Britain/Ireland (non-breeding) population of knot *Calidris canutus* and 2.7% of the *lapponica* subspecies W Europe/NW Africa (non-breeding) population of bar-tailed godwit *Limosa lapponica*.

Site	Approx. distance Liverpool Waters	Principle citations/designations
Dee Estuary SAC	2.7km north west	Annex I habitats that are a primary reason for selection of this site: • Mudflats and sandflats not covered by seawater at low tide • Salicornia and other annuals colonizing mud and sand • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: • Estuaries • Annual vegetation of drift lines • Vegetated sea cliffs of the Atlantic and Baltic coasts • Embryonic shifting dunes • Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes") • Fixed coastal dunes with herbaceous vegetation ("grey dunes") *Priority feature • Humid dune slacks Annex II species present as a qualifying feature, but not a primary reason for site selection: • Sea lamprey • River lamprey Petalwort
Mersey Estuary SPA	3.5km south west	This site qualifies under **Article 4.1** of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive: **Over winter;** Golden Plover *Pluvialis apricaria*, 3,070 individuals representing at least 1.2% of the wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6) This site also qualifies under **Article 4.2** of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species: **On passage;** Redshank, 3,516 individuals representing at least 2.0% of the Eastern Atlantic - wintering population (5 year peak mean, 1987-1991) Ringed Plover *Charadrius hiaticula*, 1,453 individuals representing at least 2.9% of the Europe/Northern Africa - wintering population (Count, as at 1989) **Over winter;** Dunlin, 44,300 individuals representing at least 3.2% of the wintering Northern Siberia/Europe/Western Africa population (5 year peak mean 1991/2 - 1995/6) Pintail *Anas acuta*, 2,744 individuals representing at least 4.6% of the wintering Northwestern Europe population (5 year peak mean 1991/2 - 1995/6) Redshank, 4,689 individuals representing at least 3.1% of the wintering Eastern Atlantic - wintering population (5 year peak mean 1991/2 - 1995/6)

Site	Approx. distance Liverpool Waters	Principle citations/designations
		Shelduck *Tadorna tadorna*, 5,039 individuals representing at least 1.7% of the wintering Northwestern Europe population (5 year peak mean 1991/2 - 1995/6) Teal *Anas crecca*, 11,667 individuals representing at least 2.9% of the wintering Northwestern Europe population (5 year peak mean 1991/2 - 1995/6) **Assemblage qualification: A wetland of international importance.** The area qualifies under **Article 4.2** of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl. Over winter, the area regularly supports 99,467 individual waterfowl (5 year peak mean 1991/2 - 1995/6) including: curlew *Numenius arquata*, black-tailed godwit *Limosa limosa islandica*, lapwing *Vanellus vanellus*, grey plover, wigeon *Anas penelope*, great crested grebe *Podiceps cristatus*, redshank, dunlin, pintail, teal, shelduck, golden plover.
Mersey Estuary Ramsar	3.5km south west	The area qualifies under Criterion 5 because it regularly supports an assemblage of international importance with peak counts in winter of 89576 waterfowl (5 year peak mean 1998/99-2002/2003). The area qualifies under Criterion 6 (species/populations occurring at levels of international importance). Qualifying species/populations Species with peak counts in spring/autumn: • Common shelduck – 12676 individuals, representing an average of 4.2% of the population (5 year peak mean 1998/99-2002/3) • Black-tailed godwit – 2011 individuals, representing an average of 5.7% of the population (5 year peak mean 1998/99-2002/3) • Common redshank – 6651 individuals, representing an average of 2.6% of the population (5 year peak mean 1998/99-2002/3) Species with peak counts in winter: • Eurasian teal – 10613 individuals, representing an average of 2.6% of the population (5 year peak mean 1998/99-2002/3) • Northern pintail - 565 individuals, representing an average of 2% of the GB population (5 year peak mean 1998/99-2002/3) • Dunlin – 48364 individuals, representing an average of 3.6% of the population (5 year peak mean 1998/99-2002/3)
Ribble & Alt Estuaries SPA	4.5km north	This site qualifies under **Article 4.1** of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive: **During the breeding season;** Common tern, 182 pairs representing at least 1.5% of the breeding population in Great Britain (Count, as at 1996) Ruff *Philomachus pugnax*, 1 pairs representing at least 9.1% of the breeding population in Great Britain (Count as at late 1980's) **Over winter;** Bar-tailed godwit, 18,958 individuals representing at least 35.8% of the wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6)

Site	Approx. distance Liverpool Waters	Principle citations/designations
		Bewick's Swan *Cygnus columbianus bewickii*, 229 individuals representing at least 3.3% of the wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6) Golden plover, 4,277 individuals representing at least 1.7% of the wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6) Whooper Swan *Cygnus cygnus,* 159 individuals representing at least 2.9% of the wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6) This site also qualifies under **Article 4.2** of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species: **During the breeding season;** Lesser black-backed gull *Larus fuscus*, 1,800 pairs representing at least 1.5% of the breeding Western Europe/Mediterranean/Western Africa population (Count, as at 1993) **On passage;** Ringed plover, 995 individuals representing at least 2.0% of the Europe/Northern Africa - wintering population (5 year peak mean 1991/2 - 1995/6) Sanderling, 6,172 individuals representing at least 6.2% of the Eastern Atlantic/Western & Southern Africa - wintering population (3 year mean May 1993 - 1995) **Over winter;** • Black-tailed godwit, 819 individuals representing at least 1.2% of the wintering Iceland - breeding population (5 year peak mean 1991/2 - 1995/6) • Dunlin, 39,952 individuals representing at least 2.9% of the wintering Northern Siberia/Europe/Western Africa population (5 year peak mean 1991/2 - 1995/6) • Grey plover, 6,073 individuals representing at least 4.0% of the wintering Eastern Atlantic - wintering population (5 year peak mean 1991/2 - 1995/6) • Knot, 57,865 individuals representing at least 16.5% of the wintering North eastern Canada/Greenland/Iceland/North western Europe population (5 year peak mean 1991/2 - 1995/6) • Oystercatcher, 16,159 individuals representing at least 1.8% of the wintering Europe & Northern/Western Africa population (5 year peak mean 1991/2 - 1995/6) • Pink-footed goose *Anser brachyrhynchus*, 23,860 individuals representing at least 10.6% of the wintering Eastern Greenland/Iceland/UK population (5 year peak mean 1991/2 - 1995/6) • Pintail, 3,333 individuals representing at least 5.6% of the wintering North western Europe population (5 year peak mean 1991/2 - 1995/6) • Redshank, 2,708 individuals representing at least 1.8% of the wintering Eastern Atlantic - wintering population (5 year peak mean 1991/2 - 1995/6)

Site	Approx. distance Liverpool Waters	Principle citations/designations
		• Sanderling, 2,859 individuals representing at least 2.9% of the wintering Eastern Atlantic/Western & Southern Africa - wintering population (5 year peak mean 1991/2 - 1995/6) • Shelduck, 4,103 individuals representing at least 1.4% of the wintering North western Europe population (5 year peak mean 1991/2 - 1995/6) • Teal, 7,641 individuals representing at least 1.9% of the wintering North western Europe population (5 year peak mean 1991/2 - 1995/6) • Wigeon, 84,699 individuals representing at least 6.8% of the wintering Western Siberia/North western/North eastern Europe population (5 year peak mean 1991/2 - 1995/6) **Assemblage qualification: A seabird assemblage of international importance** The area qualifies under **Article 4.2** of the Directive (79/409/EEC) by regularly supporting at least 20,000 seabirds. During the breeding season, the area regularly supports 29,236 individual seabirds including: black-headed gull *Larus ridibundus*, lesser black-backed gull, common tern. **Assemblage qualification: A wetland of international importance.** The area qualifies under **Article 4.2** of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl. Over winter, the area regularly supports 301,449 individual waterfowl (5 year peak mean 1991/2 - 1995/6) including: grey plover, whooper swan, golden plover, bar-tailed godwit, pink-footed goose, shelduck, wigeon, teal, Bewick's swan, oystercatcher, curlew, knot, sanderling dunlin, black-tailed godwit, redshank, cormorant, common scoter, lapwing, pintail.
Ribble & Alt Estuaries Ramsar	4.5km north	A large area including two estuaries which form part of the chain of west coast sites which fringe the Irish Sea. The site is formed by extensive sand and mudflats backed, in the north, by the saltmarsh of the Ribble Estuary and, to the south, the sand dunes of the Sefton Coast. The tidal flats and saltmarsh support internationally important populations of waterfowl in winter and the sand dunes support vegetation communities and amphibian populations of international importance. The site qualifies under **Criterion 2** supporting up to 40% of the Great Britain population of natterjack toad *Bufo calamita*. The site qualifies under **Criterion 5** because it regularly supports an assemblage of international importance with peak counts in winter of 222038 waterfowl (5 year peak mean 1998/99-2002/3). The site qualifies under **Criterion 6** (species/populations occurring at levels of international importance). <u>Qualifying species/populations</u> Species regularly supported during the breeding season: • Lesser black-backed gull - 4108 apparently occupied nests, representing an average of 2.7% of the breeding population. Species with peak counts in spring/autumn (5 year peak means 1998/9-2002/3)

Site	Approx. distance Liverpool Waters	Principle citations/designations
		• Ringed plover - 3761 individuals, representing an average of 5.1% of the population • Grey plover - 11021 individuals, representing an average of 4.4% of the population • Red knot - 42692 individuals, representing an average of 9.4% of the population • Sanderling - 7401 individuals, representing an average of 6% of the population • Dunlin - 38196 individuals, representing an average of 2.8% of the population • Black-tailed godwit - 3323 individuals, representing an average of 9.4% of the population • Common redshank - 4465 individuals, representing an average of 1.7% of the population • Lesser black-backed gull - 1747 individuals, representing an average of 2.8% of the GB population Species with peak counts in winter: • Bewick's swan - 2944 individuals, representing an average of 3.7% of the GB population • Whooper swan - 211 individuals, representing an average of 1% of the population • Pink-footed goose - 6552 individuals, representing an average of 2.7% of the population • Common shelduck - 2944 individuals, representing an average of 3.7% of the GB population • Eurasian wigeon - 69841 individuals, representing an average of 4.6% of the population • Eurasian teal - 5107 individuals, representing an average of 1.2% of the population • Northern pintail - 1497 individuals, representing an average of 2.4% of the population • Eurasian oystercatcher -18926 individuals, representing an average of 1.8% of the population • Bar-tailed godwit - 13935 individuals, representing an average of 11.6% of the population
Sefton Coast SAC	5.0km north	**Annex I habitats** that are a primary reason for selection of this site: Embryonic shifting dunes • Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes") • Fixed coastal dunes with herbaceous vegetation ("grey dunes") *Priority feature • Dunes with *Salix repens* ssp. *argentea* (Salicion arenariae) • Humid dune slacks **Annex I habitats** present as a qualifying feature, but not a primary reason for selection of this site: • Atlantic decalcified fixed dunes (Calluno-Ulicetea) *Priority feature

Site	Approx. distance Liverpool Waters	Principle citations/designations
		Annex II species that are a primary reason for selection of this site: • Petalwort **Annex II species** present as a qualifying feature, but not a primary reason for site selection: • Great crested newt *Triturus cristatus*
Dee Estuary SPA	13km west	Large funnel-shaped, sheltered estuary between England and Wales that supports extensive areas of intertidal sand-flats, mud-flats and saltmarsh. Where agricultural land-claim has not occurred, the saltmarshes grade into transitional brackish and swamp vegetation on the upper shore. The site is of major importance for waterbirds. This site qualifies under **Article 4.1** of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive: **During the breeding season;** • Common tern, 277 pairs representing at least 2.3% of the breeding population in Great Britain (5 year mean 1991-95) • Little tern, 56 pairs representing at least 2.3% of the breeding population in Great Britain (RSPB, 5 year mean 1991-95) **On passage;** • Sandwich tern *Sterna sandvicensis*, 818 individuals representing at least 5.8% of the population in Great Britain (5 year mean 1991-95) **Over winter;** • Bar-tailed godwit, 1,013 individuals representing at least 1.9% of the wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6) This site also qualifies under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species: **On passage;** • Redshank, 8,451 individuals representing at least 4.8% of the Eastern Atlantic - wintering population (5 year peak mean 1991/2 - 1995/6) **Over winter;** • Black-tailed godwit, 1,739 individuals representing at least 2.5% of the wintering Iceland - breeding population (5 year peak mean 1991/2 - 1995/6) • Curlew, 4,028 individuals representing at least 1.2% of the wintering Europe - breeding population (5 year peak mean 1991/2 - 1995/6) • Dunlin, 22,479 individuals representing at least 1.6% of the wintering Northern Siberia/Europe/Western Africa population (5 year peak mean 1991/2 - 1995/6) • Grey plover, 2,193 individuals representing at least 1.5% of the wintering Eastern Atlantic - wintering population (5 year peak mean 1991/2 - 1995/6) • Knot, 21,553 individuals representing at least 6.2% of the wintering North eastern Canada/Greenland/Iceland/North western Europe population (5 year peak mean 1991/2 - 1995/6)

Site	Approx. distance Liverpool Waters	Principle citations/designations
		• Oystercatcher, 28,434 individuals representing at least 3.2% of the wintering Europe & Northern/Western Africa population (5 year peak mean 1991/2 - 1995/6) • Pintail, 6,498 individuals representing at least 10.8% of the wintering North western Europe population (5 year peak mean 1991/2 - 1995/6) • Redshank, 6,382 individuals representing at least 4.3% of the wintering Eastern Atlantic - wintering population (5 year peak mean 1991/2 - 1995/6) Shelduck, 6,827 individuals representing at least 2.3% of the wintering North western Europe population (5 year peak mean 1991/2 - 1995/6) Teal, 5,918 individuals representing at least 1.5% of the wintering North western Europe population (5 year peak mean 1991/2 - 1995/6) **Assemblage qualification: A wetland of international importance.** The area qualifies under **Article 4.2** of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl Over winter, the area regularly supports 130,408 individual waterfowl (5 year peak mean 1991/2 - 1995/6) including: black-tailed godwit, shelduck, teal, pintail, oystercatcher, grey plover, bar-tailed godwit, dunlin, sanderling, curlew, redshank, cormorant, wigeon, mallard, lapwing and knot.
Dee Estuary Ramsar	13km west	The site qualifies under **Criterion 1** due to extensive mud and sand flats (20km by 9km) with large expanses of saltmarsh towards the head of the estuary. Habitats Directive Annex 1 features present include: • Estuaries • Mudflats and sandflats not covered by seawater at low tide • Annual vegetation of drift lines • Vegetated sea cliffs of the Atlantic and Baltic coasts • Salicornia and other annuals colonising mud and sand • Atlantic salt meadows (Glauco-Puccinellietalia maritimae) • Embryonic shifting dunes • Shifting dunes along the shoreline with Ammophila arenaria ("white dunes") • Fixed dunes with herbaceous vegetation ("grey dunes") • Humid dune slacks **Criterion 2** – it supports breeding colonies of the vulnerable natterjack toad *Epidalea calamita.* **Criterion 5** – Assemblages of international importance: Species with peak counts in winter: Non-breeding season regularly supports 120,726 individual waterbirds (5 year peak mean 1994/5 – 1998/9). **Criterion 6** – species/populations occurring at levels of international importance: Qualifying species/populations (5 year peak means 1994/95 – 1998/99)

Site	Approx. distance Liverpool Waters	Principle citations/designations
		Species with peak counts in spring/autumn: • Redshank - 8,795 individuals, representing an average of 5.9% of the Eastern Atlantic population Species with peak counts in winter: • Teal - 5,251 individuals, representing an average of 1.3% of the population • Shelduck - 7,725 individuals, representing an average of 2.6% of the population • Oystercatcher - 22,677 individuals, representing an average of 2.5% of the population • Curlew - 3,899 individuals, representing an average of 1.1% of the Europe population • Pintail - 5,407 individuals, representing an average of 9.0% of the population • Grey plover - 1,643 individuals, representing an average of 1.1% of the GB population • Knot - 12,394 individuals, representing an average of 3.5% of the GB population • Dunlin - 27,769 individuals, representing an average of 2.0% of the population • Black-tailed godwit - 1,747 individuals, representing an average of 2.5% of the population • Bar-tailed godwit - 1,150 individuals, representing an average of 1.2% of the Europe population • Redshank - 5,293 individuals representing an average of 3.5% Eastern Atlantic population

Appendix B

RSPB Design of Management of Rafts

a million voices for nature

Design of management of rafts

Rafts are a useful way of providing island habitat in areas of deep or fluctuating water levels. Their purpose is to improve breeding success by providing areas safe from flooding, disturbance or predation. Rafts are unlikely to attract terrestrial predators and so are useful where islands would be too close to shore for safety. They also provide wildfowl with loafing spots and are often used as resting places by various bird species during the winter.

Main factors to consider when making a raft

There are many conflicting requirements when constructing a nesting raft.

- The ability to float, preferably with the deck just above the water line.
- The ability to rise and fall easily with the water over the maximum flood range.
- Stability, so that the raft is not tipped or spun by current, waves or wind.
- A dry, sheltered nest site, which does not attract the attention of crows or other avian predators. The nest area must be high enough not to be swamped by storm waves.
- Means of access and some protection from waves and current for young birds.
- Harmonious blending with the surroundings if possible.
- Practical factors e.g. water not excessively deep, lake shore accessible by vehicle, for bringing in boat, raft and materials, and for regular maintenance checks.
- On SSSIs, formal consent may be required from NE, SNH or CCW.

Construction

Although rafts vary in character and design, some basic considerations apply to each.

1. - Timber rafts tend to absorb water and sink, although pine or other light wood floats better than heavy timber. In most cases, additional floats must be used if the raft is to last for more than one season.

2. - **Flotation blocks**: Small rafts can be floated with plastic 4.5 litre containers. Slightly larger rafts will stay afloat with 22 litre plastic drums. Rafts in the range of 1.2 - 1.8 m in dimension require closed cell polystyrene blocks, polystyrene scraps, airtight metal drums (including old oil drums). Polystyrene is easily held in place and can be adjusted to achieve right buoyancy. It should be packed into strong polythene to prevent it from breaking up and littering the environment. Metal drums need to be weighted so that they do not float too high. The flotation blocks must be thoroughly cleaned before they are brought to the site to prevent pollution. Annual checks and maintenance is important to ensure that the raft remains secure and firm, and that the flotation devices are not disintegrating or leaking.

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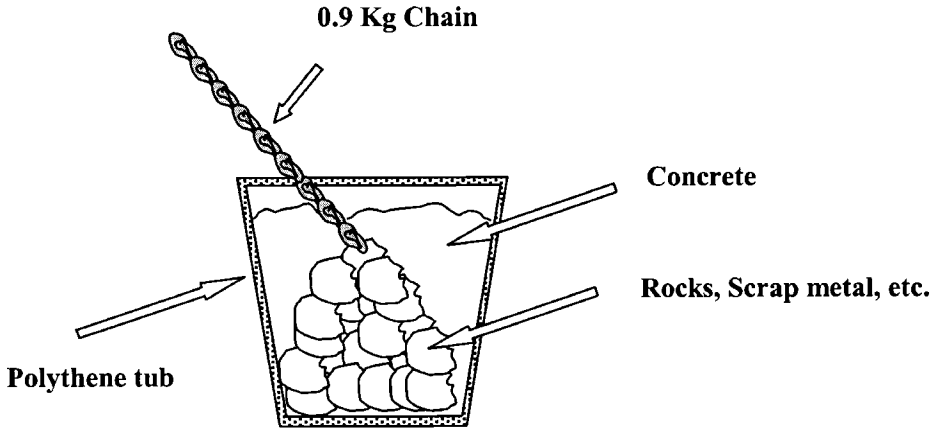
The RSPB
Wales Headquarters
Sutherland House
Castlebridge
Cowbridge Road East
Cardiff CF11 9AB
Tel: 029 2035 3000

3. - **Anchors:** Two anchors are better than one and should be attached to opposite corners of the raft to keep it from swinging in the wind. Anchor to the bottom, not to the shore, to prevent vandalism and to keep rats or weasels from getting to the raft.
    a. - Anchors can be made from breeze blocks, concrete blocks etc. The wire anchor rope should be tied to a short section of chain or to an eye bolt; for large rafts use 19 mm circumference flexible steel wire rope with a 4 ton breaking strain to ensure that the mooring is secure. An anchor weighing about 50 kg is suitable for most rafts. It can be made in a large polythene garden tub half filled with scrap metal or rocks. Wrap one end of an appropriate length of chain around the scrap and fill the tub with concrete. Once the concrete has set, the anchor can be turned out of the mould and the chain bolted to the raft. Three thickness of heavy gauge (24mm) polypropylene rope can be used instead to save money, especially if the raft is in deep water. Where strong winds or currents are likely, several 50kg anchors may be needed to securely hold a 3m x 2m turned raft.



    b. - Where one large anchor is too cumbersome to manage, a smaller (e.g. 9 litre) container can be used as a mould and concrete sinkers can be cast with holes through their centres. One sinker can be fastened to the end of the wire and others can be threaded on and allowed to slide to the bottom before fixing the other end of the wire to the raft.

4. - Where more than three rafts are to be moored in a string there should be some additional anchor points from the middle rafts to keep the string from sagging before a strong wind and dragging the main moorings.

5. - Various nest boxes and duckling ramps can be added to the raft superstructure depending on the species of birds that the raft is intended for. Duck baskets should be at least 1.2 m apart and facing away from each other. They should be tilted slightly upwards at the front and lined with dead grass or some wood shavings. Baskets should be positioned in early January and left until early September, when they should be taken up, cleaned of nesting material and stored under cover.

Species specifications:

1. - Wader and tern nesting rafts, in most cases, should be bare of vegetation and covered with a material attractive to the intended nesting species.
2. - Wildfowl rafts require more vegetation. Rushes, reeds or small willows are suitable, planted either around the edges or over the deck of the raft leaving pathways to the nest box or central clearing. Plants survive best on raft designs with an open mesh or slatted platform just above the water

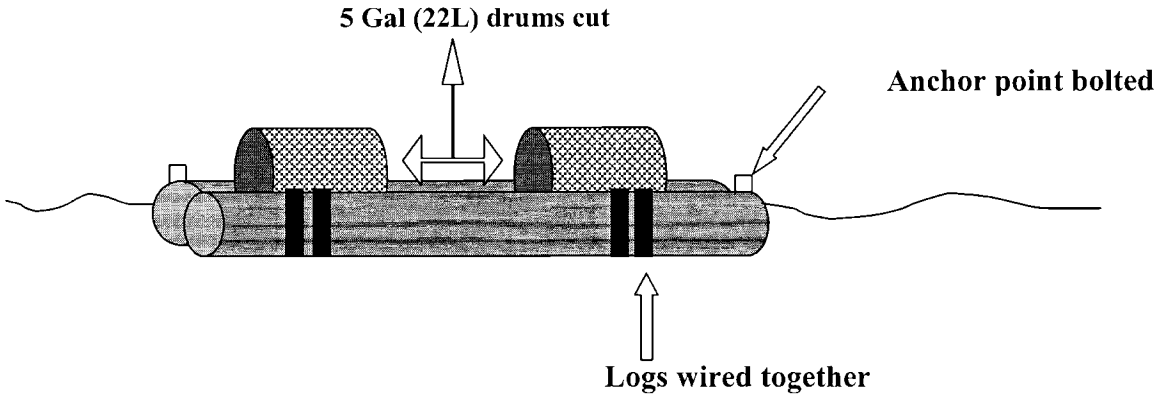
line, covered with moisture-holding mulch in which the plants can root and through which they can reach the water.

Some raft models

The area and water characteristics determine the best design for a raft. Some of the designs used on RSPB reserves are described below as a guide.

Simple log or telegraph pole rafts

Logs from nearby felling operations or used GPO poles are often available free and can be used to provide the basis both for simple rafts and more elaborate designs. Without any additional support, the timbers eventually sink low in the water and sprout a floating garden, which should prove to be attractive to nesting wildfowl if the raft is sited in a calm area.



The standard raft

This raft is made of pressure treated (do not use CCA treated) softwood and is 3 meters square. Design includes chick shelters, a re-entry ramp and an optional security fence. Buoyancy is provided by two high-density polystyrene blocks. Raft is anchored to concrete blocks by a chain attached to a marker buoy. It is covered with gravel and rocks, and any plant growth is removed each winter.

Raft platform:
Mainframe: 100x200mm timber, bolted together in each corner through overlapping ends (two upper, two lower), one top inset 150mm to allow for re-entry ramp. Deck 25x150mm planking, laid on and nailed (75mm galvanized nails) to lower mainframe timbers. Sub frame 50x75mm runners to support flotation and strengthen deck, nailed (150mm nails); main flotation holders/deck support 50x100mm runners; sides 25x150mm planking, nailed flush with top of upper mainframe timbers along the lower sides to hold in gravel etc, and flush with the bottom of the mainframe timbers along the upper sides to hold the flotation devices in place.

Buoyancy:
Blocks of 380x600x2700mm high density polystyrene foam, painted (optional) with BP Aquaseal 44 bituminous paint (as suitable for use inside cold water tanks) to water seal and strengthen the polystyrene; two optional straps per float block, 1,420mm strips of polystyrene webbing (or 50mm chair webbing as a temporary measure, eg during launching) with eyelet holes for nailing to frame. Once in the water, the weight of the raft is sufficient to hold the polystyrene in place without any additional fixings, even in extreme conditions.

Mooring:
Mooring ring bolted through center of mainframe timber (bolt fixed with two nuts so that it can swivel freely), connected preferably to a chain or a 20mm diameter hawser-lay polypropylene rope (which will not rot, but can be chafed), with hard eyes and shackles each end. Tether a 30-inch circumference marker buoy to the raft end of the chain or rope with a length of polypropylene rope to allow the raft to be detached, without having to pull up or lose the anchor.

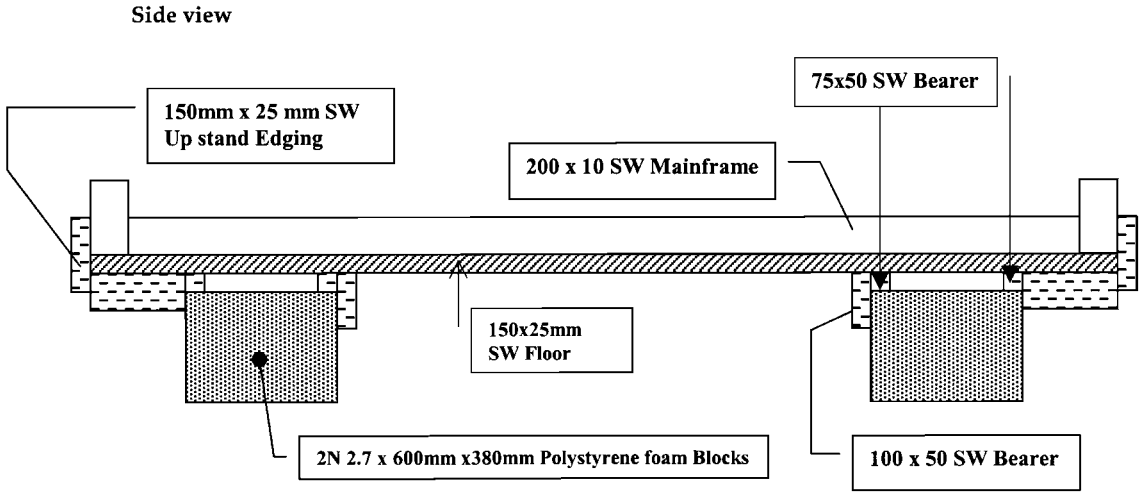
Anchor:
Multiple small weights (up to $1m^3$ concrete as a total) for ease of transport. Four buckets 250mm high by 300mm diameter of concrete, eyebolt set in centre; weights connected in pairs by shackles to 300mm lengths of chain; fixed to mooring by placing two pairs of weights together with the connecting chains forming a cross, and attaching the mooring rope shackle to the point where the chains cross. Exposed sites where wind and waves are strong may require more anchor weights.

Shelters (to protect from rain):
These comprise 1m long 25x150mm planks located in opposite corners, nailed flat onto end of upper mainframe timber, side plank and 50x75mm end block.

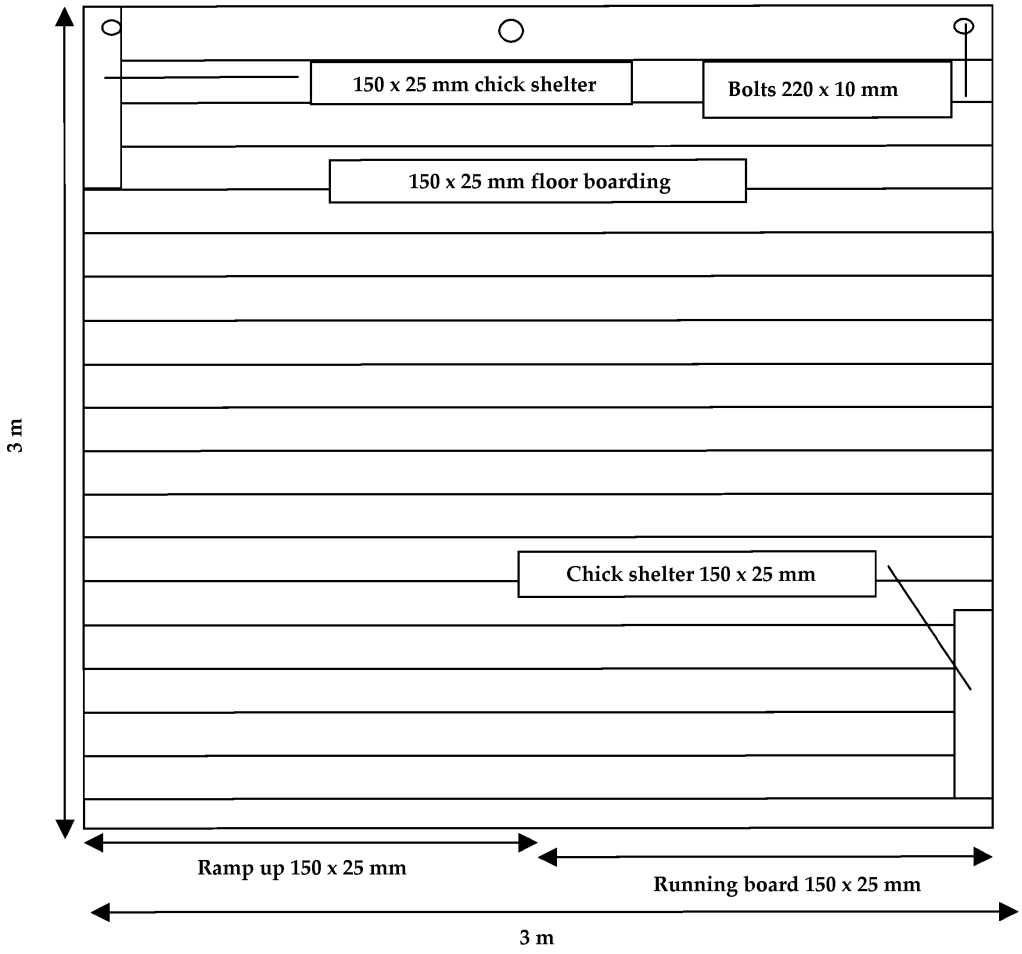
Gravel covering:
Preferably of 15mm-25mm gravel with larger pieces and rocks to provide shelter, and give sufficient weight to push running board down to water level.

Re- entry system (for chicks falling overboard):
These are located on opposite (lee) side of raft to the mooring ring: running board 3m, 25x150mm plank nailed to bottom of the two lower mainframes. Ramp (1.5m, 25x150mm plank) sloping up to top corner of mainframe, supported by up stand, nailed. Block gap under raft behind ramp with 25x150mm skirt plank.

Optional removable security fence:
These comprise four frames 230mm by 0.3m, made from 50x50mm planks covered with 25mm chicken wire, bolted along each side and fixed at top corners.



View from above

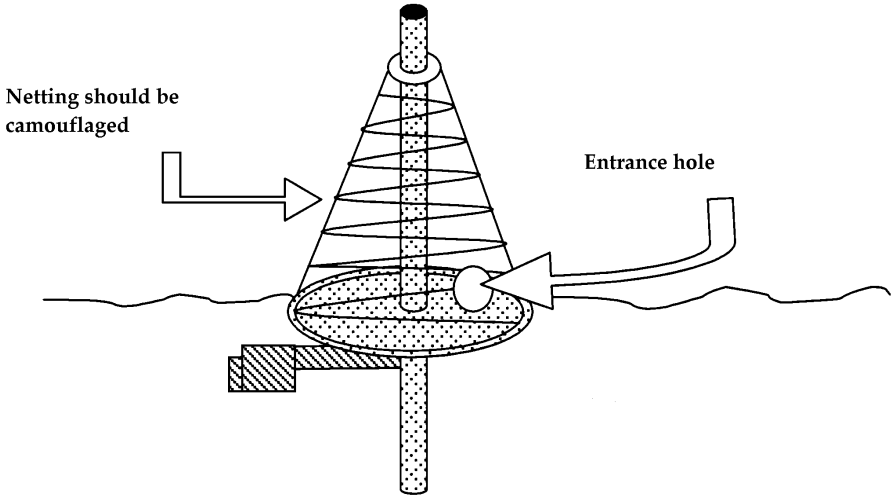


A floating wildfowl nest for use on rivers

This design, successfully used on the Ray, near Oxford, is intended to overcome the problems posed by strong currents, which make it difficult for wildfowl to nest successfully on rivers. Chick survival is best where the floating nest is sited on a quiet backwater with gently sloping banks so that, when a chick leaves the nest, it can get to the shore and climb out despite the current.

1. - Drive a suitable length of 50mm diameter steel pipe into the riverbed to provide an anchor pole on which the floating nest can rise and fall with changes in water level.
2. - Cut out a circular platform from marine plywood and cut a hole in its centre so that it fits over the anchor pipe.
3. - Screw three boards to the circular plywood piece, so that they form an equilateral triangle to make a frame underneath the platform for the floats.
4. - Strap three 4.5 litre plastic or metal tins to the triangular frame, one each side. If metal tins are used, they should be well painted with bitumen paint and coated inside with a spoonful of old engine oil before capping.
5. - Attach three metal struts, evenly spaced, to the edge of the platform, joined at the upper end to a ring that fits over the anchor pipe. This upper ring, with the hole in the platform, forms the bearing on which the nest rises and falls on the pipe.

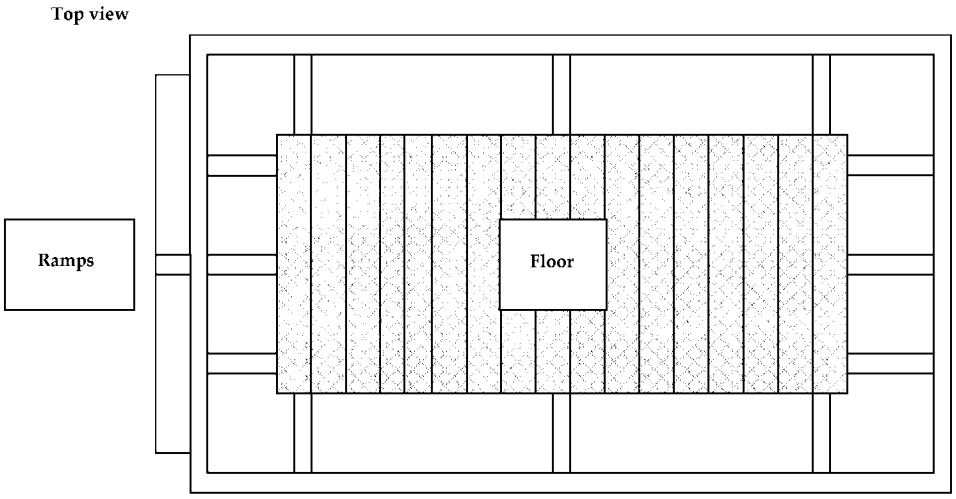
6. - Fasten a conical covering of light but firm netting around the outside of the strut assembly, and use vegetation to provide some shelter. Leave a 150 mm diameter entrance on one side.
7. - Slide the platform down over the pipe. If it tends to spin in the current, attach a rudder to the floats to keep it properly orientated. The entrance hole should be arranged to face the nearest bank.



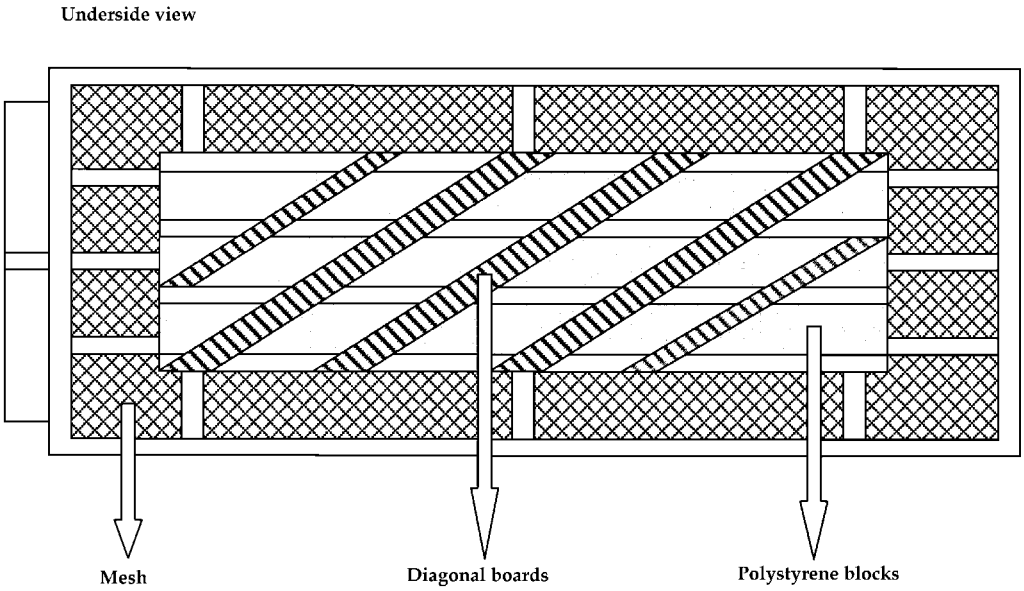
A square raft

This design is popular and has proved to be highly effective and weatherproof. Similar structures are in use in many reserves.

a. - Construct a framework of 25 x 150mm boards or similar. Nail the flooring across the top of the frame leaving the margins open to take vegetation and nail duckling ramps to one end of the raft. Use galvanized nails since they do not rust.



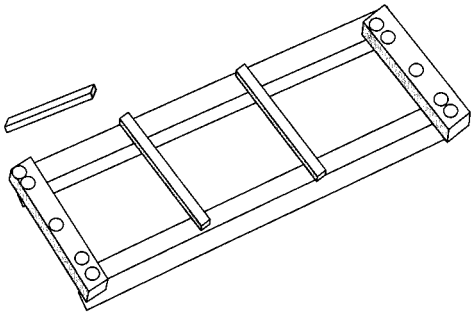
b. Turn the raft over. Staple close-mesh galvanized wire netting across the bottom of the raft, leaving the central part free to hold the flotation blocks.
c. Place 150mm thick polystyrene blocks in the uncovered centre of the frame. Hold the polystyrene in place with diagonal boards nailed across the frame.



d. - Turn the raft right way up. Cut out blocks of rush, willow etc. to fit into the margins of the frame. Fit anchor bolts to two opposite corners. Fix a nesting box or basket if required. You can cover the raft with some gravel. Finally, tow the raft into the position and anchor it firmly.

A heavier variation:

The raft described below is very successful when attracting terns to nest. Bare shingle is required for the nesting, but a completely exposed raft results in high chick mortality. At about one week old, tern chicks leap overboard at the slightest disturbance. This can be prevented by providing them with small shelters to hide underneath.



1. - Drill the sleepers as indicated in the diagram, using a brace and a bit, and bolt them together with eight 250mm coach bolts. Drill and fix anchor bolts in the end sleepers.
2. - Drill and bolt the cross members to the side sleepers. These are required to make a rigid structure and to resist the upward pressure of the floats.
3. - Nail the side battens into position; these help hold the shingle in place.
4. - There are two ways to floor the raft. One is to trap plastic-coated chain link fencing, covered in heavy-duty polythene, under the cross braces. Staple the fencing firmly to the sleepers. Alternatively, nail old garage doors or other suitable sturdy timber to the cross members and spread the flooring with a layer of concrete to help keep the shingle in place.
5. - Float the raft. Unless you have mechanical help, placing approximately 0.8 cubic metres of polystyrene blocks under the raft for flotation will require a number of water-hardy volunteers.
6. - The amount of polystyrene needed varies with the weight of the raft so trials are necessary. Provide some extra flotation to compensate for the shingle, which is added afterwards. The polystyrene stays in place between the sleepers due to its buoyancy and should not need fastening.
7. - Spread a layer of shingle over the flooring.
8. - Fix ramps or walls to the rafts sides, place a shelter on it, tow it into position and anchor it by means of bolts in the end sleepers.

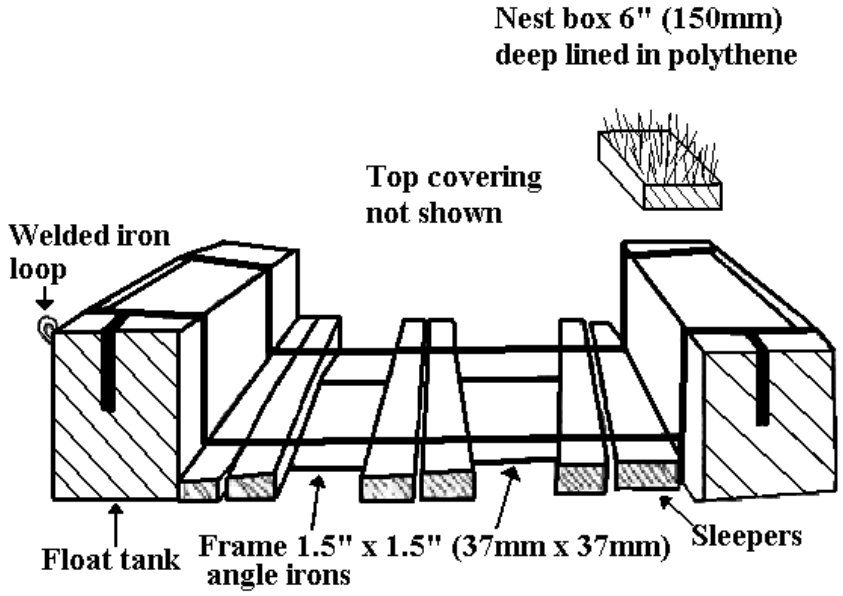
Welded Rafts

These two models were designed for the specific needs of a particular area. They require a great deal of skills and therefore are only suitable if none of the previous ones can be used. The designs shown have proved to have an estimated life of at least 12 years with minimal maintenance. These types depend on availability of suitable welding equipment and skills, and sheet-metal float tanks used by gravel companies for ferrying electrical equipment around wet pits.

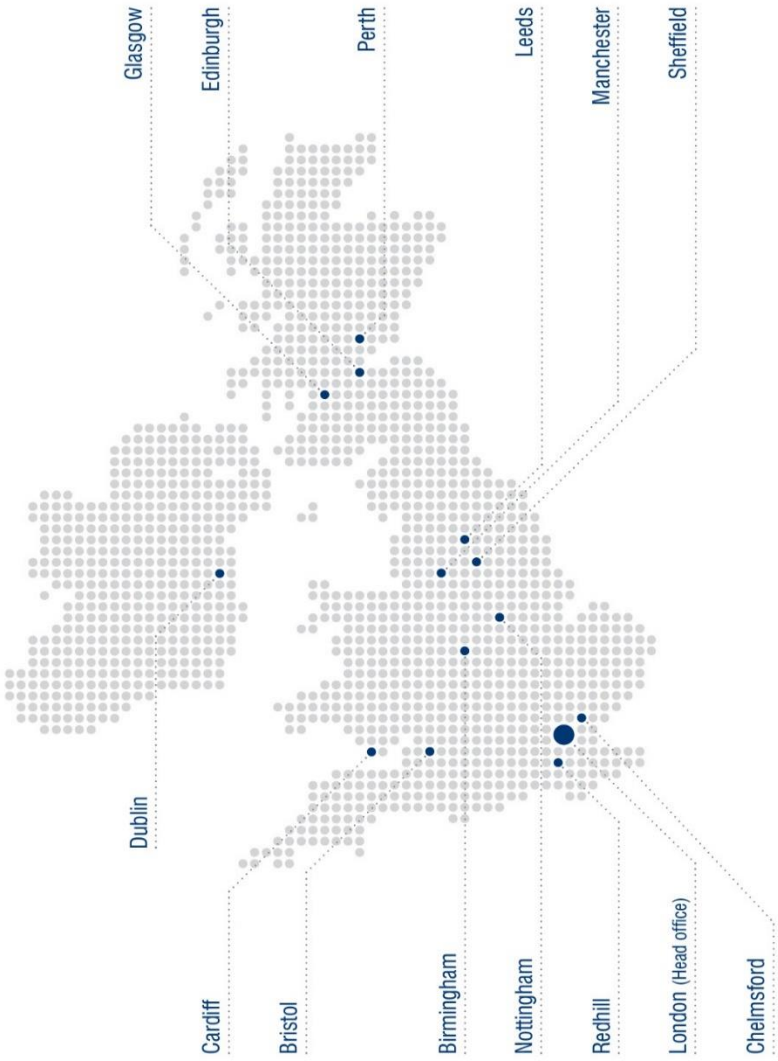
Type A
Weld together three float tanks and attach a rim of logs with welded metal straps. To moor the raft, fix a wire anchor rope to a 50 kg scrap iron or concrete anchor. This simple but strong raft gives a surface area of 6.7 square metres. It successfully attracts ducks and geese, but has two disadvantages. It is so buoyant that the nest floats at least a foot above the water so that, unless a ramp is attached to help them, once the chicks leave the raft they cannot return. Soil ultimately dries out or is dislodged and must be replaced at intervals along with fresh vegetation.

Type B
This rather elaborate design features a semi-flexible welded frame, which makes the raft very durable in exposed conditions. The float tanks are the same size as in the previous design; the sleepers are topped with a grid that holds nesting cover.

Construction:
- Weld the frame together and to the float tanks. Weld two anchor bolts to opposite corners.
- Manoeuvre the completed frame into the water.
- Slide the sleepers into position. Leave gaps between the pairs of sleepers so that plant roots can reach the water.
- Cover the top of the frame's central section with narrow-mesh galvanized metal.
- Fix the nesting boxes on top of the floats
- Cover the mesh with mulch or soil and suitable plants. Plant up the nesting boxes.
- Tow the raft into position and anchor from the anchor bolts.



UK and Ireland Office Locations



Appendix 13.8a: Starlet sea anemone Nematostella vectensis in the vicinity of the proposed Liverpool Cruise Terminal Site Investigation works

APEM Ltd
Riverview
A17 Embankment Business Park
Heaton Mersey
Stockport
SK8 3NS

To:
Melissa Gaskell-Burnup
Marine Licensing Case Officer
Marine Management Organisation
Lancaster House, Hampshire Court,
Newcastle Business Park, Newcastle upon Tyne, NE4 7YH

Your Ref: MLA 2017 00303

29/01/2018

Proposal to Marine Management Organisation for Liverpool Cruise Terminal Ground Investigation works Marine Management License

Purpose

Following the telephone conference held on the 10th January 2018, regarding the above as requested by Marine Management Organisation and Natural England, this note provides the additional information in relation to Starlet Sea Anemone for obtaining a Marine Management Licence for carrying out Ground Investigation works for the proposed new Liverpool Cruise Liner Terminal.

Background

During a subtidal benthic ecology survey for the LCT development a total of three specimens of the starlet sea anemone *Nematostella vectensis* were recorded across nine grab stations (0.1m^2 grab, single grab at each station). This species was not recorded within any of the four grabs located within the project red-line boundary[1]. As indicated below this species is protected and this note provides some background to the population status of this species in the UK and indicates actions that will be applied to the Liverpool Cruise Terminal Ground Investigation (GI) works to reduce the likelihood of any potential effects on this species.

Early records

N. vectensis was originally described from a saline lagoon in the Isle of Wight (Stephenson 1935). It was long considered to be a lagoon specialist, restricted to south-east England. Manuel (1988) noted its habitat as isolated brackish lagoons but acknowledged that it could also be found in tidal creeks

[1] Further detail is provided in the supporting note 'Starlet sea anemone *Nematostella vectensis* in the vicinity of the proposed Liverpool Cruise Terminal Site Investigation works' (Worsfold & Hubble 2017).

or saltmarsh pools and that where it occurred it could be highly abundant. The Marine Life Identification Network (MarLIN) account (Tyler-Walters *et al*. 2017) now acknowledges its non-native status and likely wider distribution, including its presence in estuaries.

Protected status

N. vectensis was given protected status based on an understanding that it was a native species with a distribution thought to be limited to lagoons in south-east England. There was also an apparent decline recorded in the 1970s and 1980s (Williams 1987). Manuel (1988) summarised this by stating that by 1988 it was known from only three UK localities, having previously been known from nine. The apparent decline was further discussed by Dipper (2003) although, by that time, several new records had already been made. The view that the species was considered to be rare and restricted to the south and east of England was also indicated by Wood (2005). It currently remains classified as Vulnerable on the IUCN Red List, Protected under the Wildlife and Countryside Act (1981) and listed as a Species of Principal Importance in England under Section 41 list of the NERC Act. After the discovery that it was a non-native species (Reitzel *et al*. 2008), suggestions were made that it could retain some protection to ensure the protection of vulnerable lagoon habitats (Reitzel *et al*. 2008, Barfield 2016).

Non-native status and global distribution

In the 1980s and 1990s it was known that *N. vectensis* was also an estuarine species found on both coasts of North America but within Europe it had not been recorded outside the UK (Hand & Uhlinger 1994, Manuel 1988). It was then proved through molecular evidence (Darling *et al*. 2004 & 2009, Reitzel *et al*. 2008) to be an Atlantic North American species that had been introduced to England, as well as to the Pacific coast of North America; and it has since also been found as a non-native in Brazil (Silva *et al*. 2010). On the Atlantic coast of North America, it is a very common species, found from Nova Scotia to Georgia (Reitzel *et al*. 2013), within a range of estuarine habitats (saltmarsh, mudflats, pools). It is so widespread and fast growing that it is widely used as an experimental animal in studies of genetics, reproduction and ontological development, and large numbers are collected and bred for laboratory use in the USA (Stefanik *et al*. 2013).

Current UK distribution

N. vectensis can no longer be considered a lagoon specialist but its estuarine habitat is mainly in more sheltered areas and in very shallow waters, particularly near saltmarsh where it may be present at high densities. MarLIN (Tyler-Walters *et al*. 2017) indicates that its current known distribution includes Norfolk, Suffolk, the Blackwater Estuary, Hamford Water, the Hampshire and Dorset coasts, Sand Bay in the Bristol Channel and St. Bees Head, Cumbria. The species is likely to have been under-recorded historically, as most finds of this species from estuarine routine samples are likely to have been recorded at the higher taxonomic levels of 'Actiniaria' (order) or 'Edwardsiidae' (family). The lagoon distribution in southeast England has been included in lagoon reviews (Smith & Laffoley 1992, Downie 1996) and supplemented by recent surveys. For example, in Brownsea Island lagoon, Dorset, *N. vectensis* is one of the dominant benthic species and was found to have increased in mean abundance from 3,217 per m^2 to 7,307 per m^2 between surveys in 2010 and 2015 (Thomas & Worsfold 2016). At Half Moon Pond, Norfolk, dense patches of *N. vectensis* were found in 2013 (Franco *et al*. 2014) and in 1996 the species had been recorded as being newly arrived at several nearby pools (Franco *et al*. 2014). The species has been found in several lagoons on the Isle of Wight, including repeated records from Harbour Farm Lagoon, Bembridge. At Harbour Farm Lagoon *N. vectensis* was rare in 1997 and 2003 (Bamber *et al*. 2003) but common in 2010 (Bamber & Robbins 2010) and 2013 (Bamber *et al*. 2014).

N. vectensis has also appeared as a new arrival in Suffolk. It first appeared (after several years of monitoring without being recorded) in a saline lagoon on Havergate Island in 1997 and was recorded in increased numbers in the following year (Welstead & Shardlow 1999). It has also been found in anthropogenically impacted lagoons, such as those used as boating lakes. For example, it recently appeared in the recreational boating lake at Poole Park, Dorset (e.g. Borough of Poole 2017) and it was recorded at Abrahams Bosom lagoon, Norfolk (Hubble *et al*. 2016).

The species has likely been overlooked in estuaries and the first estuarine records appear to have been from samples collected in the Orwell Estuary as recorded in consultancy reports (noted in Royal HaskoningDHV 2013).

Consequently, UK wide there is evidence for well-established populations of this species and now that it is understood that they can occur in estuarine habitats in the UK, it is expected that they may be more likely to be identified within estuarine samples where previously they may have been overlooked. Consequently, it is likely that the number of estuarine records will increase. There is also some evidence to indicate that numbers have been increasing in some monitored locations (e.g. Thomas & Worsfold 2016).

As indicated, only three specimens of *N. vectensis* were found during the benthic ecology survey for the LCT development and these are the first records of this species in the Mersey Estuary. The low numbers found, however, combined with the fact that specimens recorded during the LCT benthic survey were in relatively deep water and particularly that these locations were subject to tidal currents, suggest the area is outside the preferred environment for the species. There may be large populations in more suitable parts of the estuary and the specimens found may have been transported from outside the area, been washed in by tidal currents or represent an extreme fringe of a larger population. In the UK context, the fact that there have been new records of this species at a number of locations over recent years, and some evidence of localised increases in numbers suggests that the UK population is stable or, potentially, increasing.

Robustness of *N. vectensis*

N. vectensis is a very robust species, with a high rate of reproduction that has been widely used as an experimental animal in the USA in recent years (Stefanik *et al*. 2013). A research colony can be produced in a few months and *N. vectensis* is uniquely suited to experimentation due to its tolerance to disturbance and anemones that have lost their tentacles and anterior body portions can regenerated them in 10-14 days (Stefanik *et al*. 2013).

Actions for the LCT SI works to limit any potential effects on *N. vectensis*

None of the individuals recorded during the LCT benthic ecology survey were within the project red-line boundary. It should be noted that for the GI works the widest drill casing to be used is 200 mm diameter and seven boreholes are proposed (Appendices A & B).

Three actions are proposed to limit any potential effects of the GI works on *N. vectensis*:

- Maintain the number of boreholes at the minimum number to meet the requirements of the GI works. With this approach the footprint of the proposed GI works has been minimised as far as possible.

- Move some of the borehole locations. Four of the proposed borehole locations have been moved away from the station locations at which *N. vectensis* was recorded in a direction

towards the red-line boundary where no *N. vectensis* individuals were recorded (see Appendix A: Aecom LCT Ground Investigation Technical Note - for more details).

- Conduct a soft-start approach where the drill string is incrementally lowered from deck level until it lightly touches the silty seabed (mudline). The drill will then be started extremely slowly to dislodge / disperse any *N. vectensis* a short distance away from the immediate point at which drilling will occur (due to the robust nature of *N. vectensis* they would be expected to readily survives such movement across a short distance within any dislodged sediments). The speed of the drill will then increase very slowly until it reaches full capacity (see Appendices A & B: Aecom LCT Ground Investigation Technical Note - for more details).

With these actions in place, it is considered that any potential effects on *N. vectensis* will be minimised.

Regards

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Appendix A

AECOM Technical Note

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Project name:
Liverpool Cruise Terminal

Project ref:
60544184

From:
Dr Andrew Merritt

Date:
18 January 2018

TECHNICAL NOTE

Subject: Proposed actions to reduce potential benthic ecology effects of the Liverpool New Cruise Terminal Ground Investigation

1.0 Introduction

Liverpool City Council (the Client) commissioned AECOM to provide client's representative geotechnical services relating to the proposed extension to the Cruise Liner Terminal Facility. The new terminal will be located at the former Prince's Jetty, adjacent to Prince's Parade in Liverpool. The overarching objective of the construction of the new terminal is to accommodate larger vessels and increased passenger numbers.

The proposed development site comprises:

- Overwater areas of the site within the River Mersey, an area of approximately 1.1ha, and includes a derelict jetty and landing stage. The southern section of the overwater works includes open water with two mooring dolphins along the western boundary, and;
- Onland areas of the site, including a temporary car park to the west of Princes Parade, henceforth referred to as Plot 11, Quay Wall and Princes Parade.

A critical requirement of the design and construction of the new Cruise Liner Terminal Facility is the performing of a geotechnical ground investigation to obtain data on the ground conditions for use in foundation, slab and retaining wall design. The ground investigation, developed by AECOM, in conjunction with the Clients Technical Partner Ramboll, comprises both intrusive and geophysical methods on land and over water in the footprint of the proposed development.

The scope of the planned ground investigation has been developed to provide specific information on the ground conditions at the site after review of existing information through a desk study report. The extent of the investigation has been considered in detail to ensure it meets the project requirements and given the logistics and cost, particularly of overwater investigations, is limited to the extent of investigation specifically needed for the design of the development.

Aside from investigation on land, the investigation will include seven boreholes by cable percussion and rotary core drilling and associated downhole geophysical testing, incl. downhole seismic logging, in addition to geophysical surveys of the project footprint.

In planning the investigation, assessments have been made of potential environmental impacts including on local ecology. The assessments have included early sampling and testing of the sediment in the area of the project within and outside of the footprint. This note describes the findings of the ecology riverbed sampling in particular, and sets out proposed responses to these findings in adjusting the approach to the ground investigation.

2.0 Responses to Ecological Sampling Findings

A Marine Ecological Drop Sample Survey, commissioned by Waterman Group Ltd (Environmental Consultants), was performed 27th June 2017 by APEM. The Marine Ecology Survey Report (Document Number: P00001343) tentatively identified the presence of non-native Starlet Sea Anemones (*Nematostella Vectensis*), a protected species under the Wildlife and Countryside Act, which are found to reside in the upper 0.5m of silt substratum at the site. The Marine Management Organisation (MMO) requested that a procedure be proposed to reduce potential impacts of performing rotary drilling within the habitat of the Starlet Sea Anemone on the assumption that it is present on site.

A tiered approach is proposed to reduce the impact of potentially ecologically adverse drilling operations and includes the proposal of impact reduction measures at both, ground investigation design and operational stages. Ecological impact reduction measures considered include:

1. Minimising quantity of intrusive probings (Section 2.1);
2. Relocating proposed intrusive probings (Section 2.2);
3. Procedural adaptations to proposed drilling methods (Section 2.3);

2.1 Minimising Quantity of Intrusive Probings

The format, size and footprint of the ground investigation is considered to be at its minimum in light of the nature of the proposed development. The currently proposed ground investigation was developed by AECOM and Liverpool City Council's appointed Engineering Design Consultants, Ramboll. The geotechnical and geo-environmental investigation is deemed sufficient to (1) provide characteristic parameters for geotechnical design and, (2) provide geo-environmental test data to

assess the contamination status and determine the environmental risks to sensitive receptors, e.g. construction workers and site end users.

2.2 Relocating Proposed Intrusive Probings

The location of proposed intrusive works was assessed to ascertain the suitability of relocating the proposed borehole locations that are closest to the two ecological grab sample locations (G02 and G10), where the Starlet Sea Anemone was tentatively identified. Four exploratory hole locations were re-positioned to increase their distance from ecological grab samples G02, and G10. Table 2.2-1 summarises the borehole re-location proposed while, Figure 1 of this Technical Note indicates a revised Exploratory Borehole Location Plan showing original and revised borehole locations.

Table 2.2-1 Summary of Relocating Proposed Intrusive Probings

Ecological Survey			Geotechnical Investigation			Summary of Distances Between Boreholes and Ecology				
Grab Sample No.	Location (OSGB)		Borehole No.	Original Borehole Location (OSGB)		Current Distance from Ecological Grab Sample (m)	New Borehole Location (OSGB)		Revised Distance from ecological grab sample (m)	Increased Distance from grab sample locations (m)
	Easting	Northing		Easting	Northing		Easting	Northing		
G02	333448	390907	BH110	333480	390900	33.9	333478	390875	44.2	10.3
G10	333435	390975				87.6			105.1	17.5
G02	333448	390907	BH109	333460	390843	64.4	333475	390831	80.7	16.3
G10	333435	390975				133.2			148.8	15.6
G02	333448	390907	BH108	333482	390819	93.8	333486	390809	106.1	12.3
G10	333435	390975				162.7			174.8	12.1
G02	333448	390907	BH107	333491	390796	119.6	333494	390788	127.2	7.6
G10	333435	390975				188.3			193.3	5.0

It can be seen that four (4 No.) borehole (BHs 107-110) are relocated and the relocation increases their distance from tentative identification of Starlet Sea Anemones between 7.6m and 16.3m from grab sample location G02 and between 5.0m and 17.6m from grab sample location G10.

2.3 Procedural Adaptation to Proposed Drilling Methods

A procedural adaptation to proposed drilling methods (IRM 3) was developed and is described herein. In response to the MMO's request that the potential harm to Starlet Sea Anemones be minimised, the Ground Investigation Contractor, Fugro Ltd, to be appointed by Liverpool City Council, produced a procedure to perform a gentle, soft start upon commencement of each borehole. The

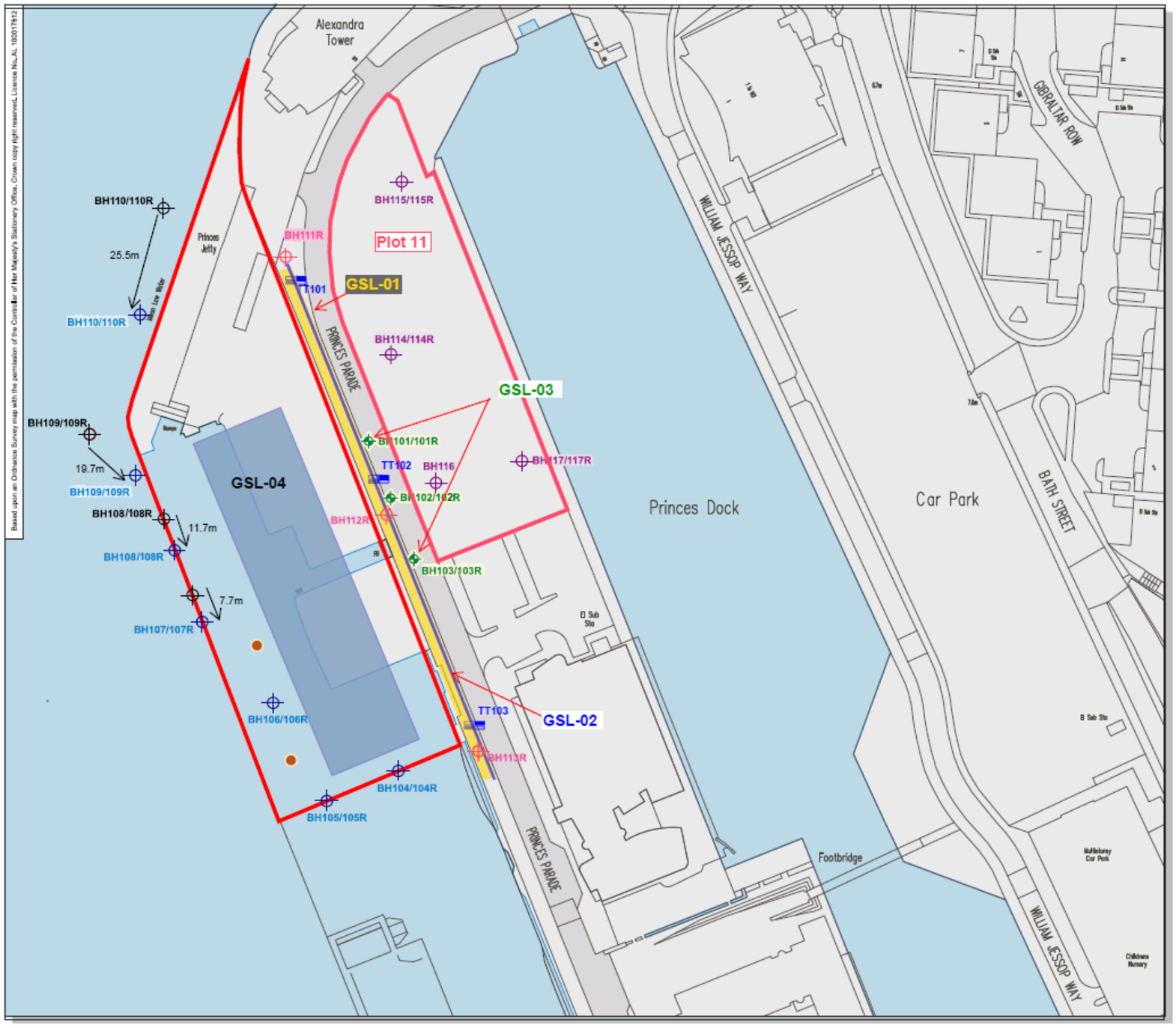
soft-start drilling procedure appended to this Technical Note (Document Number: C18XX / MS005, Section 14.2, Appendix B of this Technical Note) is considered by AECOM as best practice for minimising the potential effect of rotary drilling on the Starlet Sea Anemone population.

The process of a soft-start to a borehole occurs in three stages. Firstly, the drill string is incrementally lowered from deck level until it lightly touches the silty seabed (mudline). The drill string is then started at an extremely low rotation velocity in order to dislodge and disperse any *N. vectensis* individuals located a short distance away from the vicinity of the drilling location. Due to the robust nature of *N. vectensis* they would be expected to readily survive such movement across a short distance within any dislodged sediments. Finally, the speed of the drill is incrementally increased very slowly until reaching the required velocity for the encountered material type.

3.0 Conclusion

The project team has reviewed the findings of the riverbed ecological sampling undertaken and evaluated approaches to reduce the impacts on the environment, proposing a tiered approach considered likely to be sufficiently effective in reducing the risk posed to protected species, such as the Starlet Sea Anemone, from the potentially adverse effects of rotary drilling at the Liverpool Cruise Terminal site.

Figure 1
Revised Exploratory Borehole Location Plan



KEY:

- SITE BOUNDARY (PLOT 11)
- BH110/110R — INITIAL PROPOSED BOREHOLE LOCATIONS
- SITE BOUNDARY (CRUISE LINER TERMINAL)
- BH110/110R — PROPOSED BOREHOLE LOCATIONS CABLE PERCUSSION WITH ROTARY CORE FOLLOW ON OVER WATER **DOWNHOLE GEOPHYSICAL LOGGING**
- BH116/116R — PROPOSED BOREHOLE LOCATIONS CABLE PERCUSSION WITH ROTARY CORE FOLLOW ON FOR PROPOSED HOTEL
- BH101/101R — PROPOSED BOREHOLE LOCATIONS CABLE PERCUSSION WITH ROTARY CORE FOLLOW ON AND GEOPHYSICAL
- BH112R — DIRECTIONAL COREHOLES
- MOORING DOLPHINS
- GSL-01 — GEOPHYSICAL SURVEY LOCATION
- TT103 — PROPOSED LOCATIONS TRIAL TRENCHES FOR UTILITIES IDENTIFICATION

0 15 30 45 60m
SCALE

Title	PROPOSED BOREHOLE LOCATION PLAN
Location	LIVERPOOL CRUISE LINER TERMINAL, PRINCE'S PARADE, LIVERPOOL
Client	LIVERPOOL CITY COUNCIL

AECOM

App'd:	Drawn:	Date:
DL	RH	JULY 2017
		Ref: CM/RH/MCH
Scale: AS SHOWN		Job No: 60544184
Org. Size: A3		FIGURE 2

Appendix B

Drilling and Casing Operations

Document Number: Fugro C18XX / MS005

Project Name: Liverpool Cruise Terminal – Detailed Ground Investigation

Document Title: Drilling and Casing Operations

Contract Number / Document Number: C18XX / MS005

DOCUMENT CONTROL

Issue	Description	Reference	Approved By	Date
1	Draft	C18XX_MS005_Rev0		
1				
1				
1				
1				
1				
1				
1				

AMENDMENTS

Date	Issue Details

CONTENTS

1. INTRODUCTION

Fugro have been contracted by Liverpool City Council (the client) to conduct a site investigation for the proposed construction of a perminant cruise liner terminal to connect to the existing Liverpool Landing Stage. This will create an expanded facility to accomodate larger vessels and increased passenger numbers.

This method statement details the drilling and casing handling operations that will take place from the Fugro Geoservices Jack up Aran 120a with particular attention to performing a soft start commencement of each borehole location.

The need for a soft start is required in order to reduce any potential effects on the Starlet Sea Anemone, a protected marine species.

Refer to the main body of the Marine Phase Project management Plan for further details on the proposed investigation.

2. METHODOLOGY & SEQUENCE OF WORK

The widest drill casing to be used is 200 mm diameter.

Methodology for drilling and casing handling in order to minimise the impact of drilling on Starlet Sea Anemones is given below.

2.1 Soft-Start Methodology for Minimising Potential Effect on Starlet Sea Anemone

- The process of a soft-start to a borehole occurs in three stages;
- Firstly, the drill string is incrementally lowered from deck level until it lightly touches the silty seabed (mudline);
- The drill string is then started at an extremely low rotation velocity in order to dislodge and disperse any *N. vectensis* a short distance away from the vicinity of the drilling location;
- Finally, the speed of the drill is incrementally increased steadily until reaching the required velocity for the encountered material type.

Due to the robust nature of *N. vectensis* they would be expected to readily survive such movement across a short distance within dislodged sediments.

A METHOD STATEMENT IS ONLY A SAFE WORKING METHOD IF IT IS DISCUSSED AND AGREED BEFORE WORK BEGINS AND THEN FOLLOWED BY THOSE CARRYING OUT THE WORK.

All persons involved or who could be affected by the task / activity must read, understand and comply with this Method Statement, as well as associated risk assessments.

Any requirements to change from this "Safe System of Work" operations are to be reviewed and where necessary risk assessed again before recommencement of task / activities.

Position	Print Name	Signature	Date

Appendix 13.9a: Wintering Bird Survey Report

Liverpool Cruise Terminal

Wintering Bird Surveys

Final Report

APEM Ref P00001343

January 2018

Scott Reid, Simon Warford and Roger Buisson

Client:	**Waterman Infrastructure & Environment Ltd**
Address:	**Pickfords Wharf** **Clink Street** **London** **SE1 9DG**
Project reference:	**P00001343**
Date of issue:	**January 2018**

Project Director:	**Roger Buisson**
Project Manager:	**Simon Warford**
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This report should be cited as:

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Revision and Amendment Register

Version Number	Date	Section(s)	Page(s)	Summary of Changes	Approved by
1.0	21/12/17	All	All	Creation of report based on Interim Report	RB
1.1	18/01/18	All	All	Draft report prepared for review	SR
1.2	22/01/18	All	All	Draft report for issue to client	RB
2.0	25/01/18	All	All	Final report accounting for comments received	RB

Contents

List of Tables

1. Introduction

1.1 Project background

Liverpool City Council is seeking to obtain outline planning permission for the development of a Cruise Liner Terminal that would include a terminal building, parking for coaches, taxis and cars along with landscaped areas covering an area of 5.77 ha, located at Princes Parade, Liverpool on the north bank of the Mersey Estuary (centred on Ordnance Survey Grid Reference SJ 3358 9084). The new Cruise Terminal would be constructed at the site of the existing redundant Prince's Jetty as a two storey building (with a baggage hall and passenger lounge) and would be formed by the construction of a suspended deck independent from the river wall but will be bridged over the wall for vehicular and pedestrian access purposes.

The proposed development site (the Site) currently comprises two main areas; the first comprises the derelict Prince's Jetty within the Mersey Estuary adjacent to the dockside; and the second mainly comprises a surfaced car park. The remaining areas of the Site comprise unadopted highways, staging areas for the Isle of Man Ferry and the entirety of the existing Liverpool Landing Stage.

The Site is partly within the extended Liverpool Bay SPA and within 1 km of the Mersey Narrows and North Wirral Foreshore SPA, within 1 km of the Mersey Narrows and North Wirral Foreshore Ramsar site and within 1 km of the Mersey Narrows SSSI (APEM, 2017). All these protected sites have non-breeding waterbirds amongst the listed interest features that are the reason for their designation. Full details of the interest features and other protected sites at greater distance from the Site are provided in APEM (2017).

Liverpool City Council (LCC) consulted their ecological advisers, Merseyside Environmental Advisory Service (MEAS), and the advice received (accounting for discussion with Waterman Infrastructure & Environment Ltd and APEM Ltd) was that there should be an accelerated programme of wintering bird surveys over the period October 2017 to early January 2018 (LCC/MEAS note of meeting 19th October 2017). APEM developed this advice on the survey programme in to a method statement that was provided to MEAS. The detail of that method statement is provided in Section 2 of this report.

An Interim Report of the bird surveys, completed up to the tenth visit on 5th December 2017, was prepared and provided to MEAS on 15th December 2017. A conference call between MEAS, Waterman and APEM was held to discuss the report on 18th December 2017. It was agreed during the call that the remaining planned surveys could proceed without revision to the methodology. Written feedback has not been received from MEAS on the survey results and conclusions as set out in the Interim Report.

1.2 Aim of this report

The aim of this report is to provide baseline information (species, numbers and distribution) on the wintering birds using the area within and around the Site to:

- enable the characterisation of the bird populations present;
- identify the populations of wintering waterbird species that are interest features of protected sites;
- inform the impact assessment of the proposed development; and
- inform the decisions made on the planning application.

1.3 Selection of survey methodology

The survey aim required information to be collected on all the species of bird present within the Site, flying over the Site and occurring on or over the adjacent waters of the River Mersey. Information was also required on bird numbers, spatial distribution and behaviour in order to enable an impact assessment. As the Site is tidal, information was also required on bird populations at different states of the tide.

To fit these requirements an observation point method was selected that included the recording protocols of the long running Wetland Bird Survey (https://www.bto.org/volunteer-surveys/webs/about) that is the standard method of monitoring long-term changes in bird numbers in the UK, including those on estuaries. The recording protocols were of the high tide (Core Count) and the low tide count.

2. Methodology

2.1 Observation Point Surveys

Observation Point (OP) surveys consist of a timed period of observation over a defined area of land or water from a particular location or locations to give a measure of the species and numbers of birds using that area. The generic method is described in Bibby *et al*. (2000). Note that the survey method is not a vantage point (VP) count as required for an onshore wind farm assessment (SNH, 2014).

Set out below are the key elements of how the OP survey was delivered and bird information recorded.

The survey encompasses the site of the proposed development bounded by the 'site boundary' illustrated on the figure in Appendix 1 (marked by the red line) and the adjacent waters of the Mersey Estuary.

The observation point from which surveys were conducted was adjacent to the Alexandra Tower at SJ 3351 9092 (see Appendix 2). This location gave an unobstructed view of the derelict wood and concrete "Prince's Jetty". It also provided a wider view south down the Prince's Dock, existing hardstanding areas, and the Liverpool Landing Stage; west across the waters of the River Mersey to the shore at Seacombe; and north across the Liverpool Waters development and the proposed relocated Isle of Man Ferry Terminal at Prince's Half Tide Dock.

All birds were recorded within the site boundary, the area up to 500 m to the north (Prince's Half Tide Dock and hardstandings) and within those estuarine waters that were up to one km of the observation point, referred to from here-on as the Survey Area, noting that:

- The spatial focus of recording was the derelict wood and concrete "Prince's Jetty" that is to be demolished and which is the location of the proposed terminal building.
- The species focus of recording was those birds that are interest features of the designated sites within and around the Mersey Estuary (in summary these are wildfowl, waders, gulls and terns, for the species detail see Appendix 3).

Surveys were conducted from October 2017 to January 2018 inclusive. Within that period, one pair of high tide and low tide surveys was conducted approximately every 7-10 days (each of the pair is referred to as a 'visit' in Section 3: Survey Results). These paired surveys were arranged such that there was approximately even coverage of spring and neap tides across the survey programme.

A high tide survey and a low tide survey each lasted two and a half hours and was timed and structured as follows:

- The high tide survey started two and a quarter hours before high tide and ended quarter of an hour after high tide. This was in order that recording took place during that period that birds were moving to roost locations in response to exposed natural and artificial surfaces being covered by the rising tide. The first hour of observation was from the observation point. During that hour the full set of observations were made as described in the bird recording process below. Fifteen minutes were then

spent walking to the south to the bridge across to the pontoon of the existing Liverpool Landing Stage and observations made looking back to and under the Prince's Jetty. A return was made to the observation point and the process repeated. In the two fifteen minute periods of walking to, observing at and walking back from the existing Liverpool Landing Stage the observer ceased recording birds that were only flying over the site and/or over the Mersey Estuary but did continue to record birds on the land and water.

- The low tide survey started two and a quarter hours before low tide and ended quarter of an hour after low tide. This was in order that recording took place during that period that birds were moving to the lowest parts of the intertidal land (potential foraging locations) in response its exposure by the falling tide. The first hour of observation was from the observation point. During that hour the full set of observations were made as described in the bird recording process below. Fifteen minutes were then spent walking to the south to the bridge across to the pontoon of the existing Liverpool Landing Stage and observations made looking back to and under the Prince's Jetty and across any intertidal mud that might be exposed at the lowest spring tide. A return was made to the observation point and the process repeated. In the two fifteen minute periods of walking to, observing at and walking back from the existing Liverpool Landing Stage the observer ceased recording birds that were only flying over the site and/or over the Mersey Estuary but did continue to record birds on the land and water.

Bird recording, by locating observations on a suitably scaled map, included:

- Species
- Age and/or sex (where possible)
- Behaviour activity categorised, for birds on the water, on land or on other structures, as:
    - 'feeding activity', or
    - 'not feeding activity' (this included the range of behaviours encompassing roosting, resting, preening, bathing and vigilance/alert)
- Flight activity including flight line and flight height. Take-off or landing points for those birds that start or finish their flight within the red line boundary were recorded. Birds that flew over without landing had their flight line recorded up to one km from the observer. The flight route was mapped with sufficient accuracy to enable a future assessment to be made of whether that flight route will coincide with the proposed terminal building. Flight height was recorded as above or below 30 m based on this being the maximum proposed building height.

As a result of the cessation of recording birds in flight while walking to, observing at and walking back from the existing Liverpool Landing Stage, the duration of flight recording on each visit was two hours but the total duration of observation of birds on the land or water was two and a half hours.

Any marine mammals observed in the estuarine waters were also recorded, noting species or species group, number, activity and location.

Surveys did not take place in heavy rain, poor visibility or strong wind.

2.2 The programme of survey visits

The programme of survey visits was determined by the occurrence of suitable dates on which the period two and a quarter hours before the high or low tide occurred in daylight. With the short days of mid-winter not every day was suitable (Appendix 4 illustrates the detailed tide and dawn / dusk information on which the programme of surveys was based). The structure of the programme designed to achieve 36 hours of observation before mid-January 2018 is set out in the Table 1 below.

Table 1 Programme of surveys from October 2017 to January 2018

Week commencing	High tide survey	Low tide survey	Running total of observation hours
30/10/2017	October 1	October 1	4
06/11/2017	November 1	November 1	8
13/11/2017	November 2	November 2	12
20/11/2017	November 3		14
27/11/2017		November 3	16
		December 1	18
04/12/2017	December 1		20
	December 2		22
11/12/2017		December 2	24
		December 3	26
18/12/2017	December 3		28
25/12/2017			
01/01/2018	January 1		32
08/01/2018	January 2	January 1	34
		January 2	36

The exact day on which the survey took place was determined in the preceding 3-5 days based on the forecast of suitable weather. Sufficient flexibility was built in to the programme such that should there have been a run of adverse weather of 2-3 days the programme could still be achieved (any longer runs of adverse weather would have affected the ability to achieve the programme). Flexibility included the scope to narrow the interval between surveys provided that was permitted by the time of the tides and dawn and dusk. The final option in response to adverse weather to achieve the total of 36 hours of observation before mid-January 2018 was to conduct the survey in the period 3-4 hours before high or low tide or 1-2 hours after high or low tide.

2.3 Limitations to the surveys

Surveys are by their nature a sample of the birds occurring at a site and additional species and/or greater numbers might occur on days that were not surveyed.

The number and distribution of birds will change with the time of day, the state of the tide (the reason why high and low tide counts were conducted) and across the spring-neap cycle. The date and time of each survey within each month was chosen to provide a spread across the winter of surveys at different times of day, at high or low tide and on spring, intermediate or neap tides.

Weather forecasts were regularly monitored prior to scheduled survey dates and a final assessment made the day before each survey. In the case of weather conditions proving unsuitable for surveying, surveys were rescheduled for the next suitable date and time allowed by tides and daylight hours.

Where access to the Liverpool Landing Stage pontoon was not possible due to the survey taking place outside of business hours, the 15 minute counts were taken from the northern-most pontoon bridge which affords an unobstructed but slightly more elevated view of the Prince's Jetty substructure.

3. Survey Results

3.1 Overview

This section provides the results of the full survey programme carried out between the 30th October and the 12th January 2018. The surveys are referred to in the tables by visit number i.e. Visit 1 to Visit 18 with Table 2 identifying on which date each visit was made.

For each survey, information is provided in a standard format on when the survey took place; the weather and tidal conditions under which the survey took place; the observers conducting the survey; the count of the bird species observed on each survey; and where relevant a commentary on the counts and any limitations to the delivery of the survey. Limitations that are common to all or a specific category of survey have already been described in the methodology section above.

3.2 Survey visits

Table 2 lists the survey dates and the weather conditions for the visits.

Table 2 Survey dates and weather conditions

Visit	Date	Weather
1	30/10/2017	Cloud: 6/8, Wind: SSE f2, Rain: None, Temp: 5c
2	31/10/2017	Cloud: 3/8, Wind: SSE f2, Rain: None, Temp: 9c
3	09/11/2017	Cloud: 2/8, Wind: NW f5, Rain: None, Temp: 4c
4	10/11/2017	Cloud: 2/8, Wind: NW f5-6, Rain: None, Temp: 6c
5	15/11/2017	Cloud: 5/8, Wind: SE f2, Rain: None, Temp: 6c
6	16/11/2017	Cloud: 8/8, Wind: NW f3, Rain: None, Temp: 8c
7	23/11/2017	Cloud: 8/8, Wind: NW f3, Rain: None, Temp: 8c
8	28/11/2017	Cloud: 2/8, Wind: NNW f4, Rain: None, Temp: 6c
9	01/12/2017	Cloud: 0/8, Wind: NNW f2-3, Rain: None, Temp: 2c
10	05/12/2017	Cloud: 8/8, Wind: WSW f1, Rain: None, Temp: 8c
11	08/12/2017	Cloud: 7/8, Wind: NW f5, Rain: None, Temp: 2c
12	11/12/2017	Cloud: 0/8, Wind: N f1, Rain: None, Temp: -2c
13	15/12/2017	Cloud: 6/8, Wind: NNW f3, Rain: None, Temp: 5c
14	19/12/2017	Cloud: 8/8, Wind: SE f1, Rain: None, Temp: 6c
15	03/01/2018	Cloud: 6/8, Wind: W f6, Rain: Scattered showers, Temp: 8c
16	08/01/2018	Cloud: 0/8, Wind: N f1, Rain: None, Temp: -1c
17	09/01/2018	Cloud: 8/8, Wind: SE f4, Rain: None Temp: 4c
18	12/01/2018	Cloud: 8/8, Wind: SSE f1-2, Rain: None, Temp: 5c

Table 3 relates the date and duration of the survey to the tidal state.

Table 3 Surveys in relation to tidal state

Visit	Date	Start time (GMT)	Finish time (GMT)	Tidal state
1	30/10/2017	11.28	13.28	Low tide – 13.28
2	31/10/2017	06.40	08.40	High tide – 07.54
3	09/11/2017	12.04	14.34	High tide – 14.34
4	10/11/2017	07.30	10.00	Low tide – 09.55
5	15/11/2017	13.07	15.37	Low tide – 15.37
6	16/11/2017	07.15	09.45	High tide – 09.37
7	23/11/2017	11.15	14.00	High tide – 13.33
8	28/11/2017	10.15	12.45	Low tide – 12.32
9	01/12/2017	13.26	15.56	Low tide – 15.14
10	05/12/2017	09.35	12.05	High tide – 11.55
11	08/12/2017	12.10	14.40	High tide – 14.24
12	11/12/2017	09.20	11.58	Low tide – 11.43
13	15/12/2017	13.40	16.10	Low tide – 15.55
14	19/12/2017	09.22	11.52	High tide – 11.37
15	03/01/2018	09.26	11.56	High tide – 11.41
16	08/01/2018	07:56	10:26	Low tide – 10.11
17	09/01/2018	13:45	16:15	High tide – 16.46
18	12/01/2018	12.15	14.45	Low tide – 14.29

Table 4 lists the observers and the survey timing for each of the visits.

Table 4 Observers and survey timing.

Visit	Observer	Date	Start time (GMT)	Finish time (GMT)
1	S. Reid	30/10/2017	11.28	13.28
2	S. Reid	31/10/2017	06.40	08.40
3	M. Boa	09/11/2017	12.04	14.34
4	S. Reid	10/11/2017	07.30	10.00
5	M. Boa	15/11/2017	13.07	15.37
6	S. Reid	16/11/2017	07.15	09.45
7	R. McCloud	23/11/2017	11.15	14.00
8	M. Boa	28/11/2017	10.15	12.45
9	S. Reid	01/12/2017	13.26	15.56
10	R. McCloud	05/12/2017	09.35	12.05
11	M. Boa	08/12/2017	12.10	14.40
12	R. McCloud	11/12/2017	09.20	11.58
13	S. Reid	15/12/2017	13.40	16.10
14	S. Reid	19/12/2017	09.22	11.52
15	M. Boa	03/01/2018	09.26	11.56
16	R. McCloud	08/01/2018	07:56	10:26

Visit	Observer	Date	Start time (GMT)	Finish time (GMT)
17	M. Boa	09/01/2018	13:45	16:15
18	S. Reid	12/01/2018	12.15	14.45

3.3 Observations

3.3.1 Peak counts of birds on land / water

Table 5 lists the peak count of each species recorded on land and/or water for each of the visits in the survey programme. A peak count was identified as the highest number of each species observed at any one time during the two and a half hour survey. The peak count was determined by the observer to ensure that duplicate counting was avoided. The observer noted the behaviour and plumage details of the individuals observed and where there was certainty that a bird was not a duplicate of those already recorded, it would be added to the peak count total. For example; if a group of three cormorants were observed on the water within the Survey Area before flying south up river, and shortly afterwards a lone cormorant arrived from the north and landed within the Survey Area, the peak count would be recorded as four as it could be determined with certainty that the lone individual had not been recorded previously.

Numbers highlighted in orange represents the peak count of each species of bird observed on land and/or water across the programme of survey visits. Where that same peak number occurred on several visits, lighter orange shading is used.

Table 5 Peak count of each bird species recorded on land and/or water on each visit

Bird Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Canada goose	2				2		7	2		2	2	8	5	15	5		9	3
Cormorant	6	12	5	1	8	2	4	6	3	3		10	2	4		5	4	3
Grey heron					1		1				1							
Sparrowhawk		1																
Redshank																1		
Oystercatcher					1										2		16	
Turnstone			6		2		6		7			4	7				8	5
Black-headed gull	10	5			3		19	11		2	8	7		11	8		28	3
Common gull							3	1	2					1				1
Lesser black-backed gull		1																
Herring gull	15	36	1	3	12	68	2	7	5	2	7	14	2	8	3	5	7	8
Great black-backed gull		2	1			2			1	2		2		1	1	1	2	
Kingfisher	1																	
Carrion crow					3		2	1	2	2	1		1	3	2	1	4	2
Magpie					2	1		2	1	1	1	1	1	1	1	1	2	1
Wren					1													1
Pied wagtail												1			1	1		
Starling					5			2		1	3	6	3	6	5		2	
Mistle thrush							2			1								
Song thrush															2			
Robin												1			1	1	1	

Table note: The scientific names of birds are provided in Appendix 5.

3.3.2 Total counts of flying birds

Table 6 lists the total count of each species recorded as in flight only for each of the visits in the survey programme. Total counts were identified as the total number of each species recorded in flight without landing during the two hour period of recording flight activity from the observation point. In order to avoid duplicate counting, any birds suspected to be associating with the survey area in flight on more than one occasion throughout the duration of the survey were only recorded once. Implementing this method of obtaining a peak count ensured that duplicate counting was avoided. The behaviour of the species observed was considered and where there was certainty that a bird in flight was not a duplicate of those already recorded, it would be added to the total count.

Numbers highlighted in orange represents the largest total of each species of bird observed in flight only across the programme of survey visits. Where that same peak number occurred on several visits, lighter orange shading is used.

Table 6 Total count of each bird species recorded as in flight only on each visit

Bird Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Pink-footed goose					150											28		
Canada Goose									12							11		
Shelduck															7	1		
Mallard	2											3		2				
Cormorant	3	19	7	8	6	5	5	6	3	2		7	2	5		14	20	4
Grey Heron							1		1		1			1				
Black-tailed Godwit																24		
Redshank														1				
Oystercatcher	2							3	1	5	1	3		3		5	6	5
Black-headed gull	5	12	29	41	14	21	28	29	10	16	30	68	18	30	35	544	37	49
Common gull				9			6		4			2	3	5		3		1
Lesser black-backed gull	1								2		2			4	1			1
Herring gull	11	31	48	165	169	326	71	89	82	157	169	105	96	89	169	85	81	75
Great black-backed gull	5	3	5	13	6	8	7	4	5	16	7	12	3	1	3	10	2	5
Wood pigeon														1		2		
Raven										1								
Carrion crow																2		
Magpie																1	1	
Pied wagtail	1				1			1									1	
Starling											2				5	1		

Table note: The scientific names of birds are provided in Appendix 5.

3.3.3 Species accounts

Wildfowl & Cormorants

Five species of wildfowl and cormorant were recorded during the Liverpool Cruise Terminal surveys from October 2017 to January 2018.

A flock of 150 pink-footed geese was observed flying high in v-formation, heading west, over the River Mersey to the south of the Site on the 15th of November and a flock of 28 were recorded flying south over the far side of the river channel on the 8th of January.

Canada goose was observed during 13 of the 18 surveys, on 12 occasions feeding on open hardstanding ground and the adjacent Prince's Dock to the east of the Site with a peak count of 15 recorded on the 23rd of November. Canada goose was recorded in flight only on two occasions, with a peak count of 12 observed flying over the Site on the 1st of December.

Shelduck was observed in flight during two surveys, with a peak count of seven flying south at varying distances across the river channel on the 3rd of January, with a lone individual also recorded flying south up river mid-way across the river channel on the 8th of January.

Mallard was recorded in flight during three surveys, with a peak count of three birds observed flying to the north of the Site on the 11th of December.

Cormorant was observed during 16 of the 18 survey visits, with each of these surveys involving birds both on land and/or water and birds recorded as in flight only. A peak count of 12 cormorants on land and/or water was recorded on the 31st of October with the majority of these birds perched on permanent structures within the Site, including six birds perched on the Prince's Jetty. A peak count of 20 birds in flight only was recorded on the 9th of January with the majority of these birds flying south up river at varying distances across the river channel during the rising tide. Cormorants were recorded as feeding in the water around the base of the Prince's Jetty on two occasions (two birds on the 16th of November and one on the 1st of December), all of which were observed during the 15 minute observations from the Liverpool Landing Stage pontoon.

Of the five wildfowl and cormorant species recorded, cormorant and shelduck represent features of a protected site in close proximity to the proposed development. Cormorant is an assemblage feature of the Liverpool Bay SPA, an assemblage feature of the Mersey Narrows & North Wirral Foreshore SPA, an assemblage feature of the Mersey Narrows & North Wirral Foreshore Ramsar site and an interest feature of the Mersey Narrows SSSI. The counts of cormorants recorded are not of a scale to be of national or greater importance or to be a significant component of either of these two SPAs, the Ramsar site or the SSSI. Shelduck is an interest feature of the Mersey Estuary SPA, the Mersey Estuary Ramsar site and the Mersey Estuary SSSI. The counts of shelduck recorded are not of a scale to be of national or greater importance or to be a significant component of the SPA, the Ramsar site or the SSSI.

Waders & Herons

Five species of waders and herons were recorded during the Liverpool Cruise Terminal surveys from October 2017 to January 2018.

Oystercatcher was observed during 12 of the 18 surveys, on three occasions on land and on ten occasions recorded as in flight only. A peak count of birds on land was of 16 recorded as perched on the sea wall adjacent to Prince's Half Tide Dock to the north of the Site on the 9th of January. The peak count of birds recorded as in flight only was of six (five flying north and one flying south within 50m of the Site) on the same date.

Turnstone was observed during eight of the 18 surveys. All eight occasions involved birds feeding (during a falling tide) or roosting (during a rising tide) on the substructure of the Prince's Jetty, as observed from the Liverpool Landing Stage pontoon. A peak count of eight turnstones was recorded as feeding over low tide on the 9th of January.

Black-tailed godwit was observed on one occasion only. A flock of 24 birds was recorded in flight only flying south up river, approximately three-quarters of the way across the river channel, on the 8th of January.

Redshank was observed on two occasions during the 18 surveys. A lone redshank was recorded in flight heading south up river, approximately three-quarters of the way across the river channel from the Site, on the 19th of December. A lone redshank was also recorded on the 8th of January, perched on the substructure of the Prince's Jetty as observed from the Liverpool Landing Stage pontoon.

Grey heron was recorded during five of the 18 surveys, with individuals recorded as perched on the substructure of the Prince's Jetty from the Observation Point before flying north down river on the 15th and 23rd of November, and the 8th of December. No feeding behaviour was observed. Individuals were recorded as in flight only on four occasions, all flying north over the Prince's Jetty.

Of the five wader and heron species recorded, turnstone, black-tailed godwit, redshank and oystercatcher represent features of a protected site in close proximity to the proposed development. Turnstone is an interest feature of the Mersey Narrows & North Wirral Foreshore SPA, the Mersey Narrows SSSI and the North Wirral Foreshore SSSI. Black-tailed godwit is an interest feature of the New Ferry SSSI and is an assemblage feature of the Mersey Estuary SPA. Redshank is an interest feature of the Mersey Estuary SPA, the Mersey Estuary Ramsar site, the Mersey Estuary SSSI, the Mersey Narrows & North Wirral Foreshore SPA, the Mersey Narrows SSSI and is an assemblage feature of the Mersey Narrows & North Wirral Foreshore Ramsar site. Oystercatcher is an assemblage feature of the Mersey Narrows & North Wirral Foreshore SPA and the Mersey Narrows & North Wirral Foreshore Ramsar site. The counts of turnstone, redshank, black-tailed godwit and oystercatcher recorded are not of a scale to be of national or greater importance or to be a significant component of the SPAs, Ramsar sites or the SSSIs.

Gulls

Five species of gull were recorded during the Liverpool Cruise Terminal surveys from October 2017 to January 2018.

Black-headed gulls were observed during all 18 survey visits, with 12 surveys involving birds recorded on land and/or water, whilst all 18 surveys involved birds recorded as in flight only. A peak count of 28 black-headed gulls on land and/or water was recorded on the 9th of January with approximately half of these birds perched on permanent structures or hard-standing within the Site, and half sitting on the water surface. A peak count of 544 black-headed gulls recorded as in flight only were observed on the 8th of January, with the majority of these birds flying south up river at varying distances across the river channel.

Common gulls were observed during nine of the 18 survey visits, with five surveys involving birds on land and/or water, whilst eight surveys involved birds recorded in flight only. A peak count of three common gulls on land and/or water was recorded on the 23rd of November with all three birds observed feeding on the water surface approximately midway across the river channel. A peak counts of nine common gulls recorded as in flight only was observed on the 10th of November, with the majority of these birds flying at varying distances across the river channel.

Herring gulls were observed during all 18 survey visits, with each survey involving birds both on land and/or water and birds recorded as in flight only. A peak count of 68 herring gulls on land and/or water was recorded on the 16th of November with the majority of these birds recorded as feeding on the water surface beside the bow of a large supply vessel which was docked at the Liverpool Landing Stage pontoon. A peak count of 326 birds recorded as in flight only was observed on the same date, with the majority of these birds flying south up river close to, or directly over, the Site.

Great black-backed gulls were observed during all 18 survey visits, with nine surveys involving birds recorded on land and/or water, whilst all 18 surveys involved birds recorded as in flight only. Peak counts of two great black-backed gulls on land and/or water were recorded on the 31st of October, 16th of November, 5th and 11th of December, and the 9th of January, all of which involved birds perched on permanent structures within, or in close proximity to, the Site, or sitting on the water surface. A peak count of 16 great black-backed gulls recorded as in flight only were observed on the 5th of December, with the majority of these birds flying south up river at varying distances across the river channel.

Lesser Black-backed gulls were observed during seven of the 18 surveys. A lone bird was sitting on the water surface north of the Prince's Jetty on the 31st of October, whilst birds were recorded as in flight only during six surveys with a peak count of four, all flying west to east across the river channel, on the 19th of December.

Of the five species of gull recorded, none represent a feature of the protected sites in close proximity to the proposed development (those sites within 5 km being Liverpool Bay SPA, Mersey Narrows & North Wirral Foreshore SPA, Mersey Estuary SPA, Mersey Narrows & North Wirral Foreshore Ramsar site, Mersey Estuary Ramsar site, Mersey Estuary SSSI,

Mersey Narrows SSSI, New Ferry SSSI and North Wirral Foreshore SSSI). The counts of gulls recorded are not of a scale to be of national or greater importance.

Raptors

One species of raptor was recorded during the Liverpool Cruise Terminal surveys from October 2017 to January 2018. A lone sparrowhawk was observed on the 31st of October, flying in from the east and perching momentarily on the Prince's Jetty before continuing west.

Sparrowhawk is not a feature of any of the protected sites within close proximity to the proposed development. The counts of sparrowhawk recorded are not of a scale to be of national or greater importance.

Passerines, Pigeons & Kingfisher

A total of 11 species of passerine, pigeon and kingfisher were recorded during the Liverpool Cruise Terminal surveys from October 2017 to January 2018.

Kingfisher was recorded on one occasion, 30th of October, perched on the substructure of the Prince's Jetty before flying south up river as observed from the Liverpool Landing Stage pontoon.

Wood pigeon was recorded as in flight only on two occasions, with a peak count of two flying south and east over the Site on the 8th of January.

Carrion crow was recorded on land within the Site during 12 of the 18 surveys, with a peak count of four on the 9th of January. Magpie was observed on land within the Site on 13 occasions, with a peak count of two recorded during three of these surveys. A single raven was observed flying high, heading east, over the River Mersey to the north of the Site on the 15th November.

There were two records of wren, both individual birds, observed on the 15th of November and the 12th of January. Pied wagtail was observed during seven of the 18 surveys, with three records involving individual birds on land in the Site, and individual birds recorded as in flight only over the Site on four occasions. Starling was recorded on land during nine surveys, with peak counts of six recorded on the 11th and 19th of December. Mistle thrush was recorded on land during two surveys, with a peak count of two birds observed to the north of the Site on the 23rd of November. Song thrush was recorded on one occasion involving two birds perched on the Prince's Jetty on the 3rd of January. Robin was recorded on land within the Site on four occasions, each involving individual birds.

None of the 11 species of passerine, pigeon and kingfisher recorded are features of the protected sites within close proximity to the proposed development. The counts of passerines, pigeons and kingfisher recorded are not of a scale to be of national or greater importance.

3.3.4 Consideration of the flight paths and flight heights of birds

During consultation with MEAS it was suggested that the proposed new terminal building might present a collision risk. For this reason flight paths and flight heights were recorded of birds passing over the proposed development site and across the adjacent River Mersey. A total of 20 species of bird (Table 6) were recorded flying across those areas during the Liverpool Cruise Terminal surveys from October 2017 to January 2018.

Bird flight paths were categorised in to those that were:

- Within 50 m of the proposed site and those that were at a greater distance
- Above or below 30 m in height.

In Table 7 the number of flying birds recorded has been expressed as flights per hour for each species whose flight path occurred within 50 m of the proposed site (totalling 16 species - pink-footed goose, black-tailed godwit, redshank and raven were outside this area) and categorised as above or below 30 m in height. When considering potential collision risk, a measure of flight activity or 'flux' (such as flight per hour) is the parameter that is evaluated.

Table 7 Flight activity (birds per hour) within 50 m of the Site at the two height categories

Bird Species	< 30 m	> 30 m	Total
Canada goose	0.5	0	0.5
Shelduck	<0.1	0	<0.1
Mallard	0.1	0	0.1
Cormorant	1.3	0.6	1.9
Grey heron	0.1	0	0.1
Oystercatcher	0.6	0	0.6
Black-headed gull	8.3	3.3	11.6
Common gull	0.4	0.2	0.6
Lesser black-backed gull	0.3	0	0.3
Herring gull	30.4	17.3	47.7
Great black-backed gull	1.1	0.8	1.9
Wood pigeon	<0.1	<0.1	<0.1
Carrion crow	<0.1	<0.1	<0.1
Magpie	<0.1	0	<0.1
Pied wagtail	0.1	0	0.1
Starling	0.2	0	0.2

Table note: The scientific names of birds are provided in Appendix 5.

3.3.5 Limitations

The first two surveys were undertaken prior to pontoon access being agreed and therefore only a single 15 minute count was taken from either the pontoon or the northern most pontoon bridge at the end of the first two OP surveys.

Some bird species, primarily gulls, are attracted to moving vessels due to water disturbance or the discarding of organic matter from fishing vessels presenting a feeding opportunity. The movement of shipping traffic through the main river channel has the potential to attract birds to fly in to or through the Survey Area which otherwise may have not been recorded. In such situations, birds associating with vessels were recorded if they were observed associating with any birds that had been initially recorded in the Survey Area and/or moved to within the Survey Area e.g. landing on the water surface within the Survey Area.

There were no other limitations to the conduct of the surveys.

4. Conclusions

The survey method selected to inform the baseline characterisation of wintering bird populations (species, numbers and distribution) using the area within and around the proposed Liverpool Cruise Terminal has proven effective in achieving that aim.

No significant numbers of birds have been recorded that are features of protected sites within close proximity to the proposed development. Those protected sites, all within 5 km, are Liverpool Bay SPA, Mersey Narrows & North Wirral Foreshore SPA, Mersey Estuary SPA, Mersey Narrows & North Wirral Foreshore Ramsar site, Mersey Estuary Ramsar site, Mersey Estuary SSSI, Mersey Narrows SSSI, New Ferry SSSI and North Wirral Foreshore SSSI.

Herring gull was the bird species with the greatest number of occurrences on the land and water within and immediately adjacent to the proposed development site, being observed on all visits. Along with black-headed gull, herring gull was observed in flight within the Survey Area on all visits. Herring gull is not an interest feature of any of the protected sites in close proximity to the proposed development. It is listed as a Bird of Conservation Concern 4 Red List species (Eaton *et al*., 2015) and NERC Act Section 41 species. The peak count of herring gull on land or water was 68 and the largest total recorded in flight on any one survey was 326. These numbers are not of a scale to be of national or greater importance. Its flight activity within 50 m of the site and below 30 m height was 30 birds per hour. Herring gulls are closely associated with human activity and there is no reason why the proposed development should adversely affect the continued use of the area by herring gull. There is no evidence in the published scientific literature that herring gull, or any other waterbird species, is likely to collide with a large waterside building. It is concluded that the replacement of an existing, redundant waterside structure with a new waterside structure and a two storey building will not have a significant adverse effect on the population of herring gull recorded wintering on the Site.

Black-headed gull was the bird species with the greatest peak count on any visit with a total of 544, the majority of which were flying south up river at varying distances across the river channel. Black-headed gull is not an interest feature of any of the protected sites in close proximity to the proposed development. It is listed as a Bird of Conservation Concern 4 Amber List species (Eaton *et al*., 2015). The numbers recorded are not of a scale to be of national or greater importance. Its flight activity within 50 m of the site and below 30 m height was 8 birds per hour. Black-headed gulls are closely associated with human activity and there is no reason why the proposed development should adversely affect the continued use of the area by this gull. There is no evidence in the published scientific literature that black-headed gull, or any other waterbird species, is likely to collide with a large waterside building. It is concluded that the replacement of an existing, redundant waterside structure with a new waterside structure and a two storey building will not have a significant adverse effect on the population of black-headed gull recorded wintering on the Site.

The other bird species of particular conservation status that were recorded in smaller and also non-significant numbers are listed in Table 8 along with herring and black-headed gull.

Table 8 Bird species recorded and their conservation status

Species	Feature of protected site within 5 km of proposed development	Conservation listing
Pink-footed goose	-	BoCC4 Amber
Shelduck	Mersey Estuary SPA Mersey Estuary Ramsar site Mersey Estuary SSSI	BoCC4 Amber
Cormorant	Liverpool Bay SPA Mersey Narrows & North Wirral Foreshore SPA Mersey Narrows & North Wirral Foreshore Ramsar site Mersey Narrows SSSI	-
Black-tailed godwit	Mersey Estuary SPA New Ferry SSSI	BoCC4 Red NERC Section 41
Redshank	Mersey Estuary SPA Mersey Estuary Ramsar site Mersey Estuary SSSI Mersey Narrows & North Wirral Foreshore SPA Mersey Narrows & North Wirral Foreshore Ramsar site Mersey Narrows SSSI	BoCC4 Amber
Oystercatcher	Mersey Narrows & North Wirral Foreshore SPA Mersey Narrows & North Wirral Foreshore Ramsar site	BoCC4 Amber
Turnstone	Mersey Narrows & North Wirral Foreshore SPA Mersey Narrows SSSI North Wirral Foreshore SSSI	BoCC4 Amber
Black-headed gull	-	BoCC4 Amber
Common gull	-	BoCC4 Amber
Herring gull	-	BoCC4 Red NERC Section 41
Lesser black-backed gull	-	BoCC4 Amber
Great black-backed gull	-	BoCC4 Amber
Kingfisher	-	BoCC4 Amber
Starling	-	BoCC4 Red NERC Section 41
Mistle thrush		BoCC4 Red

Overall conclusion and information to inform the impact assessment of the proposed development

The evidence available from the wintering bird surveys of the area within and around the proposed Liverpool Cruise Terminal is that:

- Numbers of wintering birds are not present in significant numbers, either in a national context or as interest features of protected sites.
- The proposed development is of a nature that it will not significantly adversely affect any of the populations of wintering birds that were recorded in the surveys.

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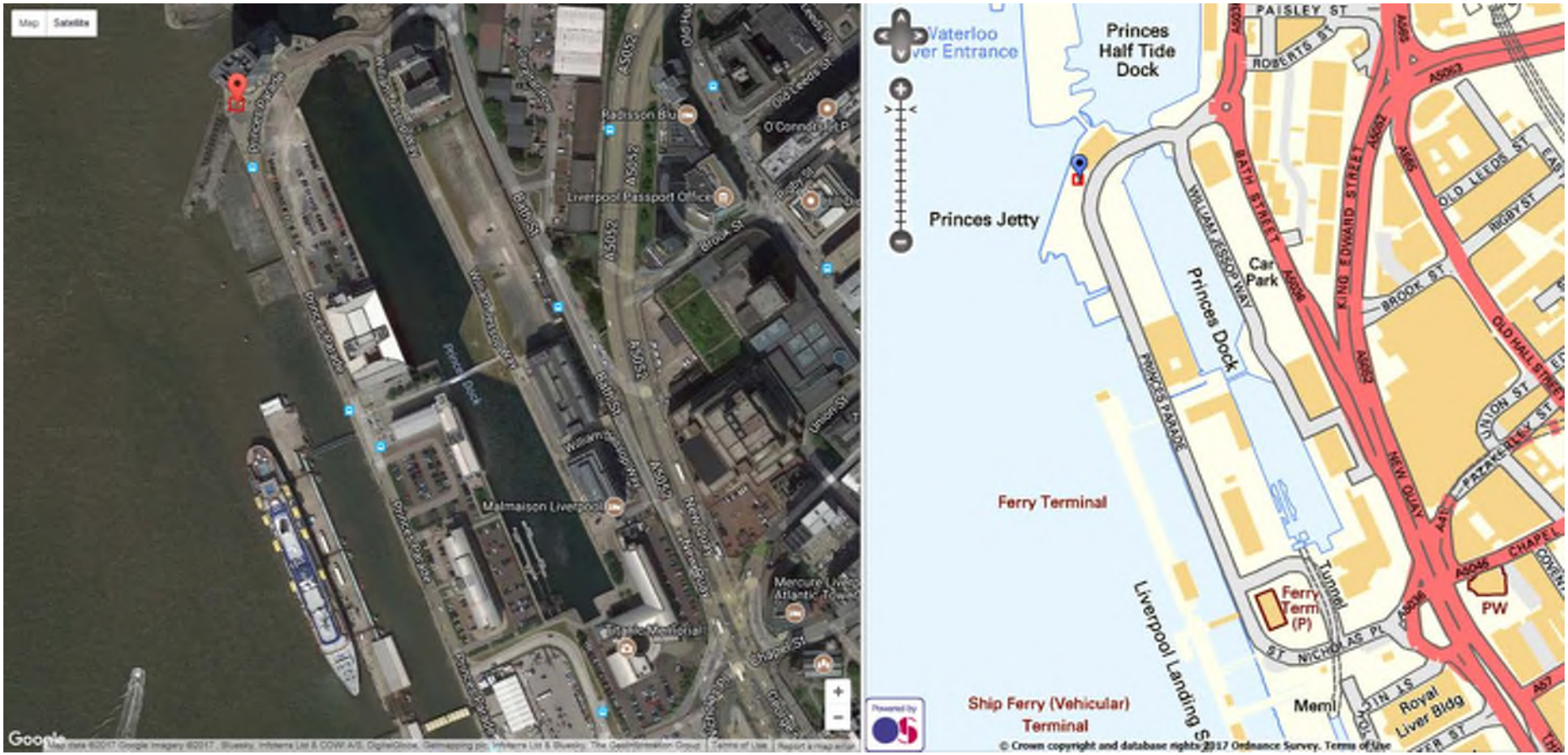
Appendix 1: Red line boundary of proposed development

Appendix 2: Observation point location



Appendix 3: Designated sites around the Mersey Estuary and their bird interest features

Designated Site	Bird Interest features
Liverpool Bay SPA [as extended in late 2017]	Red-throated diver, common scoter, little gull, common tern and little tern. Waterbird assemblage: The above plus red-breasted merganser and cormorant.
Mersey Estuary SPA	Golden plover, dunlin, pintail, redshank, shelduck and ringed plover. Waterbird assemblage: The above plus curlew, black-tailed godwit, lapwing, grey plover, wigeon, great crested grebe and teal.
Mersey Estuary Ramsar site	Shelduck, redshank, teal, pintail and dunlin. Waterbird assemblage: The above plus ringed plover, curlew, spotted redshank, greenshank and wigeon.
Mersey Estuary SSSI	Pintail, shelduck, wigeon, teal, dunlin, curlew, redshank and golden plover.
Mersey Narrows & North Wirral Foreshore SPA.	Redshank and turnstone. Waterbird assemblage: The above plus dunlin, knot, grey plover, oystercatcher and cormorant.
Mersey Narrows & North Wirral Foreshore Ramsar site	Little gull, common tern, knot and bar-tailed godwit. Waterbird assemblage: The above plus cormorant, oystercatcher, grey plover, sanderling, dunlin and redshank.
Mersey Narrows SSSI	Turnstone, redshank and cormorant.
New Ferry SSSI	Pintail and black-tailed godwit.
North Wirral Foreshore SSSI	Knot, bar-tailed godwit, turnstone and dunlin.
Ribble and Alt Estuaries SPA	Bewick's swan, whooper swan, pink-footed goose, shelduck, wigeon, teal, pintail, oystercatcher, ringed plover, golden plover, grey plover, knot, sanderling, dunlin, ruff, black-tailed godwit, bar-tailed godwit, redshank, lesser black-backed gull and common tern. Waterbird assemblage: The above plus cormorant, scaup, common scoter, lapwing, whimbrel and curlew.

Designated Site	Bird Interest features
Ribble and Alt Estuaries Ramsar site	Bewick's swan, whooper swan, pink-footed goose, shelduck, wigeon, teal, pintail, oystercatcher, ringed plover, grey plover, knot, sanderling, dunlin, black-tailed godwit, bar-tailed godwit, redshank, lesser black-backed gull and common tern. Waterbird assemblage: The above plus red-throated diver, cormorant, shoveler, common scoter, golden plover, spotted redshank, greenshank, ruff, curlew and black-headed gull.
The Dee Estuary SPA	Shelduck, teal, pintail, oystercatcher, grey plover, knot, dunlin, black-tailed godwit, bar-tailed godwit, curlew, redshank, Sandwich tern, common tern and little tern. Waterbird assemblage: The above plus great crested grebe, cormorant, wigeon, lapwing and sanderling.
The Dee Estuary Ramsar site	Shelduck, teal, pintail, oystercatcher, grey plover, knot, dunlin, black-tailed godwit, bar-tailed godwit, curlew and redshank. Waterbird assemblage: The above plus great crested grebe, cormorant, wigeon, ringed plover and sanderling.

Appendix 4: Tide and dusk/dawn information for Liverpool on which the survey programme is based

Day	Date	AM twilight	PM twilight	High tide	High tide level	Low tide	Low tide level	Neap or spring
Wednesday	25/10/2017	07:22:00	18:29:00	14:56:00	8.3	09:20:00	2.5	
Thursday	26/10/2017	07:24:00	18:27:00	15:38:00	7.9	09:56:00	2.9	
Friday	27/10/2017	07:26:00	18:25:00	16:32:00	7.5	10:43:00	3.3	Neap
Saturday	28/10/2017	07:28:00	18:23:00	17:41:00	7.3	11:46:00	3.6	
Sunday	29/10/2017	06:30:00	17:21:00	17:59:00	7.3	12:06:00	3.7	
Monday	30/10/2017	06:31:00	17:19:00	06:50:00	7.2	13:28:00	3.4	
Tuesday	31/10/2017	06:33:00	17:17:00	07:54:00	7.7	14:33:00	2.9	
Wednesday	01/11/2017	06:35:00	17:15:00	08:42:00	8.3	15:25:00	2.3	
Thursday	02/11/2017	06:37:00	17:13:00	09:23:00	8.8	16:12:00	1.8	
Friday	03/11/2017	06:38:00	17:12:00	10:02:00	9.3	16:56:00	1.3	
Saturday	04/11/2017	06:40:00	17:10:00	10:41:00	9.6	17:40:00	1.0	Spring
Sunday	05/11/2017	06:42:00	17:08:00	11:21:00	9.8	18:25:00	0.9	
Monday	06/11/2017	06:44:00	17:06:00	12:03:00	9.8	19:09:00	0.9	
Tuesday	07/11/2017	06:45:00	17:05:00	12:49:00	9.6	07:29:00	1.0	
Wednesday	08/11/2017	06:47:00	17:03:00	13:39:00	9.3	08:14:00	1.4	
Thursday	09/11/2017	06:49:00	17:02:00	14:34:00	8.8	09:02:00	1.9	
Friday	10/11/2017	06:51:00	17:00:00	15:38:00	8.4	09:55:00	2.4	
Saturday	11/11/2017	06:52:00	16:59:00	16:49:00	8.0	10:58:00	2.8	Neap
Sunday	12/11/2017	06:54:00	16:57:00	18:06:00	7.9	12:15:00	3.0	
Monday	13/11/2017	06:56:00	16:56:00	19:20:00	8.1	13:36:00	2.8	
Tuesday	14/11/2017	06:57:00	16:54:00	07:59:00	8.4	14:43:00	2.4	
Wednesday	15/11/2017	06:59:00	16:53:00	08:53:00	8.6	15:37:00	2.1	
Thursday	16/11/2017	07:01:00	16:52:00	09:37:00	8.8	16:22:00	1.8	
Friday	17/11/2017	07:02:00	16:51:00	10:15:00	9.0	17:01:00	1.7	Spring
Saturday	18/11/2017	07:04:00	16:49:00	10:49:00	9.1	17:36:00	1.6	
Sunday	19/11/2017	07:06:00	16:48:00	11:21:00	9.2	18:09:00	1.7	
Monday	20/11/2017	07:07:00	16:47:00	11:53:00	9.1	18:40:00	1.8	
Tuesday	21/11/2017	07:09:00	16:46:00	12:25:00	9.0	06:55:00	1.9	
Wednesday	22/11/2017	07:11:00	16:45:00	12:58:00	8.8	07:25:00	2.1	
Thursday	23/11/2017	07:12:00	16:44:00	13:33:00	8.5	07:57:00	2.4	
Friday	24/11/2017	07:14:00	16:43:00	14:12:00	8.2	08:34:00	2.7	
Saturday	25/11/2017	07:15:00	16:42:00	14:58:00	7.9	09:17:00	3.0	
Sunday	26/11/2017	07:17:00	16:41:00	15:55:00	7.7	10:10:00	3.3	Neap
Monday	27/11/2017	07:18:00	16:41:00	17:01:00	7.6	11:17:00	3.5	
Tuesday	28/11/2017	07:19:00	16:40:00	18:10:00	7.7	12:32:00	3.4	
Wednesday	29/11/2017	07:21:00	16:39:00	06:56:00	7.6	13:44:00	3.0	
Thursday	30/11/2017	07:22:00	16:38:00	07:56:00	8.1	14:46:00	2.5	
Friday	01/12/2017	07:24:00	16:38:00	08:47:00	8.6	15:41:00	1.9	
Saturday	02/12/2017	07:25:00	16:37:00	09:33:00	9.1	16:31:00	1.5	
Sunday	03/12/2017	07:26:00	16:37:00	10:17:00	9.5	17:20:00	1.1	Spring

Day	Date	AM twilight	PM twilight	High tide	High tide level	Low tide	Low tide level	Neap or spring
Monday	04/12/2017	07:27:00	16:36:00	11:03:00	9.8	18:09:00	0.8	
Tuesday	05/12/2017	07:29:00	16:36:00	11:50:00	9.9	18:57:00	0.7	
Wednesday	06/12/2017	07:30:00	16:36:00	12:38:00	9.7	07:16:00	0.9	
Thursday	07/12/2017	07:31:00	16:35:00	13:30:00	9.5	08:03:00	1.2	
Friday	08/12/2017	07:32:00	16:35:00	14:24:00	9.1	08:51:00	1.6	
Saturday	09/12/2017	07:33:00	16:35:00	15:21:00	8.7	09:41:00	2.1	
Sunday	10/12/2017	07:34:00	16:35:00	16:22:00	8.3	10:37:00	2.6	Neap
Monday	11/12/2017	07:35:00	16:35:00	17:29:00	8.0	11:43:00	2.9	
Tuesday	12/12/2017	07:36:00	16:35:00	18:40:00	7.8	12:57:00	3.0	
Wednesday	13/12/2017	07:37:00	16:35:00	07:22:00	7.9	14:08:00	2.8	
Thursday	14/12/2017	07:38:00	16:35:00	08:22:00	8.1	15:07:00	2.5	
Friday	15/12/2017	07:39:00	16:35:00	09:12:00	8.4	15:55:00	2.3	
Saturday	16/12/2017	07:39:00	16:35:00	09:53:00	8.7	16:37:00	2.1	
Sunday	17/12/2017	07:40:00	16:36:00	10:30:00	8.9	17:14:00	2.0	
Monday	18/12/2017	07:41:00	16:36:00	11:04:00	9.0	17:48:00	1.9	
Tuesday	19/12/2017	07:41:00	16:36:00	11:37:00	9.1	18:21:00	1.8	Spring
Wednesday	20/12/2017	07:42:00	16:37:00	12:10:00	9.0	18:54:00	1.9	
Thursday	21/12/2017	07:42:00	16:37:00	12:43:00	8.9	07:07:00	2.0	
Friday	22/12/2017	07:43:00	16:38:00	13:16:00	8.8	07:41:00	2.2	
Saturday	23/12/2017	07:43:00	16:38:00	13:51:00	8.6	08:17:00	2.4	
Sunday	24/12/2017	07:44:00	16:39:00	14:30:00	8.4	08:56:00	2.6	
Monday	25/12/2017	07:44:00	16:40:00	15:17:00	8.2	09:41:00	2.9	
Tuesday	26/12/2017	07:44:00	16:41:00	16:13:00	8.0	10:35:00	3.1	Neap
Wednesday	27/12/2017	07:44:00	16:41:00	17:17:00	7.9	11:39:00	3.1	
Thursday	28/12/2017	07:44:00	16:42:00	18:26:00	7.6	12:52:00	3.0	
Friday	29/12/2017	07:45:00	16:43:00	07:08:00	7.9	14:05:00	2.7	
Saturday	30/12/2017	07:45:00	16:44:00	08:13:00	8.3	15:11:00	2.2	
Sunday	31/12/2017	07:45:00	16:45:00	09:10:00	8.8	16:10:00	1.7	
Monday	01/01/2018	07:44:00	16:46:00	10:03:00	9.2	17:05:00	1.2	
Tuesday	02/01/2018	07:44:00	16:47:00	10:52:00	9.6	17:57:00	0.8	
Wednesday	03/01/2018	07:44:00	16:48:00	11:41:00	9.8	18:46:00	0.6	Spring
Thursday	04/01/2018	07:44:00	16:49:00	12:29:00	9.8	07:04:00	0.9	
Friday	05/01/2018	07:44:00	16:50:00	13:18:00	9.7	07:51:00	1.0	
Saturday	06/01/2018	07:43:00	16:52:00	14:07:00	9.4	08:37:00	1.3	
Sunday	07/01/2018	07:43:00	16:53:00	14:57:00	9.0	09:23:00	1.8	
Monday	08/01/2018	07:42:00	16:54:00	15:49:00	8.5	10:11:00	2.3	
Tuesday	09/01/2018	07:42:00	16:56:00	16:46:00	8.1	11:05:00	2.8	
Wednesday	10/01/2018	07:41:00	16:57:00	17:50:00	7.7	12:08:00	3.1	
Thursday	11/01/2018	07:41:00	16:58:00	19:03:00	7.6	13:20:00	3.2	Neap
Friday	12/01/2018	07:40:00	17:00:00	07:43:00	7.7	14:29:00	3.0	
Saturday	13/01/2018	07:39:00	17:01:00	08:42:00	7.9	15:26:00	2.8	
Sunday	14/01/2018	07:39:00	17:03:00	09:29:00	8.3	16:13:00	2.5	

Appendix 5: Scientific names of birds

English vernacular name	Scientific name	Species code used on maps
Pink-footed goose	*Anser brachyrhynchus*	PG
Canada goose	*Branta canadensis*	CG
Shelduck	*Tadorna tadorna*	SU
Mallard	*Anas platyrhynchos*	MA
Cormorant	*Phalacrocorax carbo*	CA
Grey heron	*Ardea cinerea*	H.
Sparrowhawk	*Accipiter nisus*	SH
Black-tailed godwit	*Limosa limosa*	BW
Redshank	*Tringa totanus*	RK
Oystercatcher	*Haematopus ostralegus*	OC
Turnstone	*Arenaria interpres*	TT
Black-headed gull	*Chroicocephalus ridibundus*	BH
Common gull	*Larus canus*	CM
Lesser black-backed gull	*Larus fuscus*	LB
Herring gull	*Larus argentatus*	HG
Great black-backed gull	*Larus marinus*	GB
Wood pigeon	*Columba palumbus*	WP
Kingfisher	*Alcedo atthis*	KF
Raven	*Corvus corax*	RN
Carrion crow	*Corvus corone*	C.
Magpie	*Pica pica*	MG
Wren	*Troglodytes troglodytes*	WR
Pied wagtail	*Motacilla alba*	PW
Starling	*Sturnus vulgaris*	SG
Mistle thrush	*Turdus viscivorus*	M.
Song thrush	*Turdus philomelos*	ST
Robin	*Erithacus rubecula*	R.

Appendix 6: Figures

[Supplied as a separate file]

Liverpool Cruise Terminal

Wintering Bird Surveys: Appendix 6: Figures

Final Report

APEM Ref P00001343

January 2018

Scott Reid, Simon Warford and Roger Buisson

Client:	**Waterman Infrastructure & Environment Ltd**
Address:	**Pickfords Wharf** **Clink Street** **London** **SE1 9DG**
Project reference:	**P00001343**
Date of issue:	**January 2018**

Project Director:	**Roger Buisson**
Project Manager:	**Simon Warford**
Other:	Scott Reid & Charlotte Altass

APEM Ltd
Riverview A17 Embankment Business Park
Heaton Mersey
Stockport
SK4 3GN

Registered in England No. 02530851

This document is Appendix 6 to:

APEM (2018). Liverpool Cruise Terminal Wintering Bird Surveys. [APEM Ref P00001343, January 2018]. APEM Ltd, Stockport.

Contents

Appendix 6: Figures

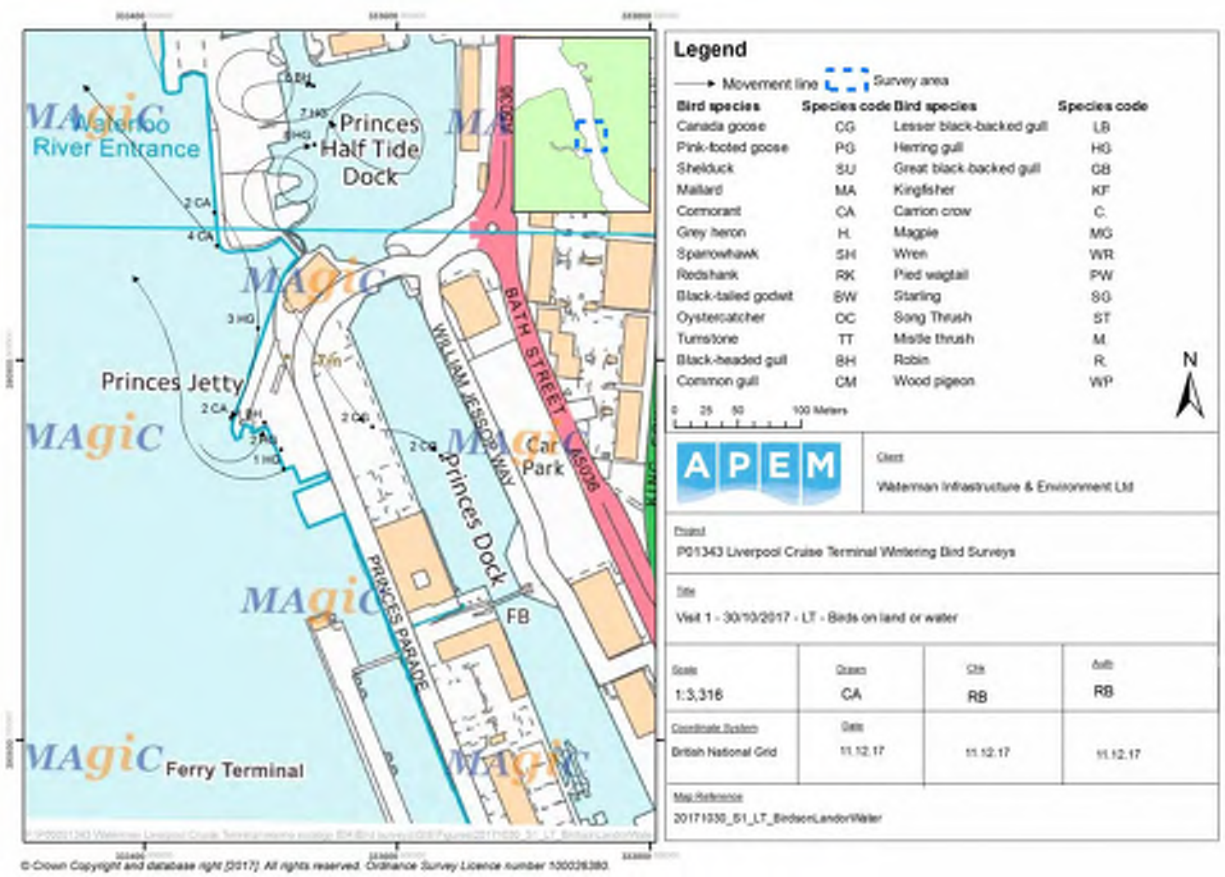


Figure 1: Visit 1 30/10/2017 Low Tide Birds on land and water

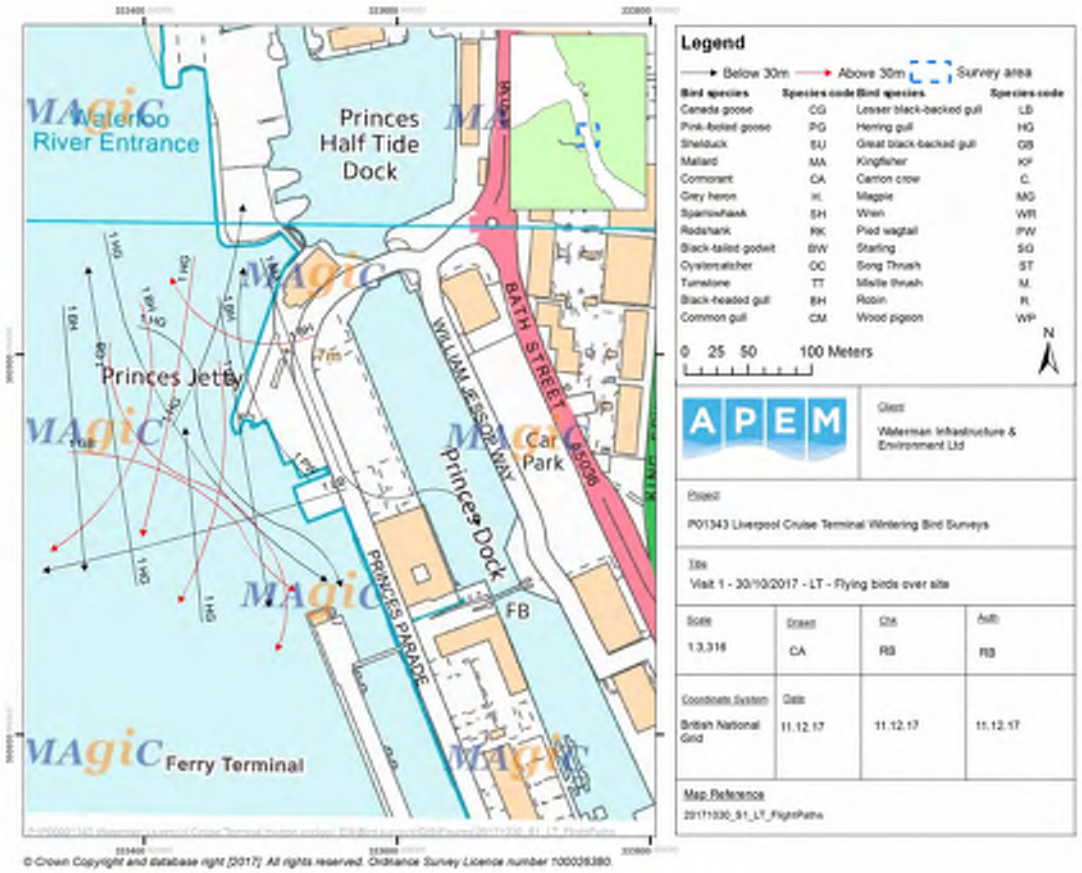


Figure 2: Visit 1 30/10 /2017 Low Tide Flying birds adjacent to site

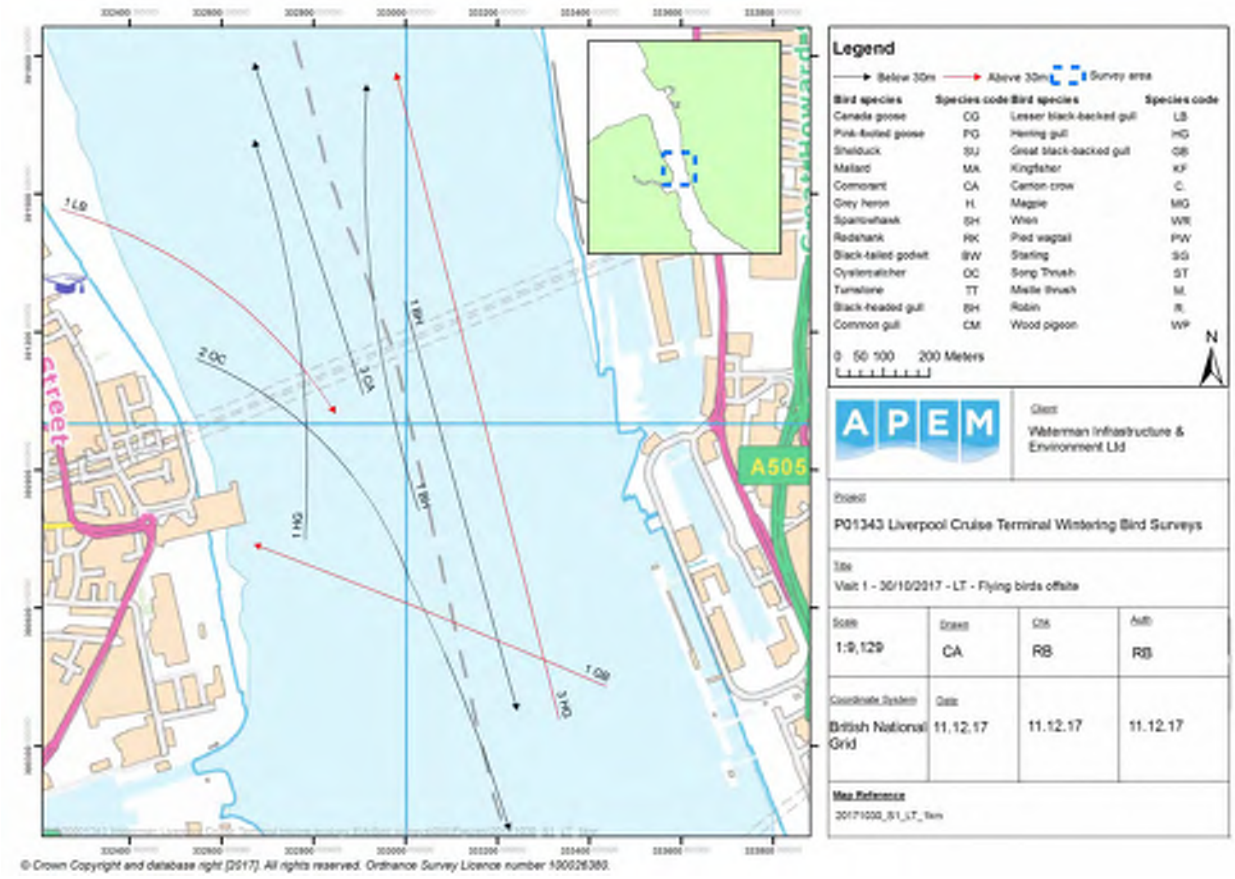


Figure 3: Visit 1 30/10/2017 Low Tide Flying birds in 1 km zone

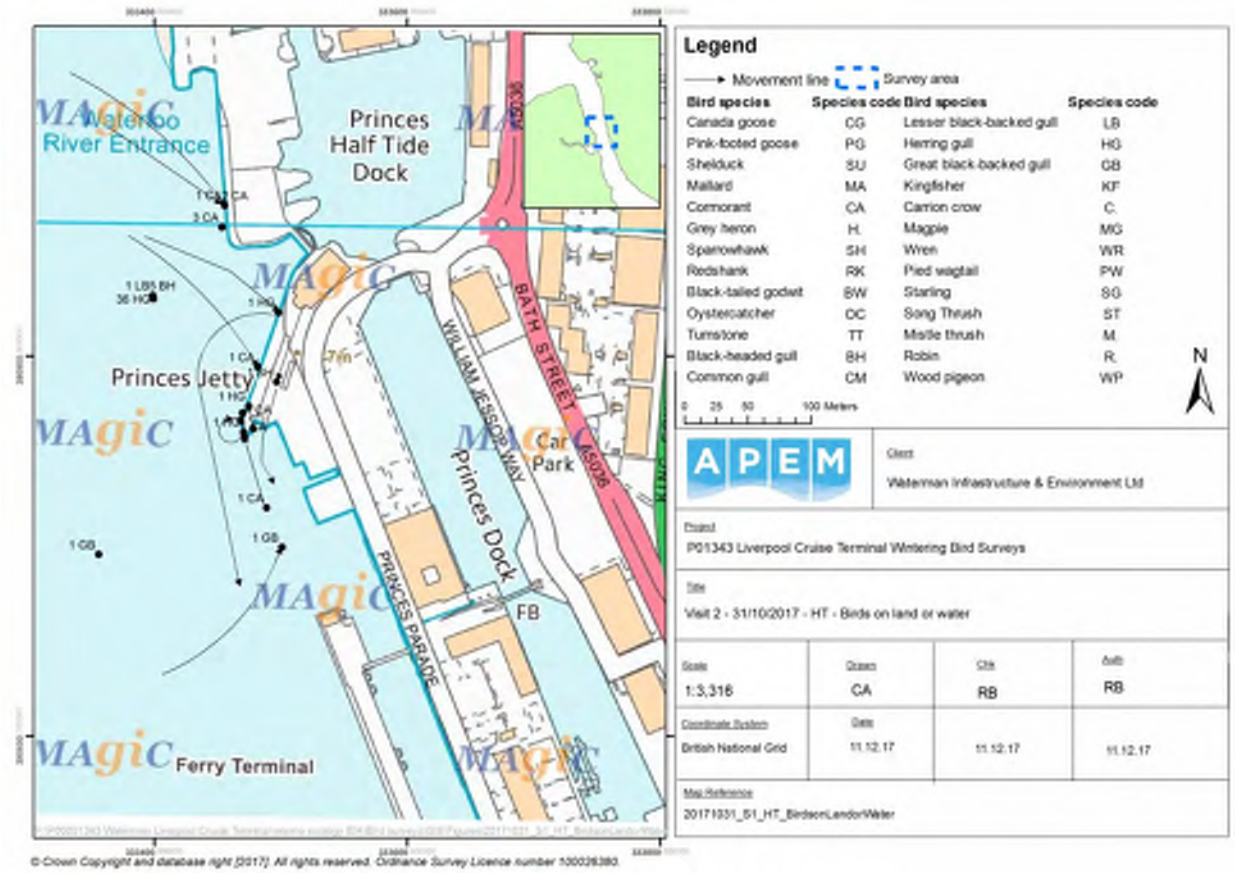


Figure 4: Visit 2 31/10/2017 High Tide Birds on land and water

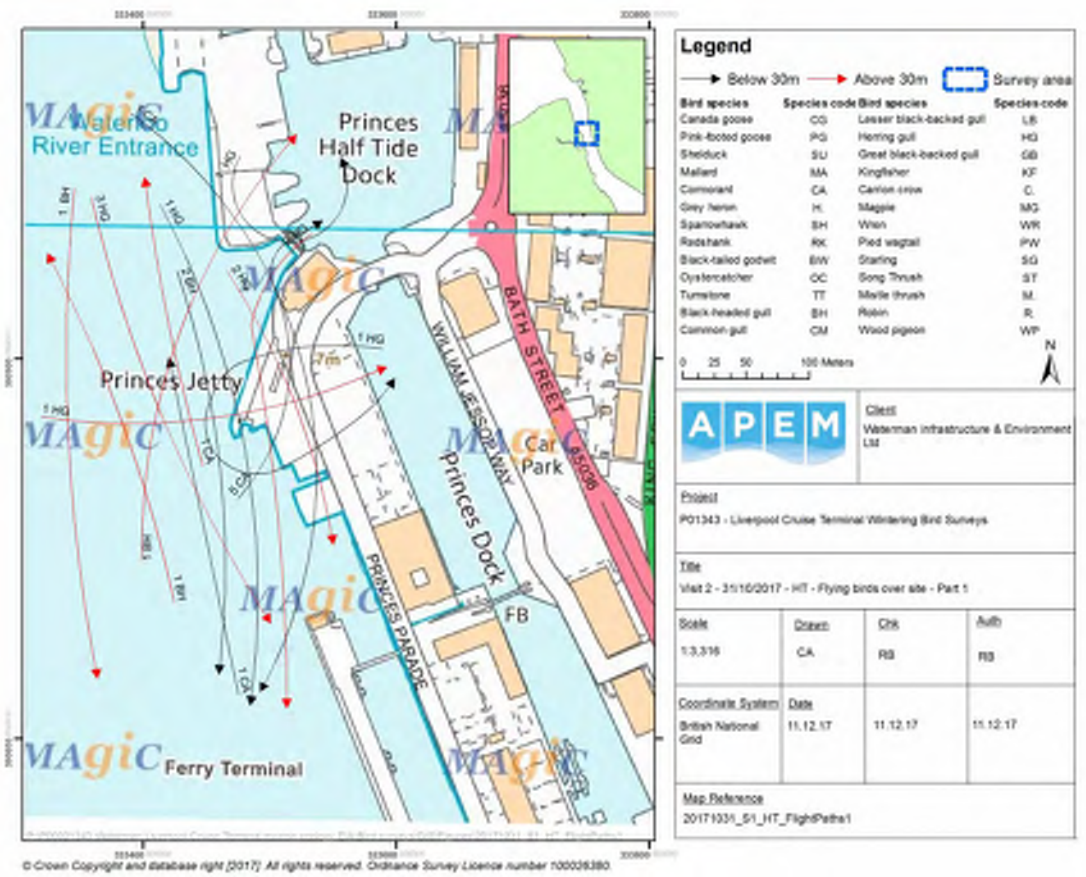


Figure 5: Visit 2 31/10/2017 High Tide Flying birds adjacent to site Part 1

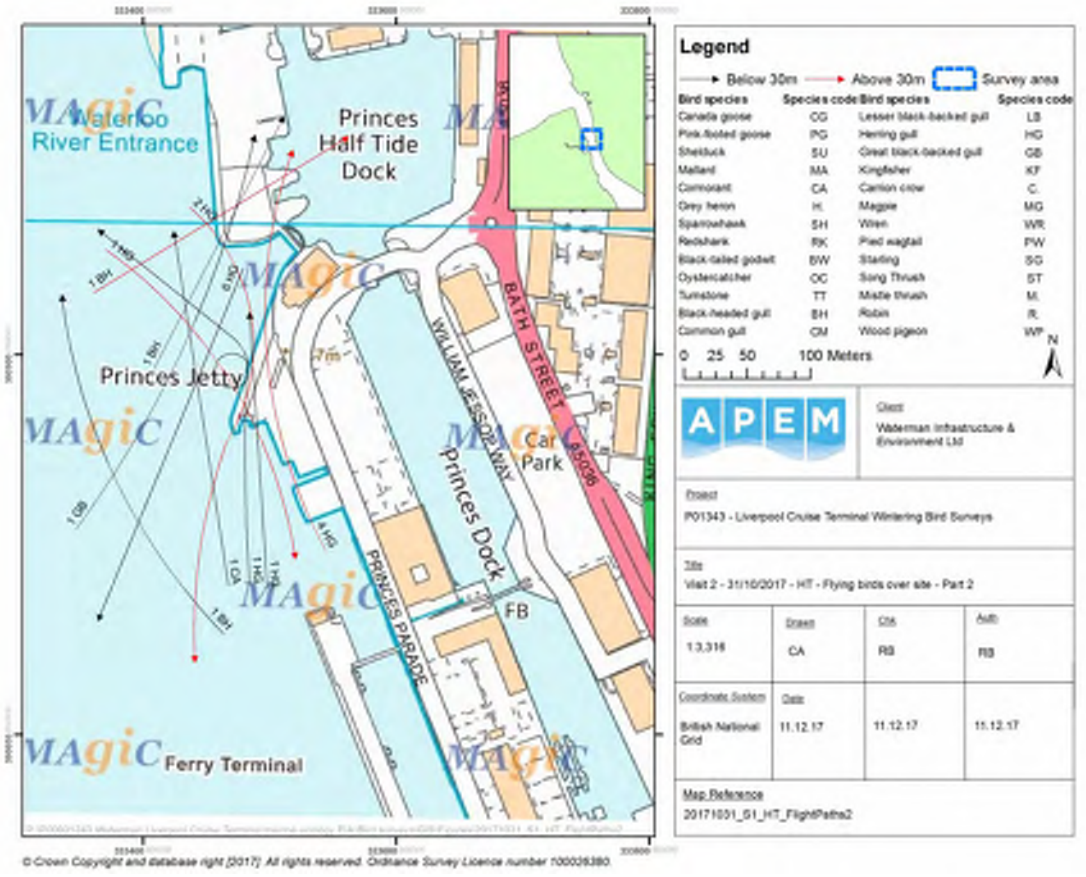


Figure 6: Visit 2 31/10/2017 High Tide Flying birds adjacent to site Part 2

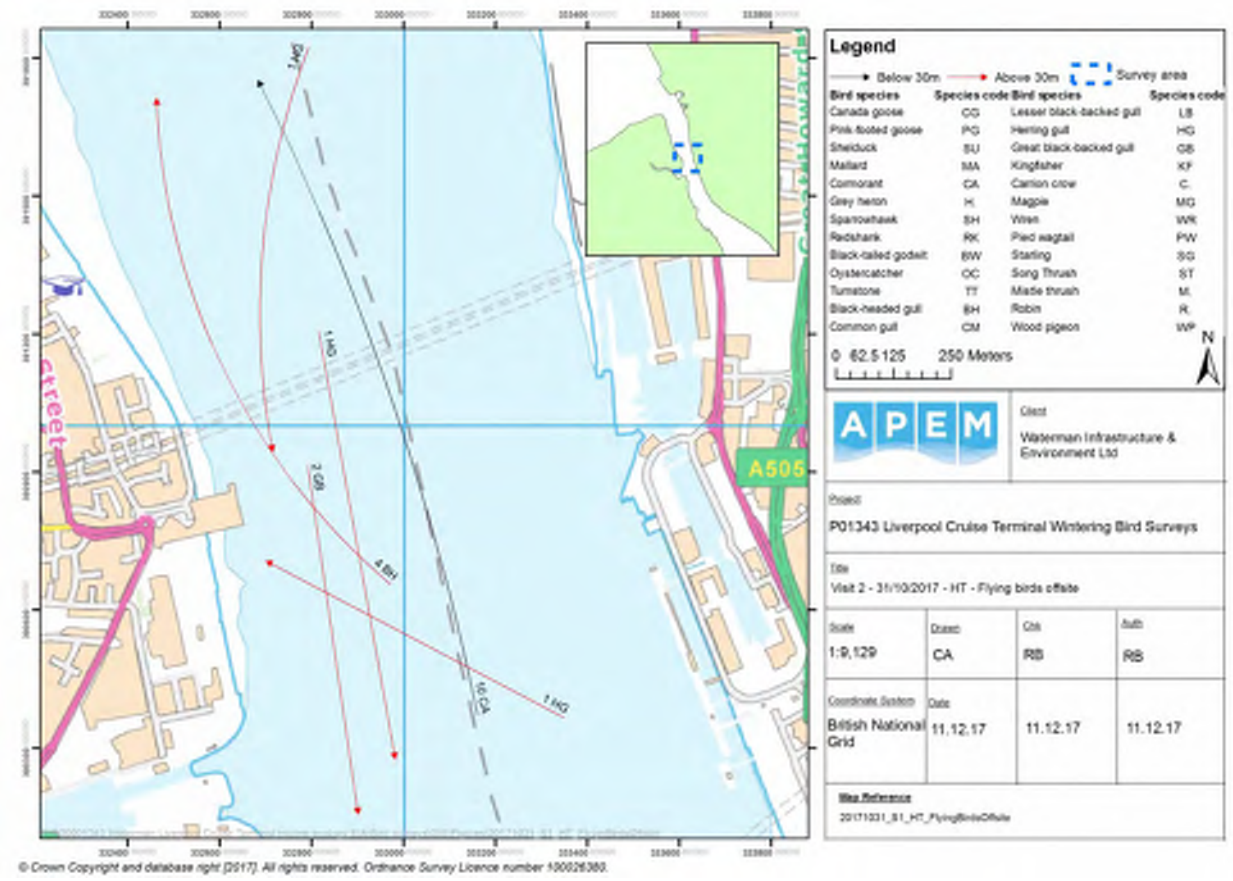


Figure 7: Visit 2 31/10/2017 High Tide Flying birds in 1 km zone

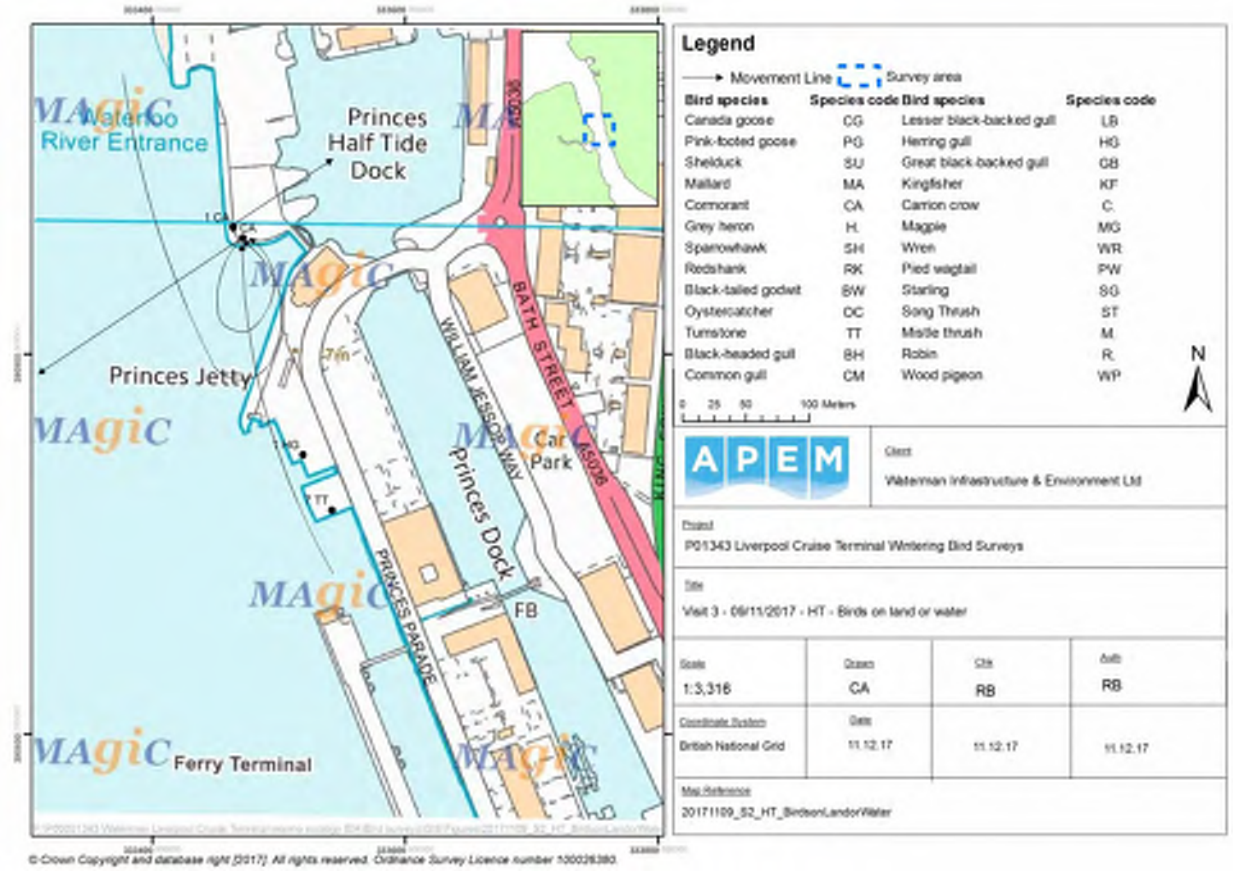


Figure 8: Visit 3 09/11/2017 High Tide Birds on land and water

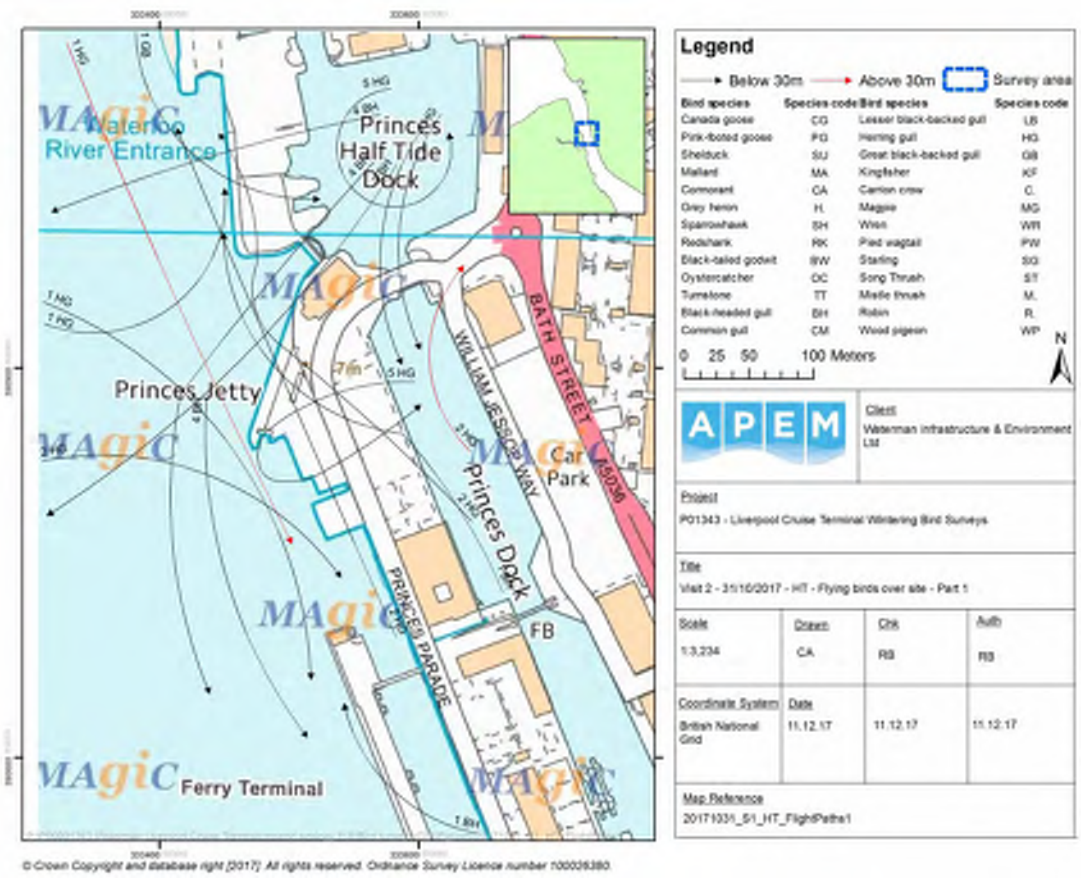


Figure 9: Visit 3 09/11/2017 High Tide Flying birds adjacent to site Part 1

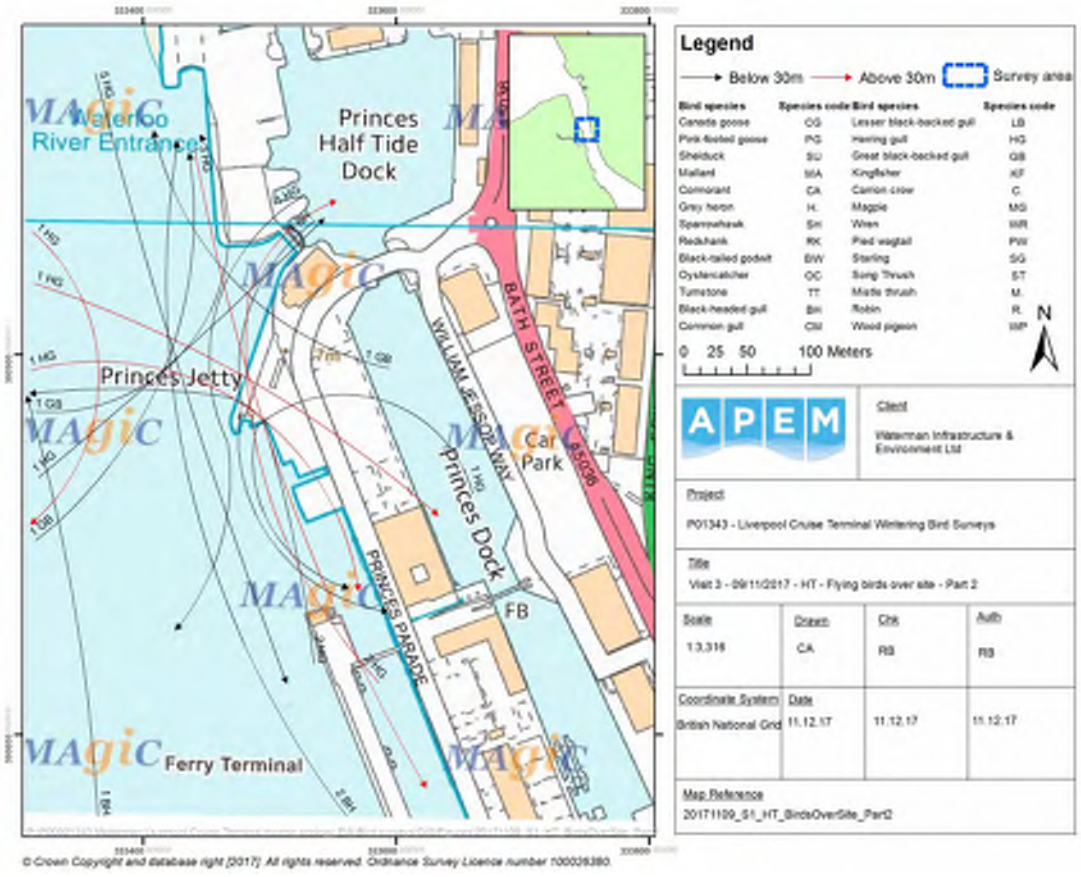


Figure 10: Visit 3 09/11/2017 High Tide Flying birds adjacent to site Part 2

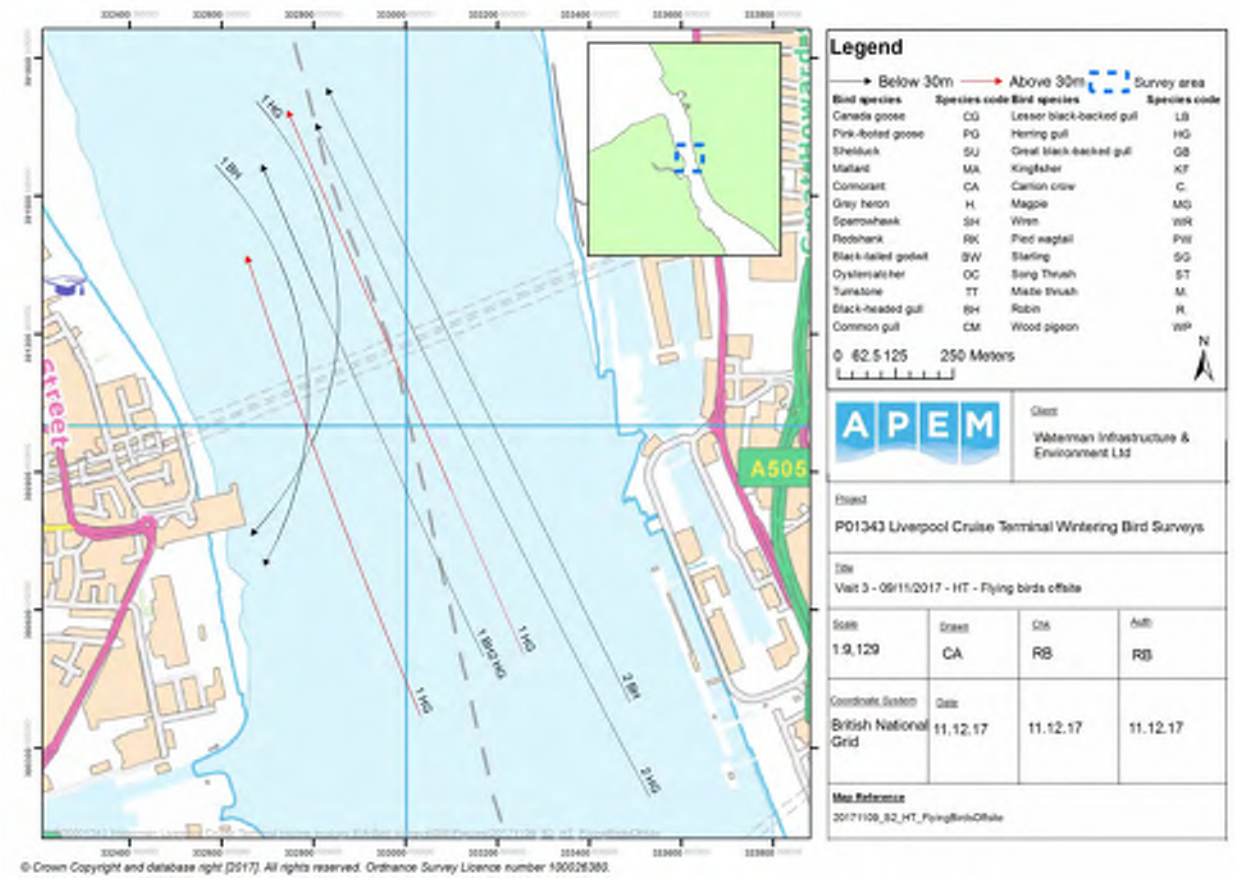


Figure 11: Visit 3 09/11/2017 High Tide Flying birds in 1 km zone

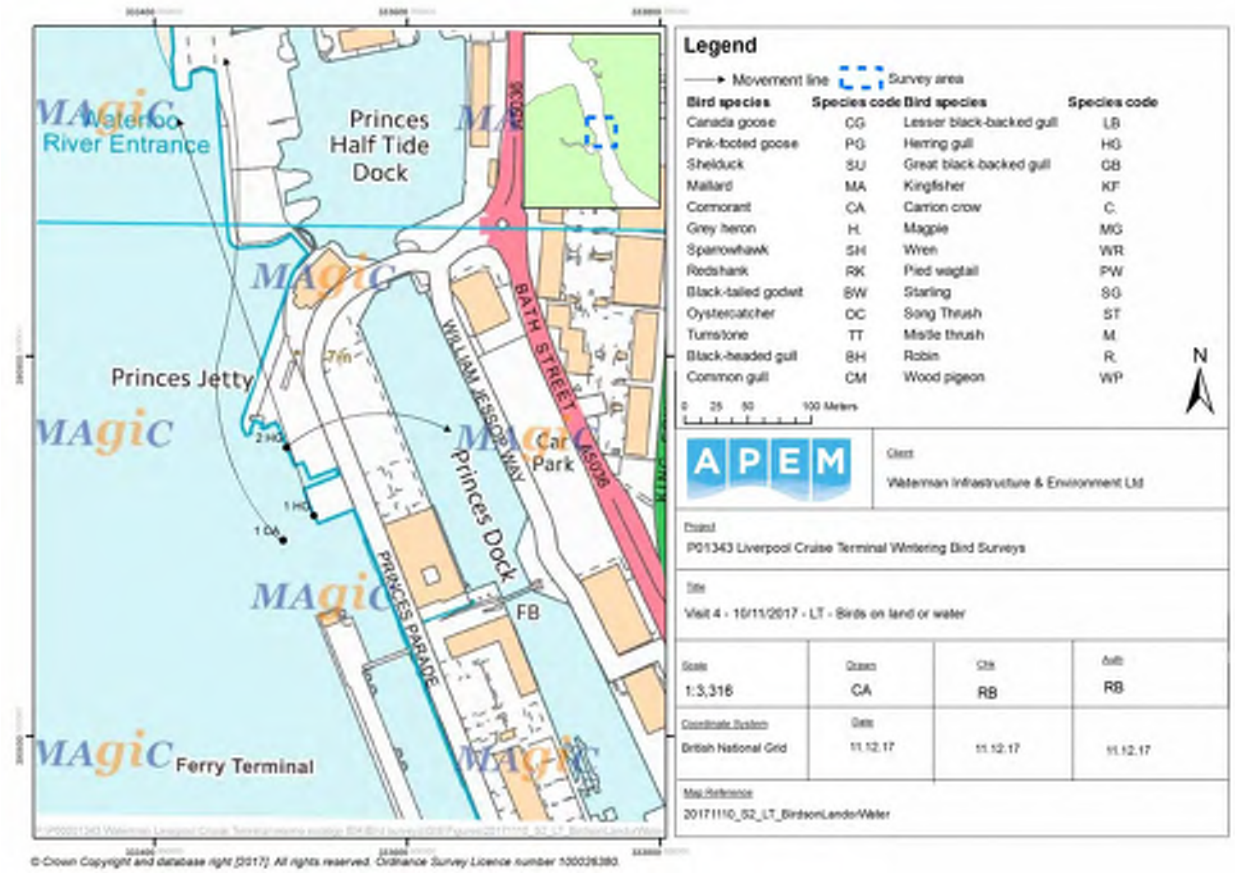


Figure 12: Visit 4 10/11/2017 Low Tide Birds on land and water

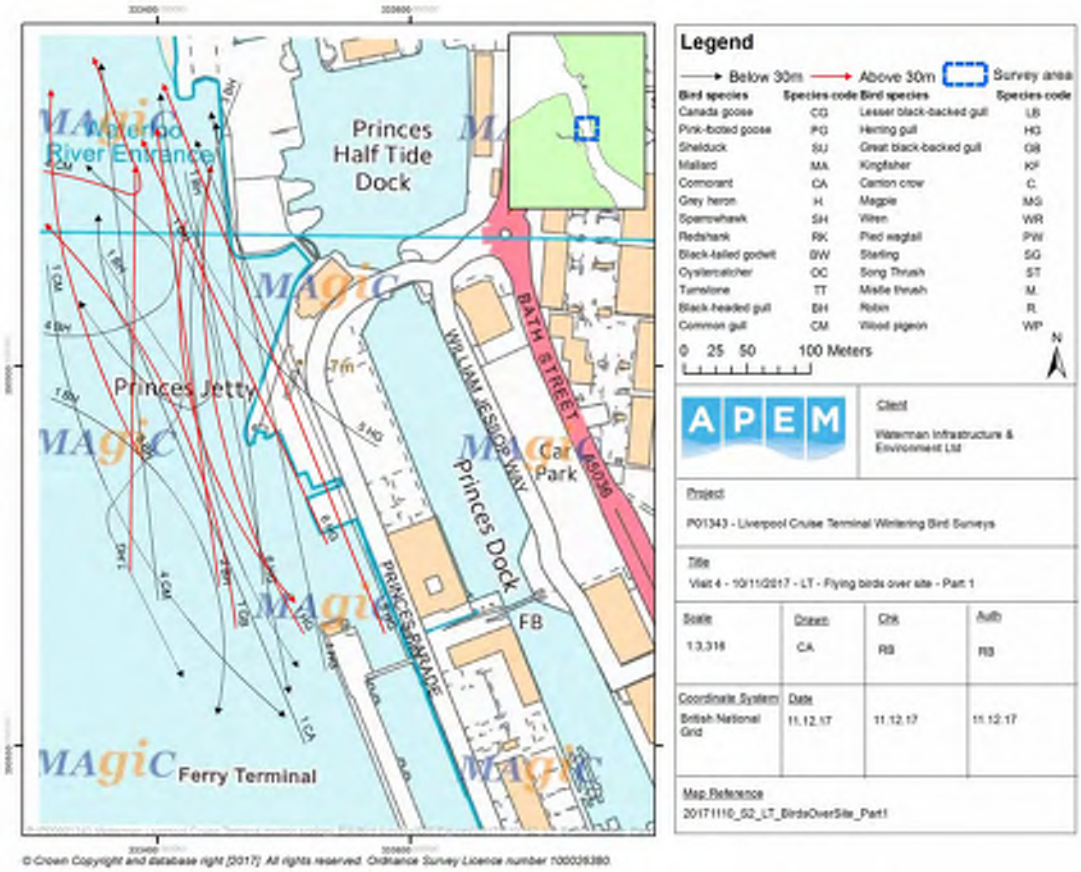


Figure 13: Visit 4 10/11/2017 Low Tide Flying birds adjacent to site Part 1

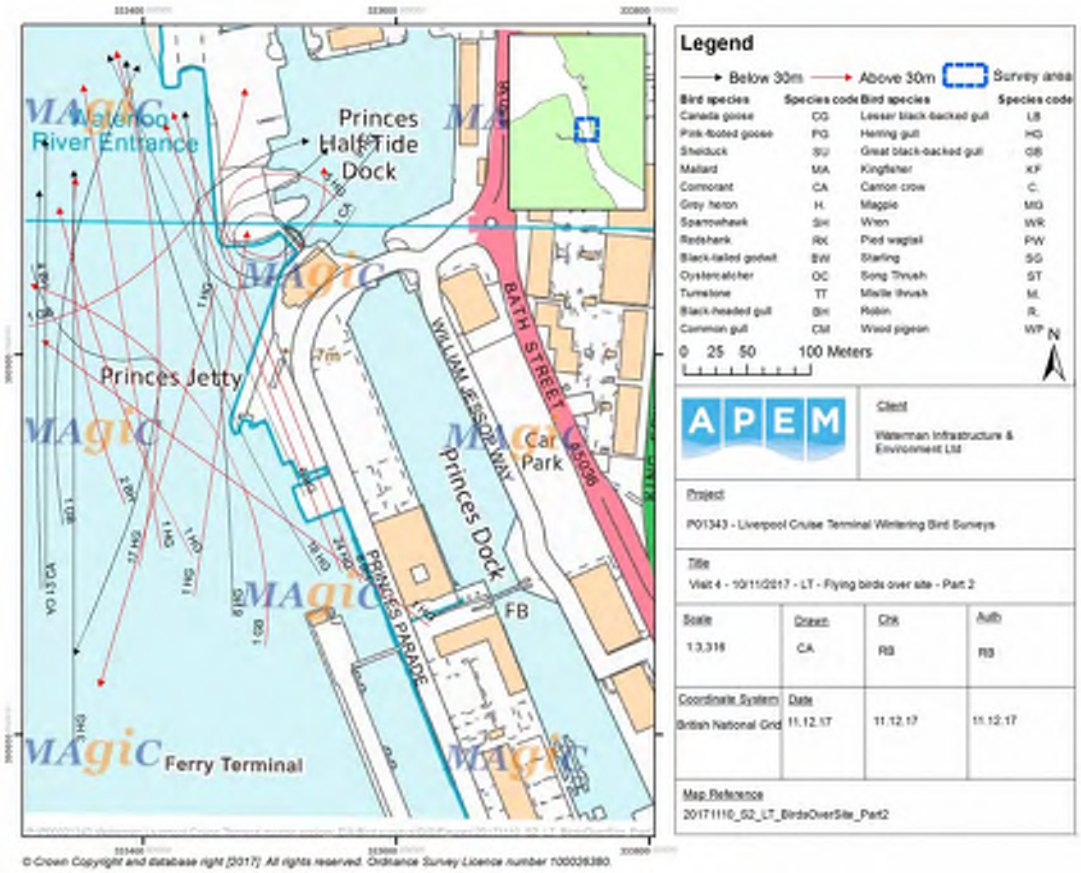


Figure 14: Visit 4 10/11 /2017 Low Tide Flying birds adjacent to site Part 2

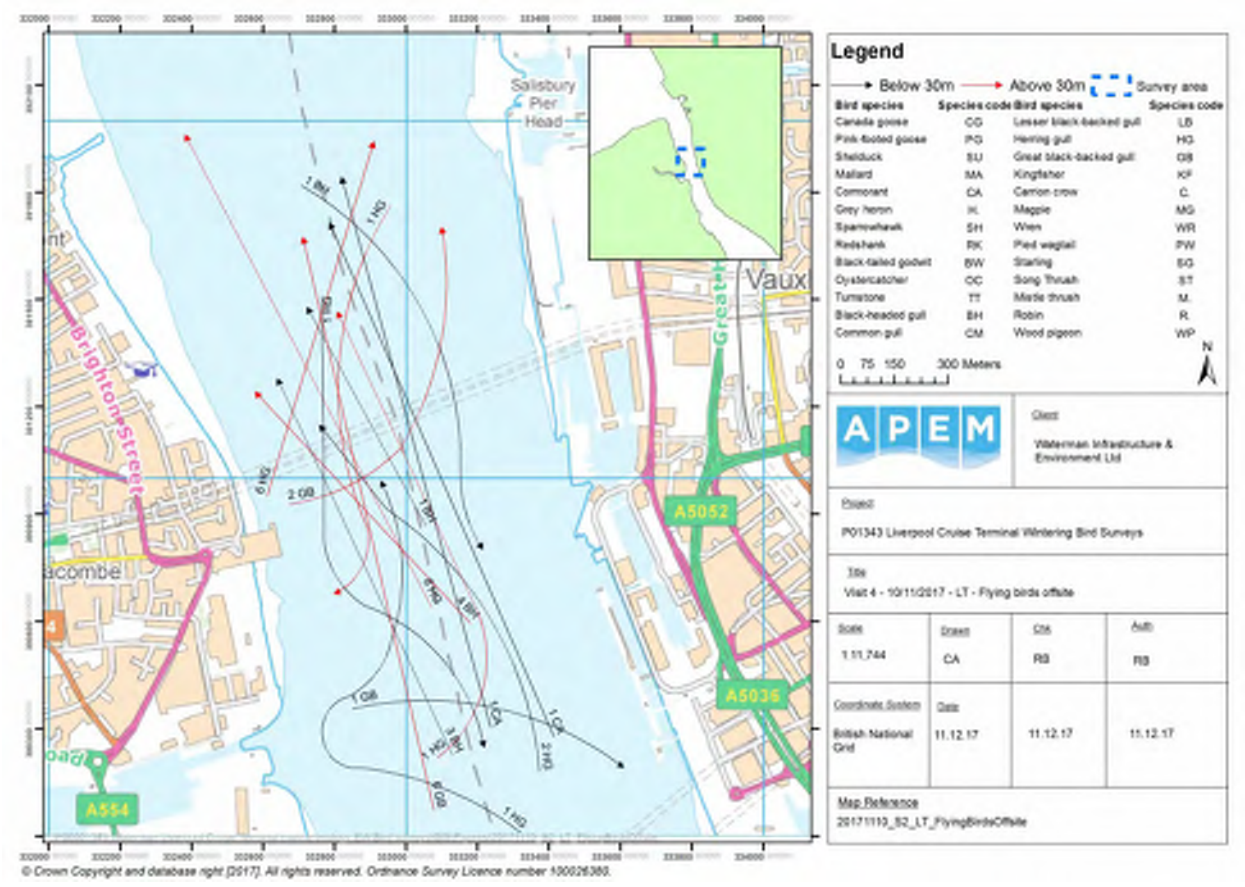


Figure 15: Visit 4 10/11/2017 Low Tide Flying birds in 1 km zone

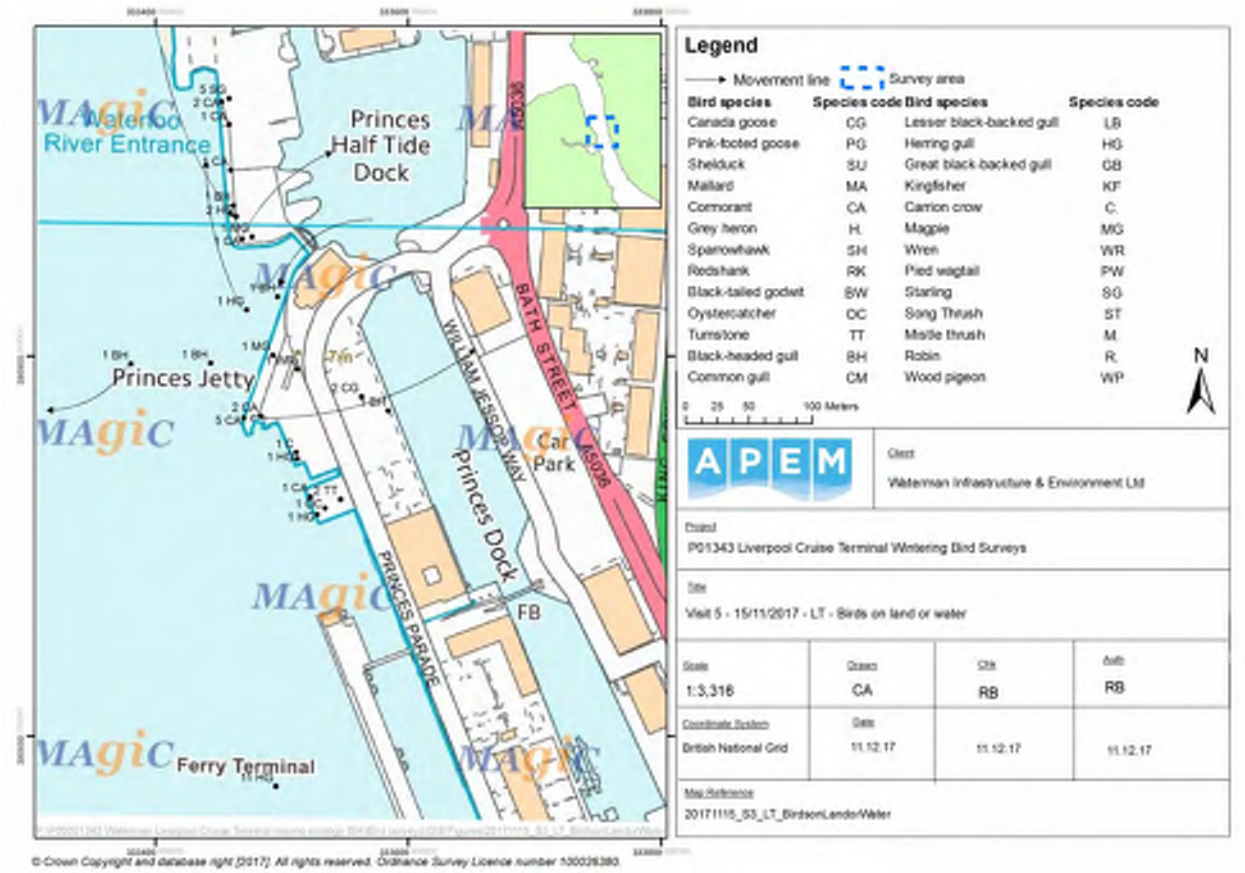


Figure 16: Visit 5 15/11/2017 Low Tide Birds on land and water

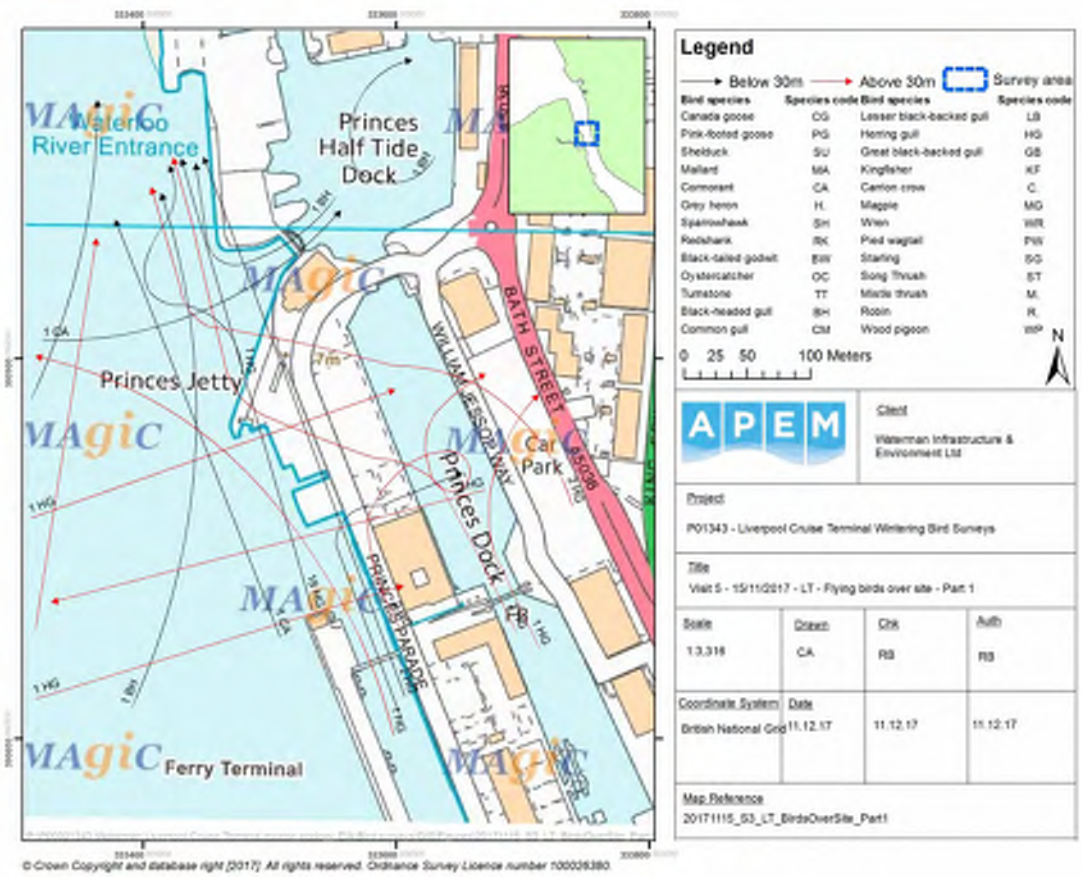


Figure 17: Visit 5 15/11/2017 Low Tide Flying birds adjacent to site Part 1

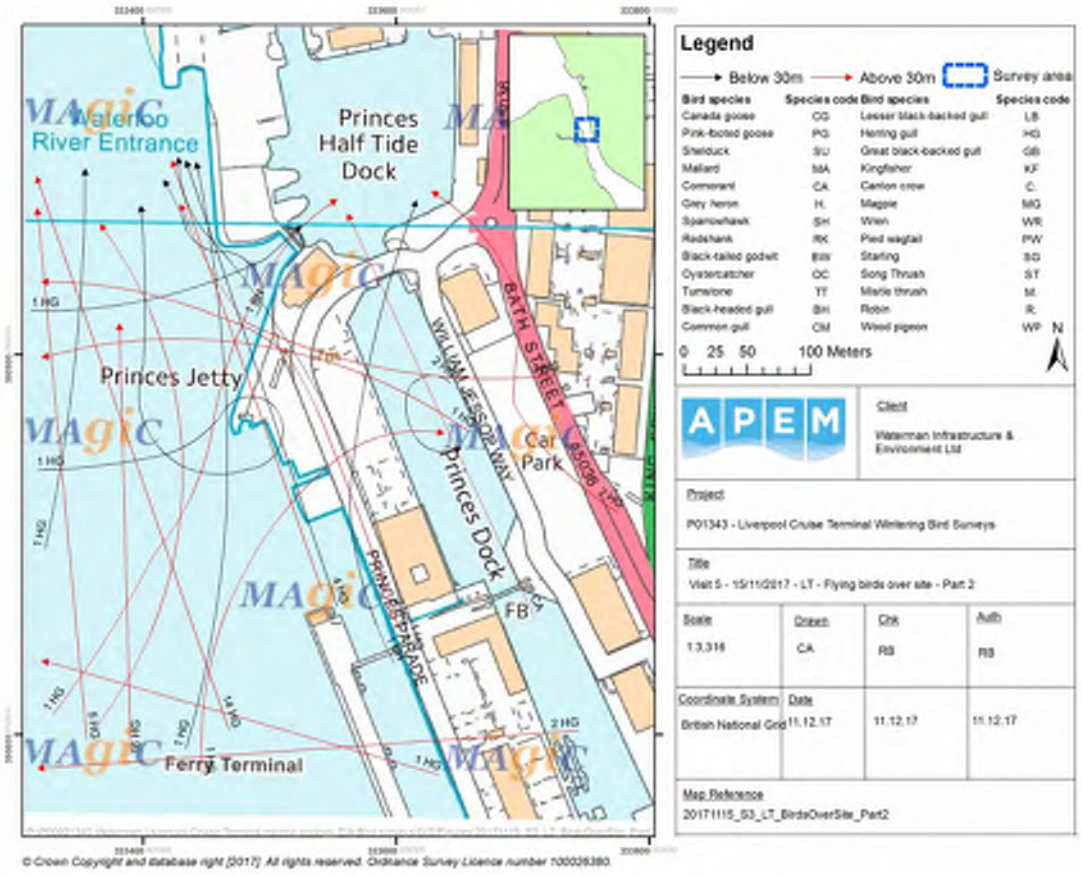


Figure 18: Visit 5 15/11/2017 Low Tide Flying birds adjacent to site Part 2

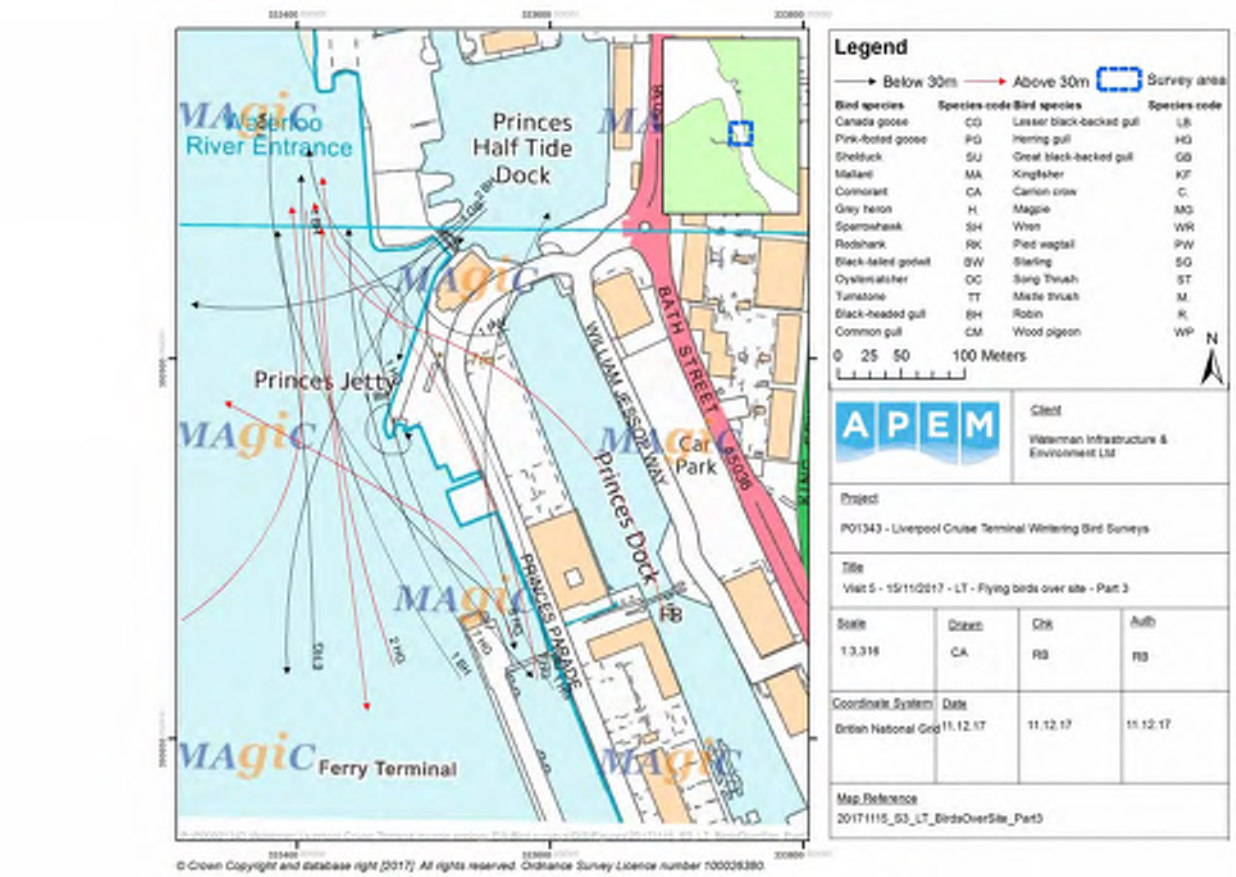


Figure 19: Visit 5 15/11/2017 Low Tide Flying birds adjacent to site Part 3

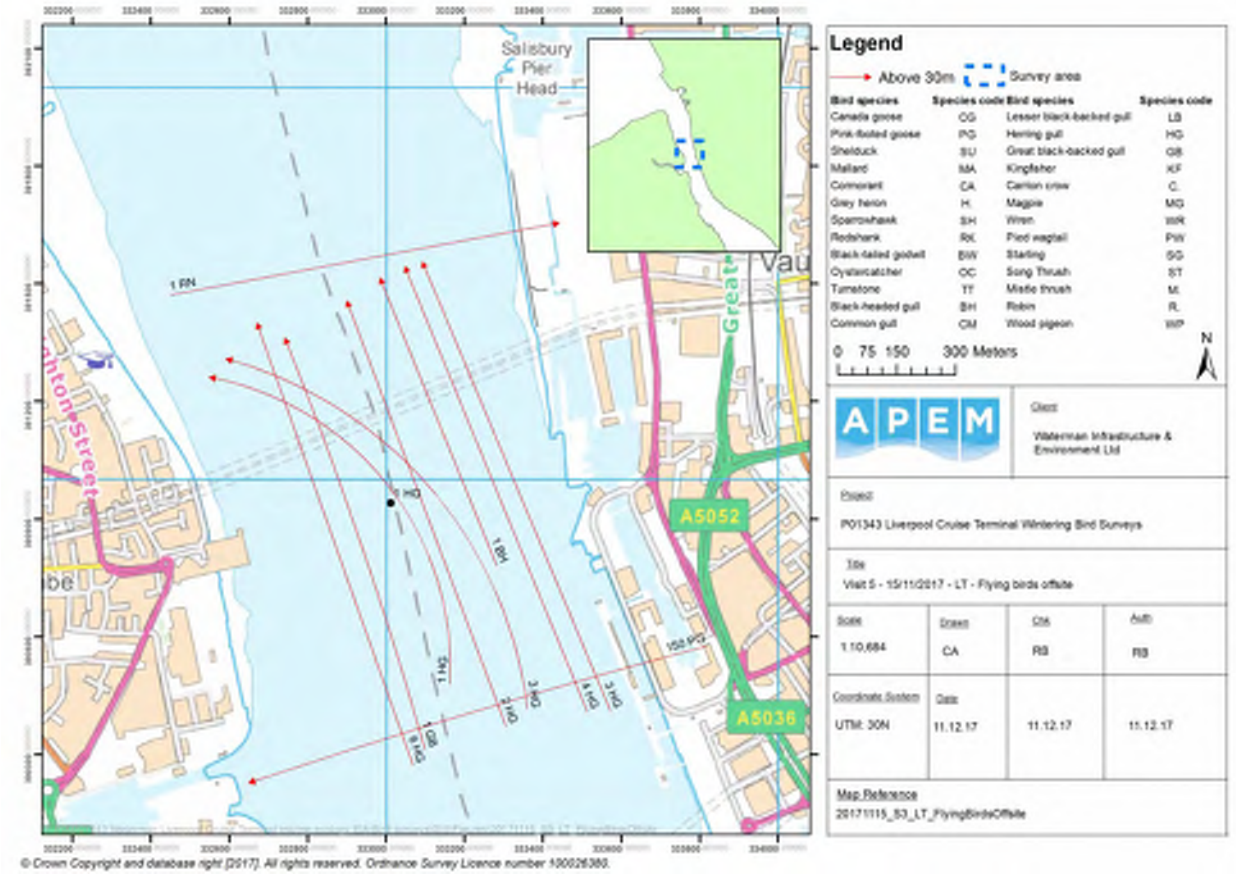


Figure 20: Visit 5 15/11/2017 Low Tide Flying birds in 1 km zone

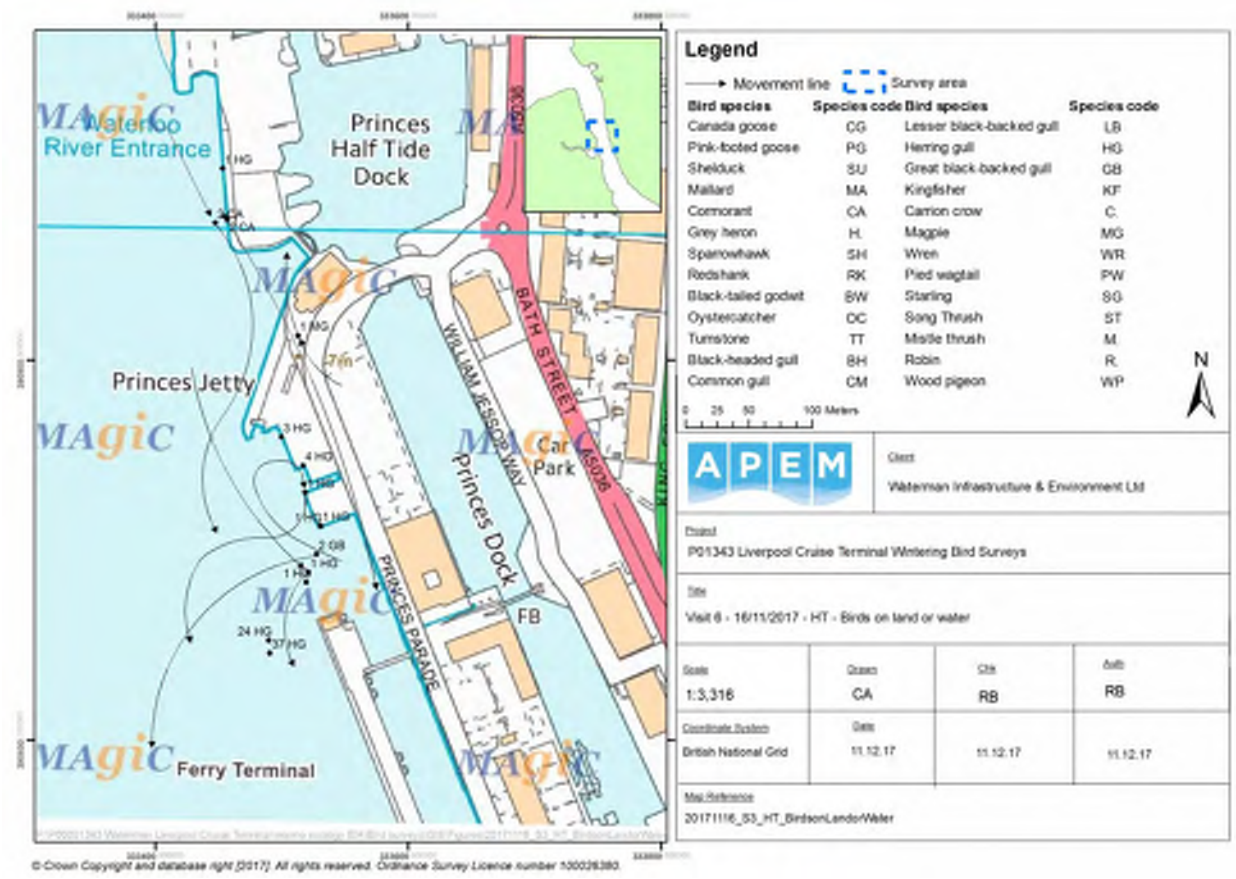


Figure 21: Visit 6 16/11/2017 High Tide Birds on land and water

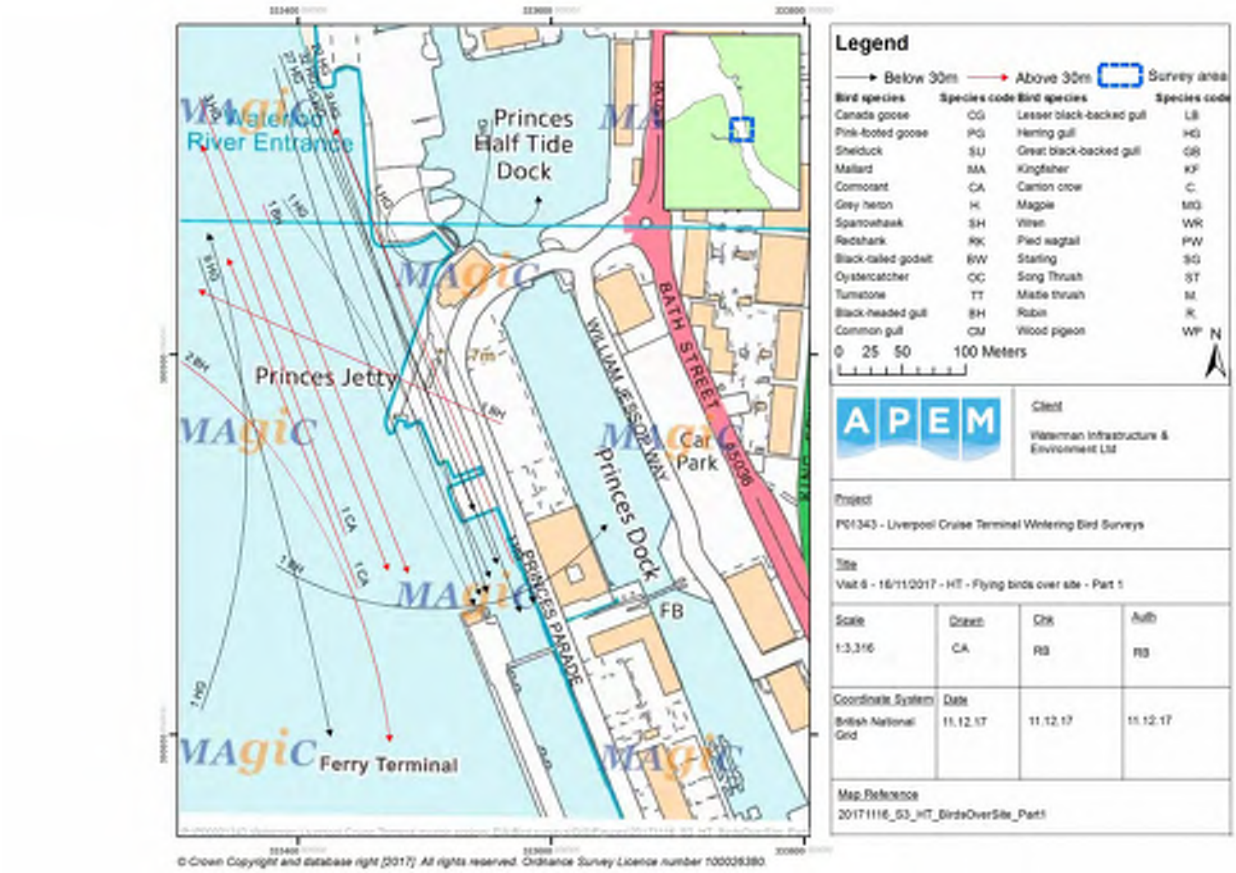


Figure 22: Visit 6 16/11/2017 High Tide Flying birds adjacent to site Part 1

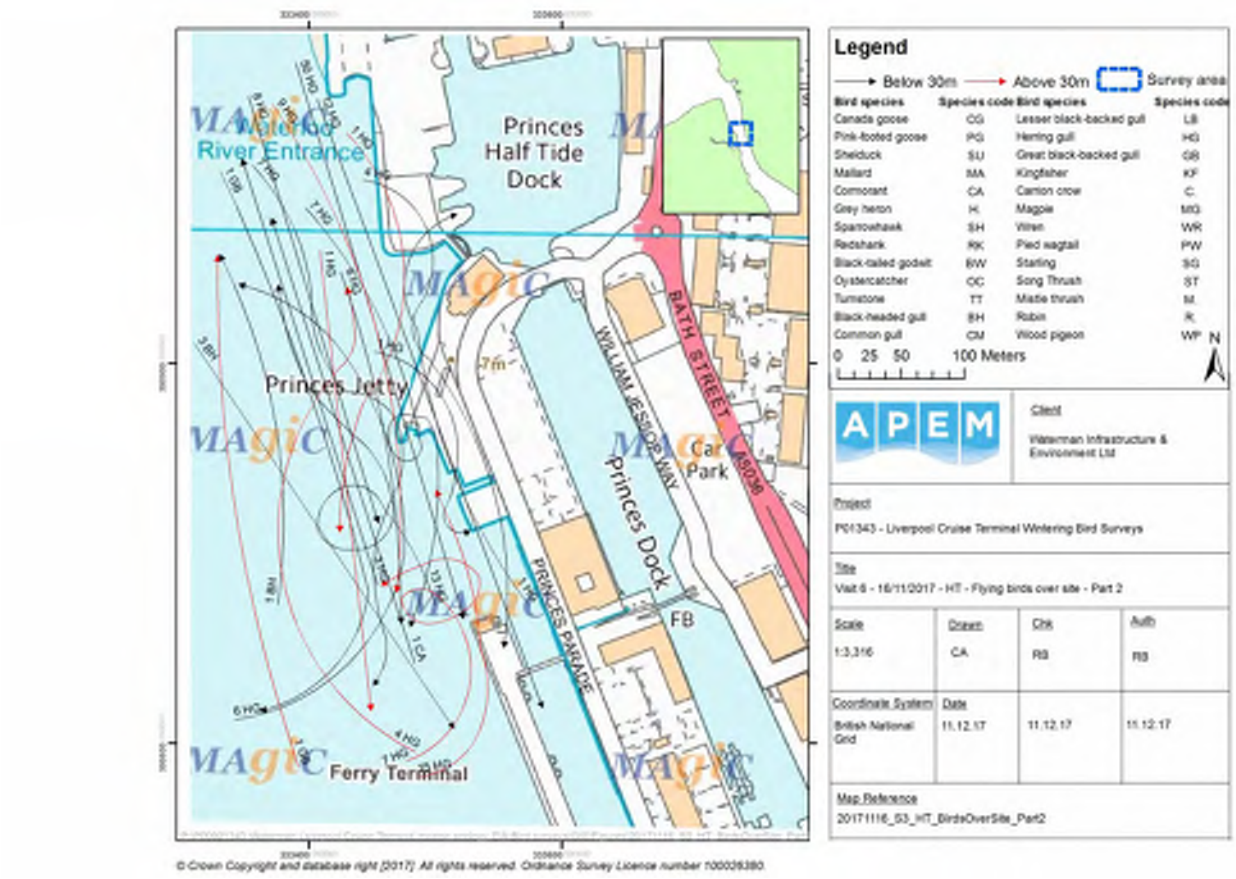


Figure 23: Visit 6 16/11/2017 High Tide Flying birds adjacent to site Part 2

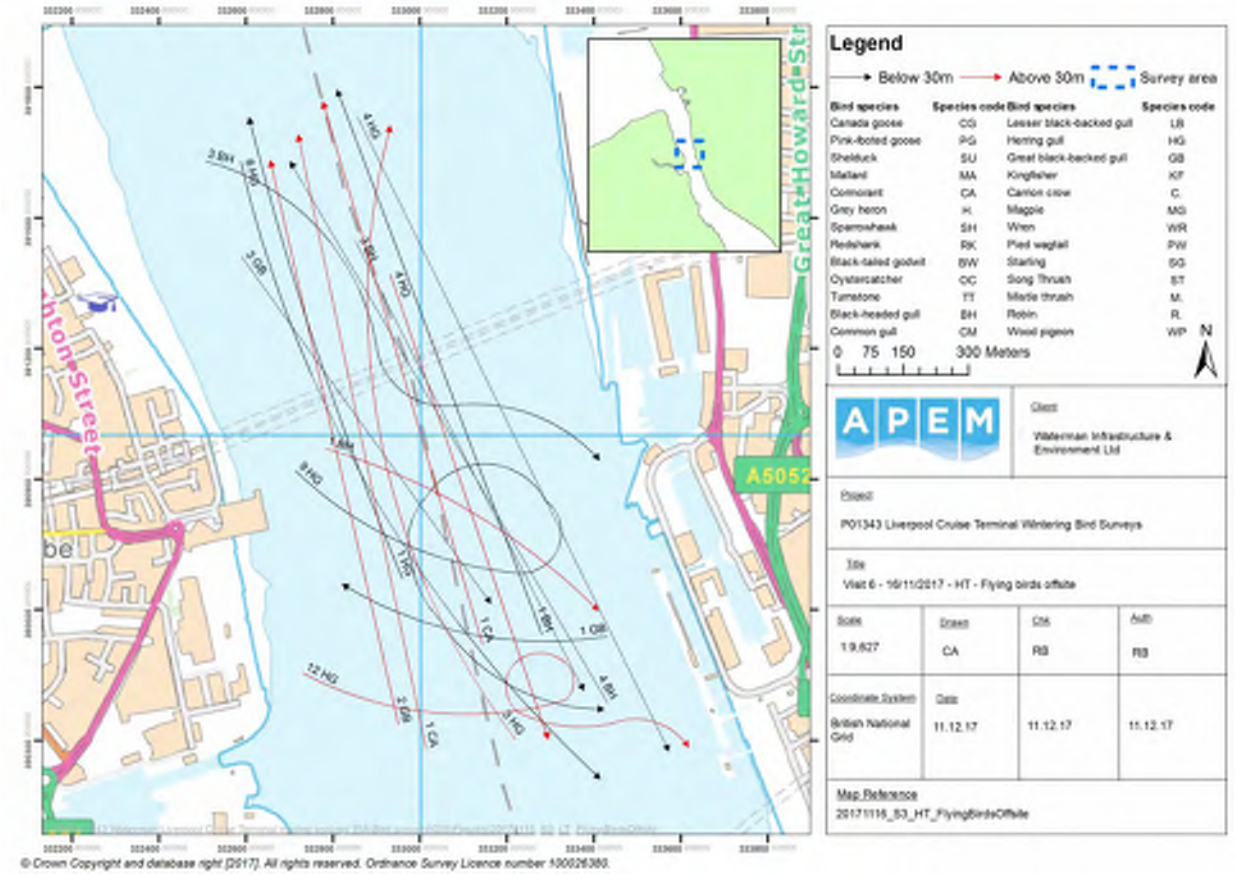


Figure 24: Visit 6 16/11/2017 High Tide Flying birds in 1 km zone

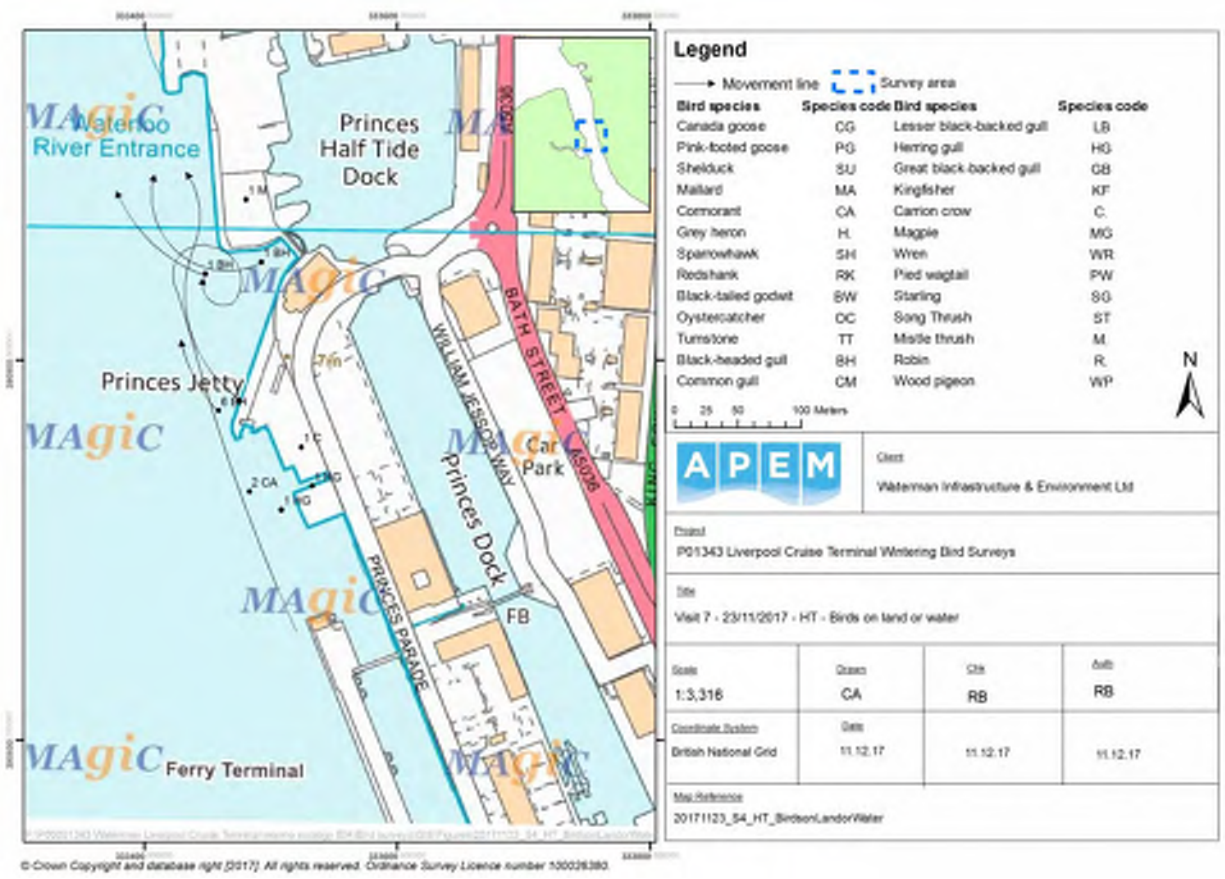


Figure 25: Visit 7 23/11/2017 High Tide Birds on land and water

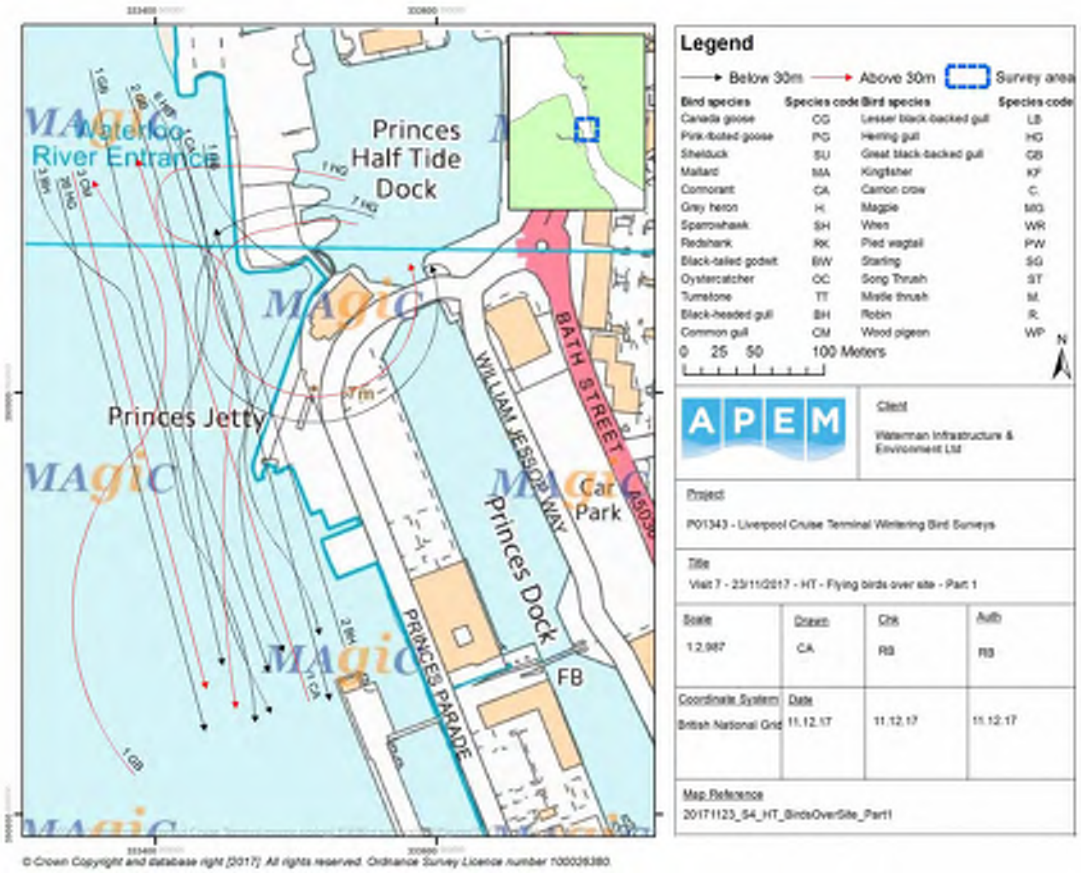


Figure 26: Visit 7 23/11/2017 High Tide Flying birds adjacent to site Part 1

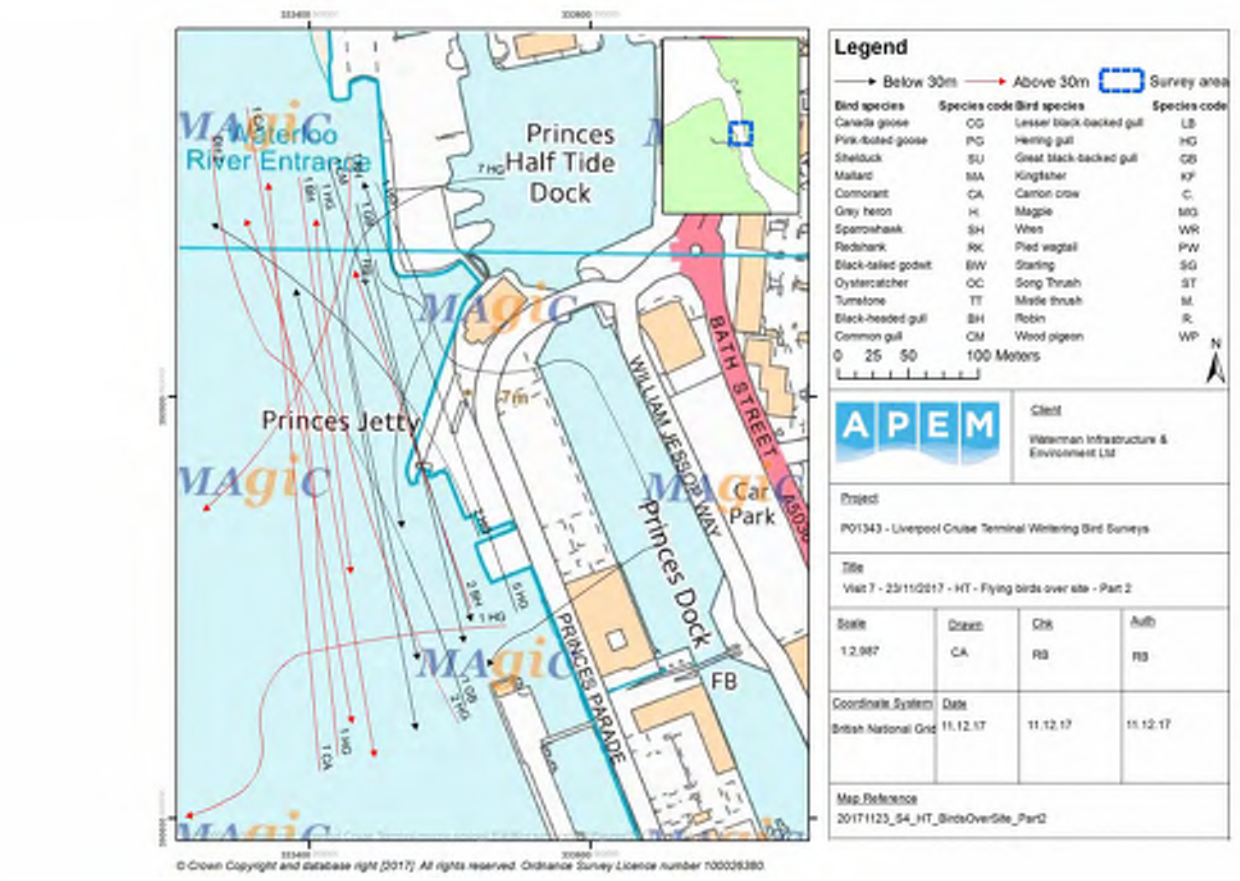


Figure 27: Visit 7 23/11/2017 High Tide Flying birds adjacent to site Part 2

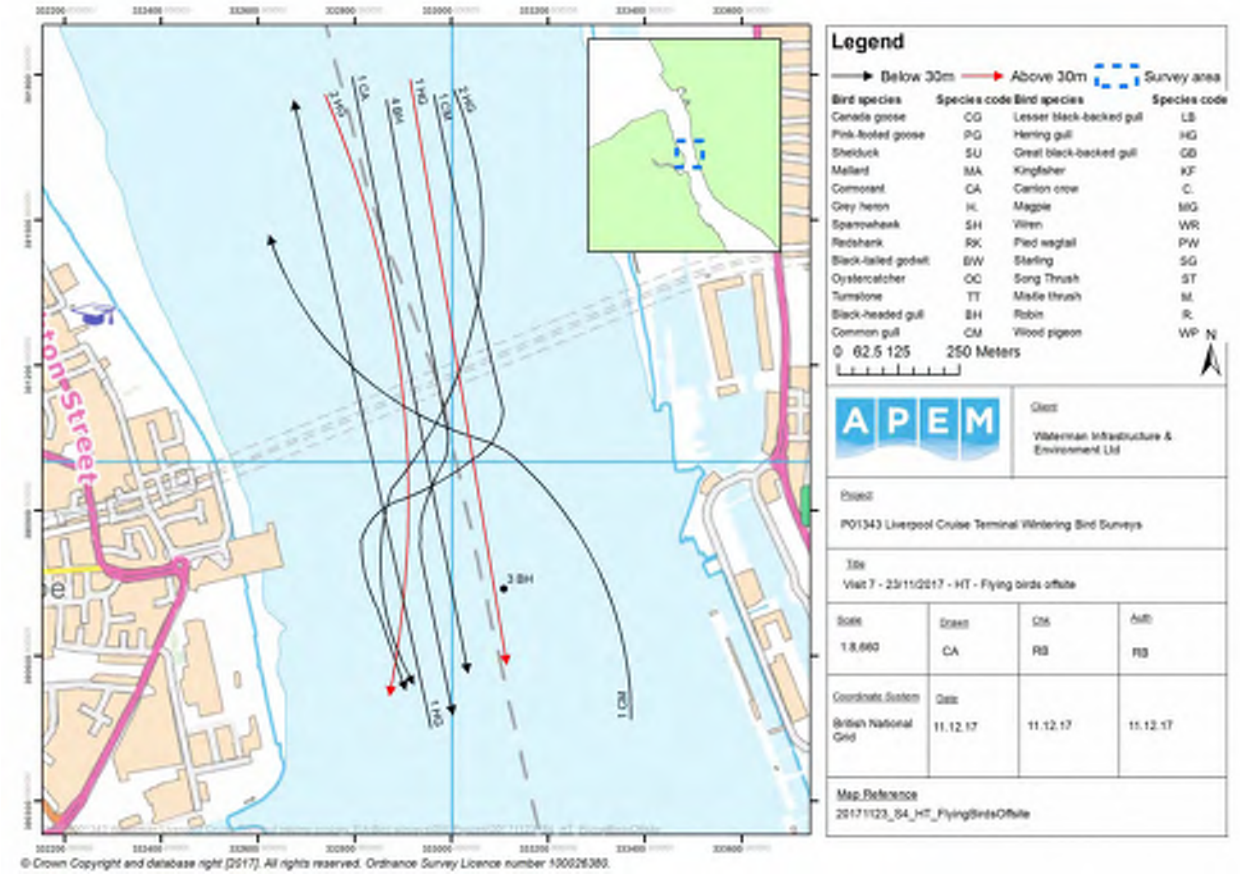


Figure 28: Visit 7 23/11/2017 High Tide Flying birds in 1 km zone

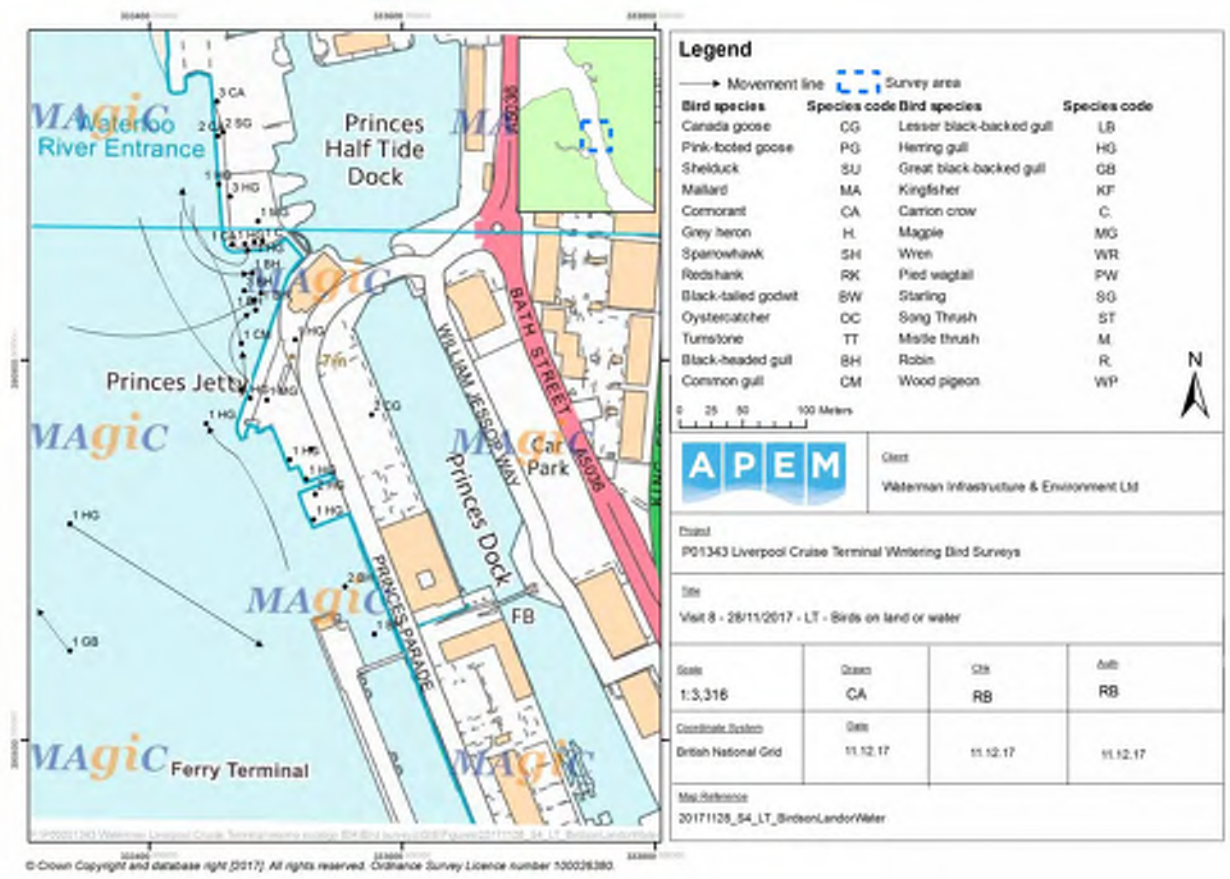


Figure 29: Visit 8 28/11/2017 Low Tide Birds on land and water

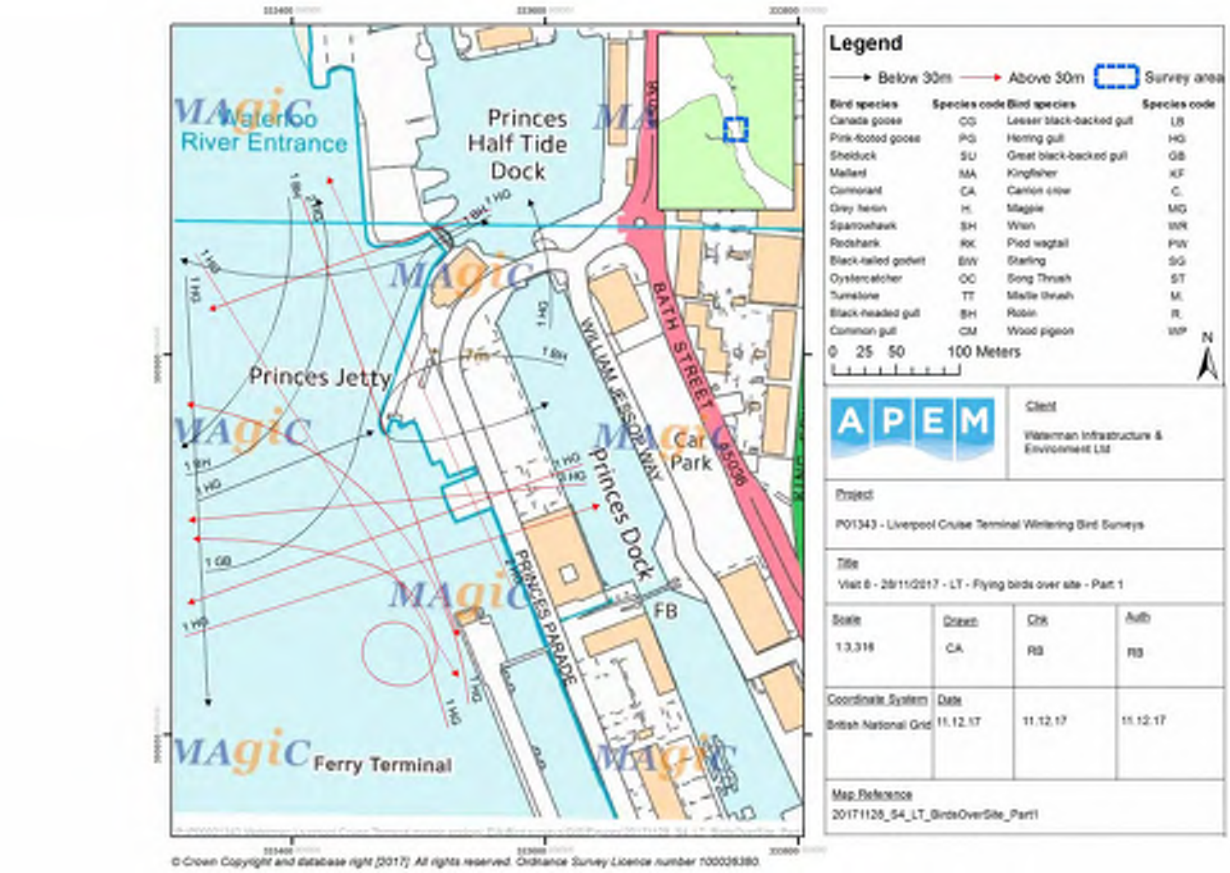


Figure 30: Visit 8 28/11/2017 Low Tide Flying birds adjacent to site Part 1

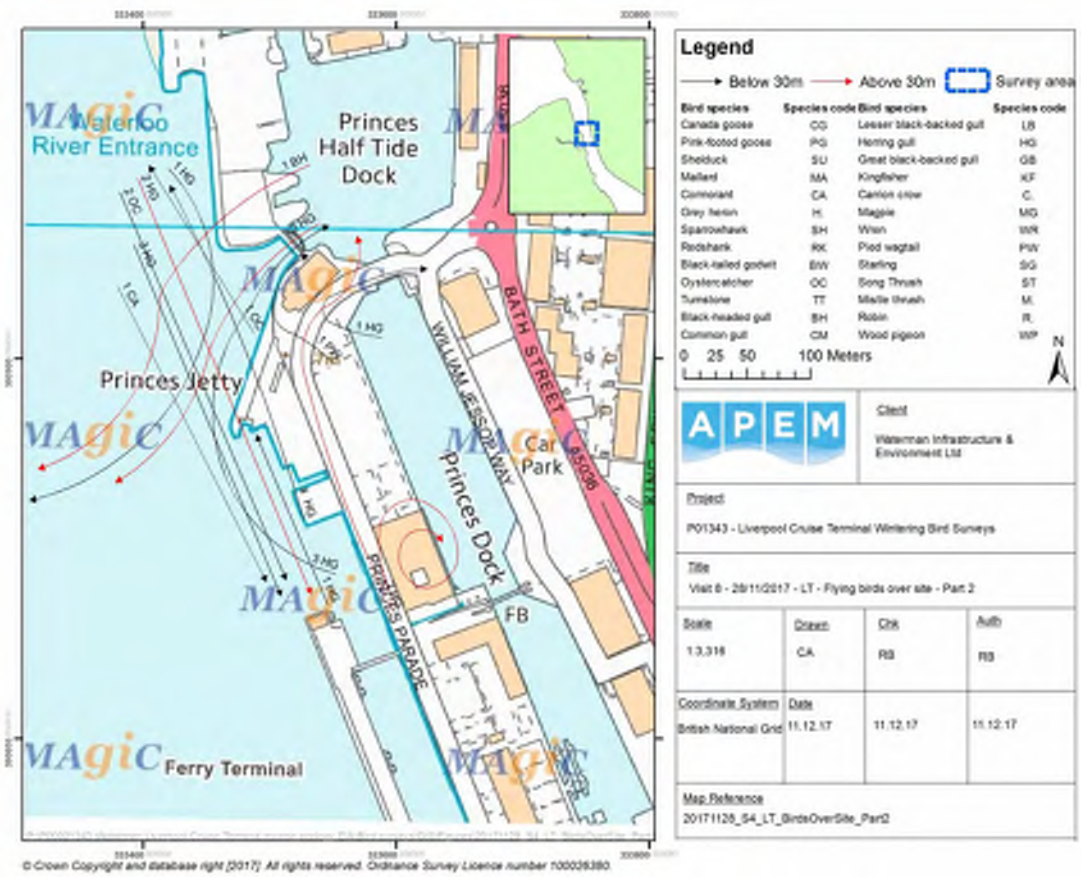


Figure 31: Visit 8 28/11/2017 Low Tide Flying birds adjacent to site Part 2

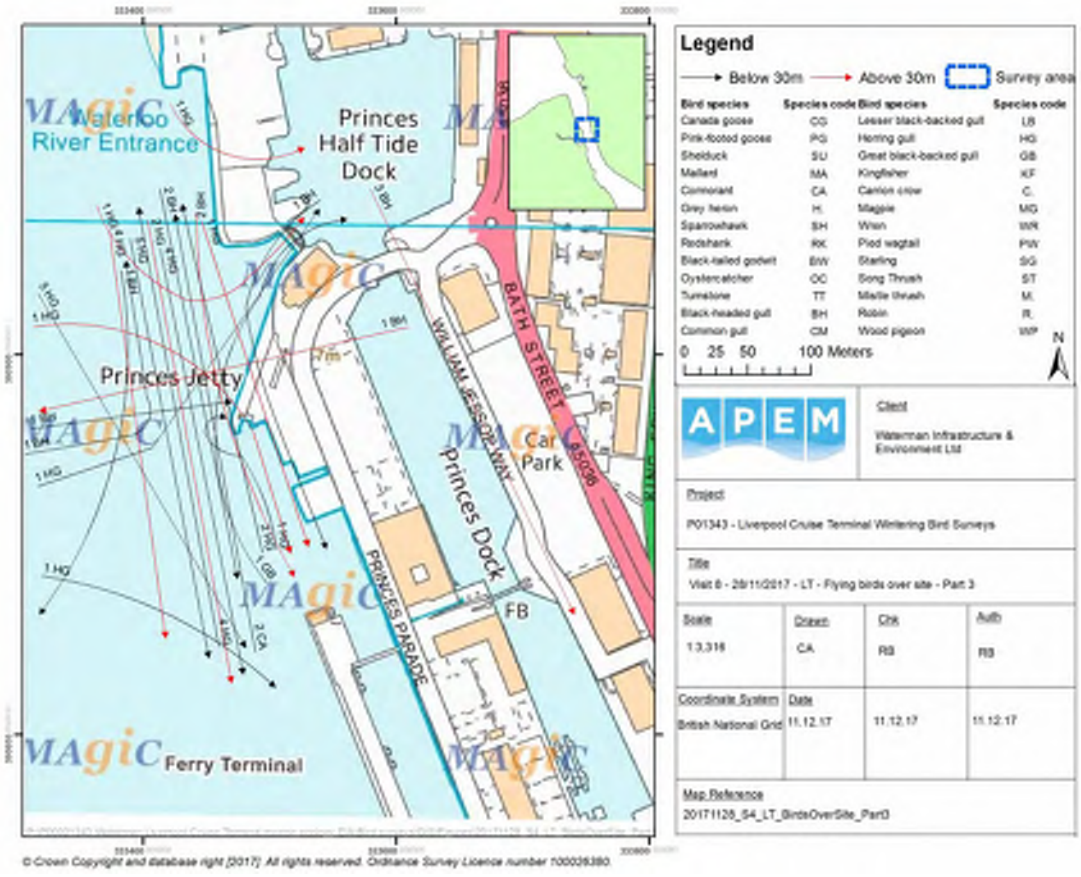


Figure 32: Visit 8 28/11/2017 Low Tide Flying birds adjacent to site Part 3

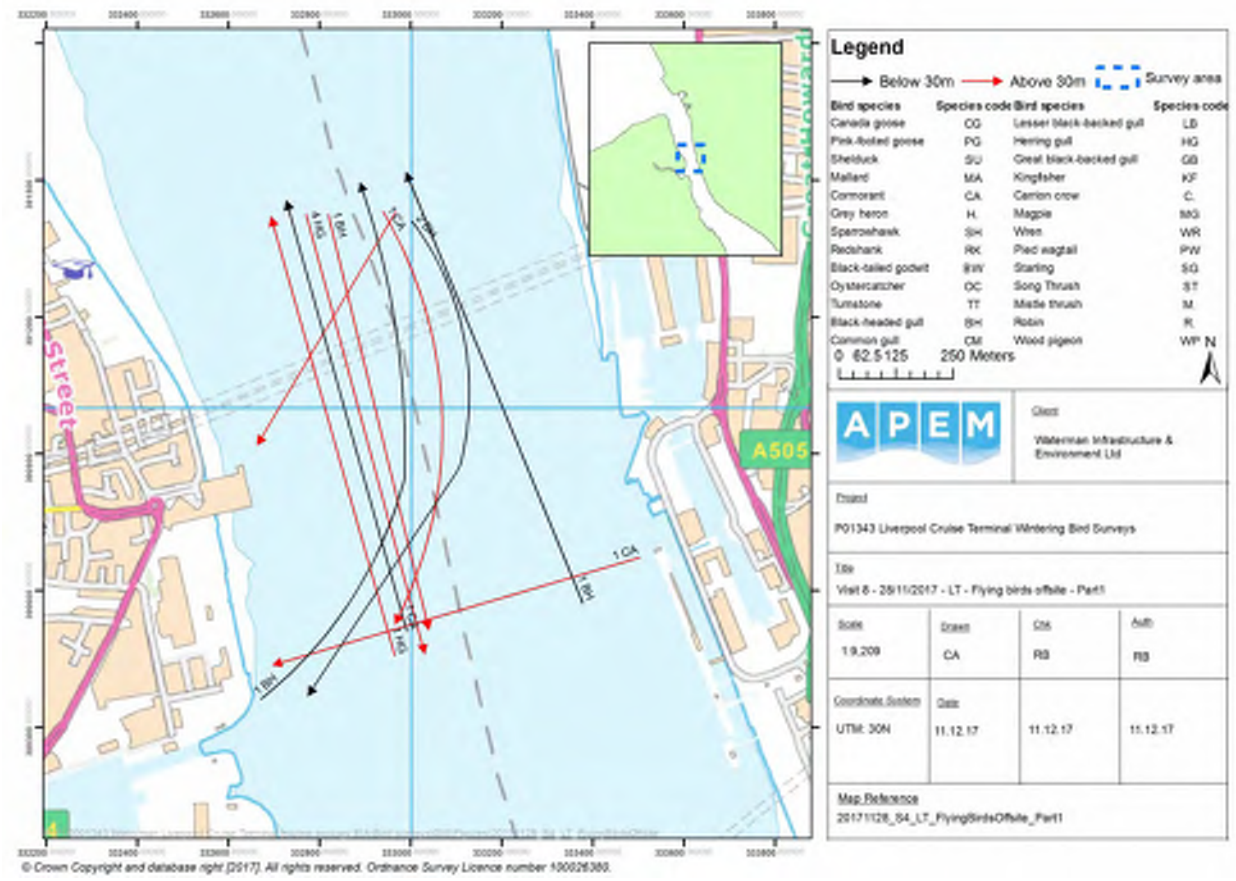


Figure 33: Visit 8 28/11/2017 Low Tide Flying birds in 1 km zone Part 1

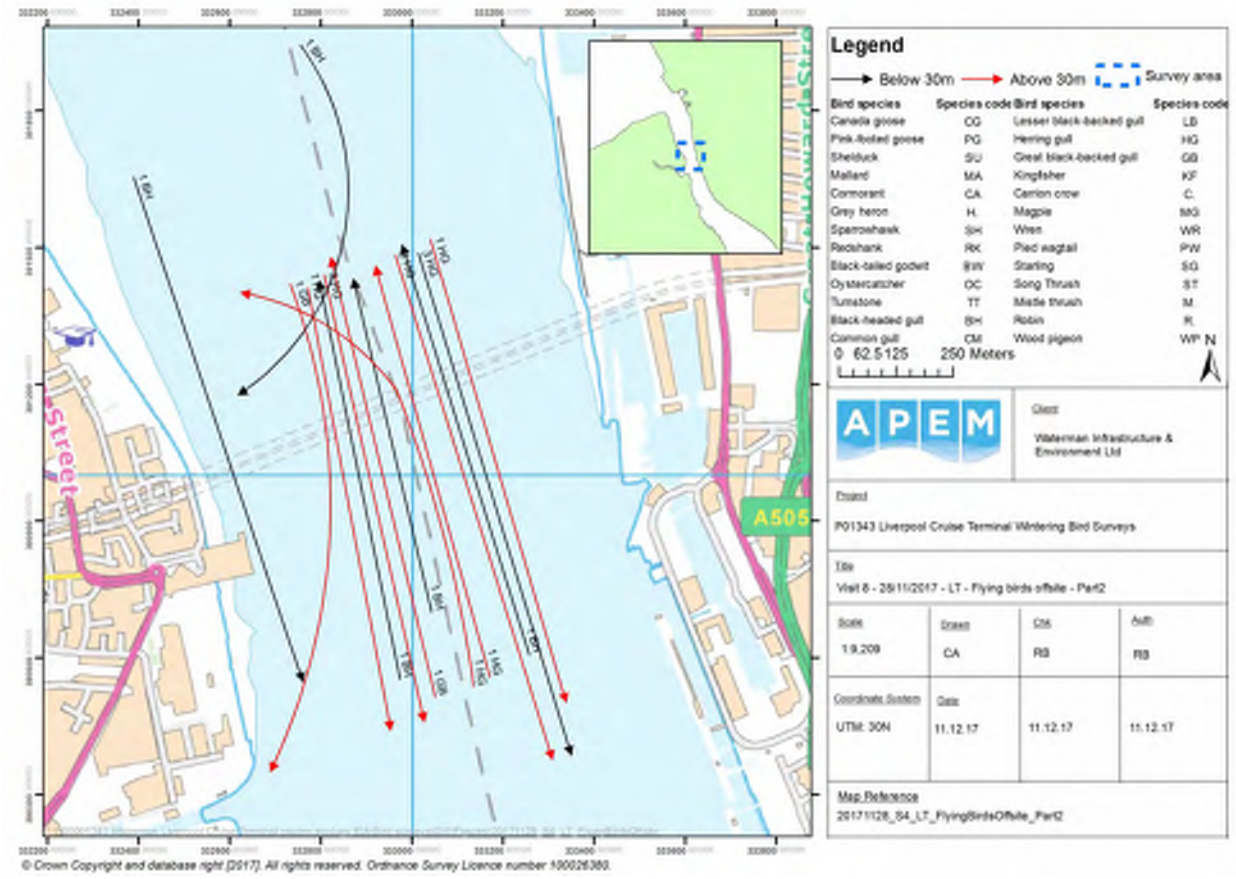


Figure 34: Visit 8 28/11/2017 Low Tide Flying birds in 1 km zone Part 2

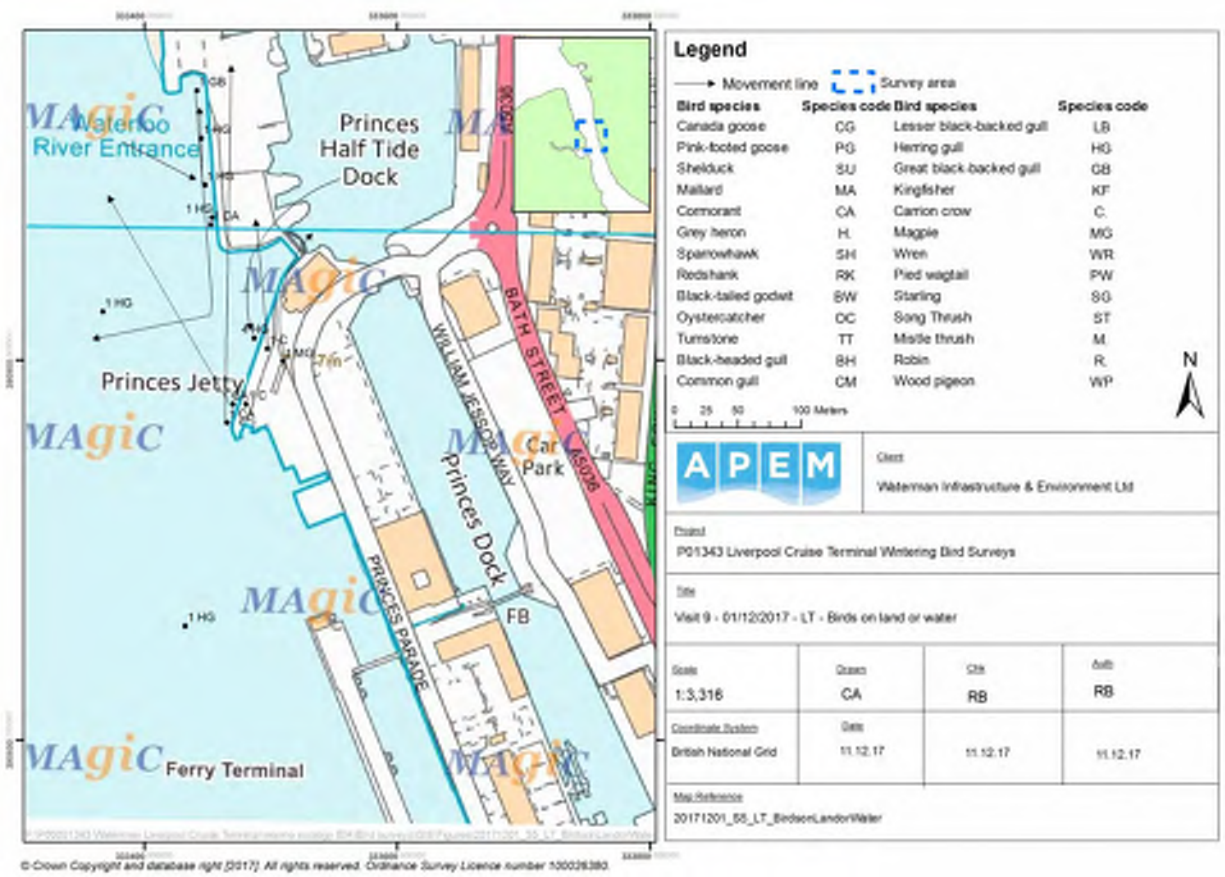


Figure 35: Visit 9 01/12 /2017 Low Tide Birds on land and water

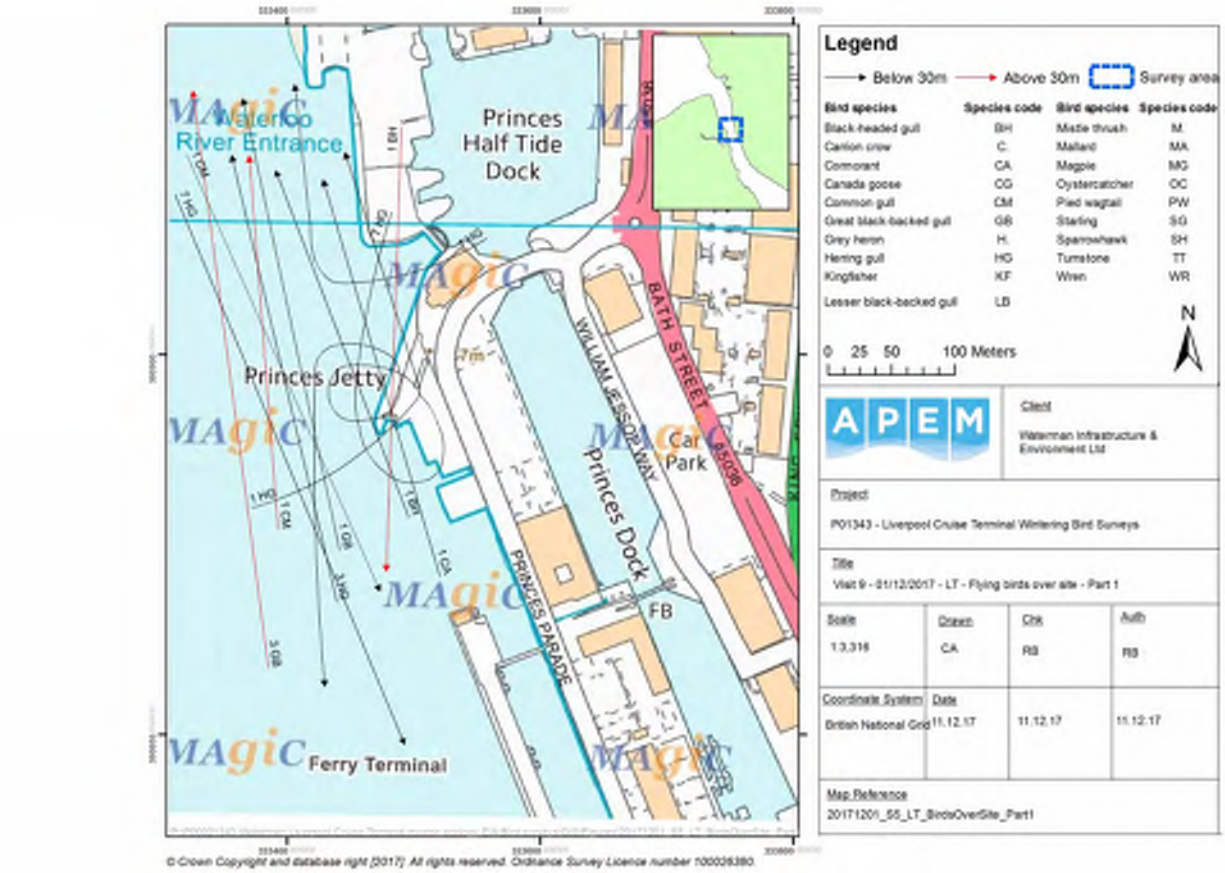


Figure 36: Visit 9 01/12/2017 Low Tide Flying birds adjacent to site Part 1

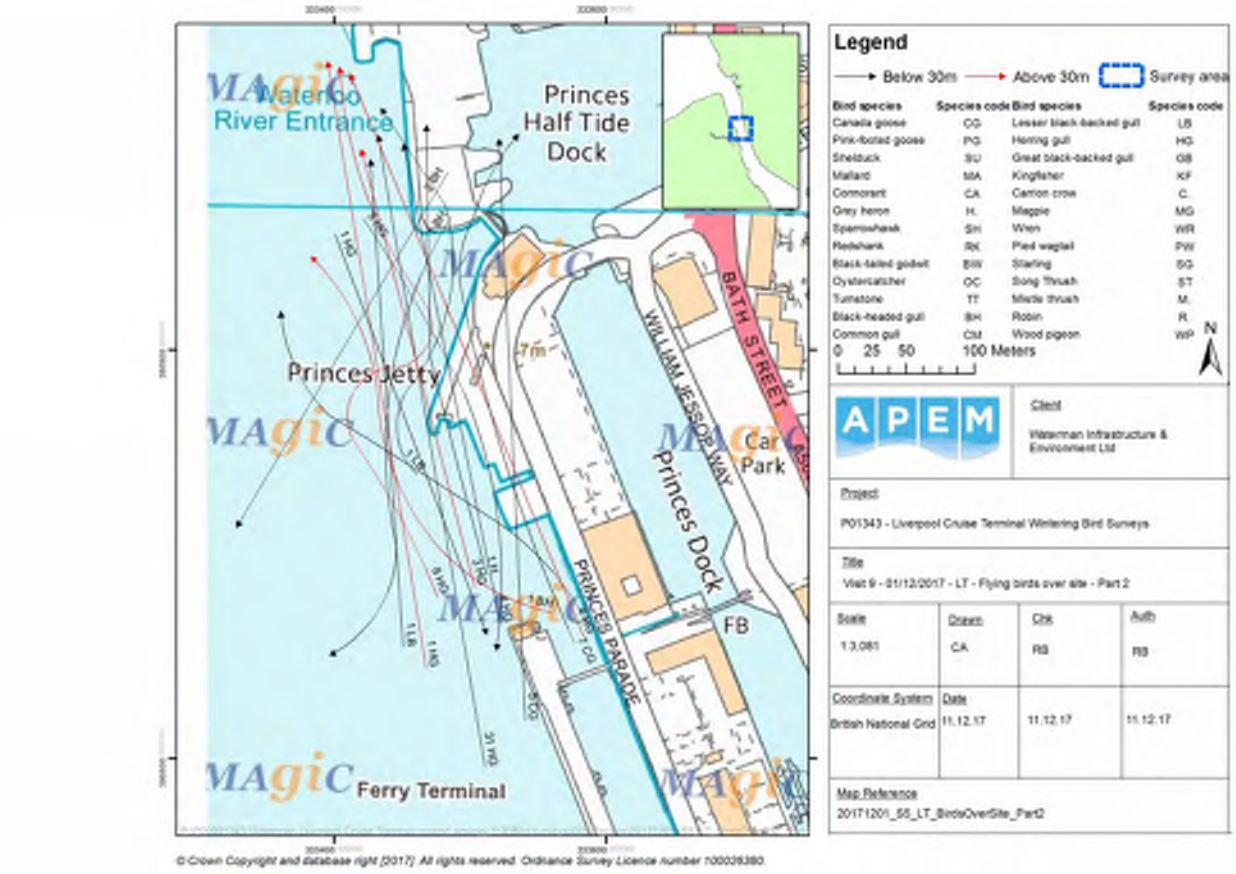


Figure 37: Visit 9 01/12/2017 Low Tide Flying birds adjacent to site Part 2

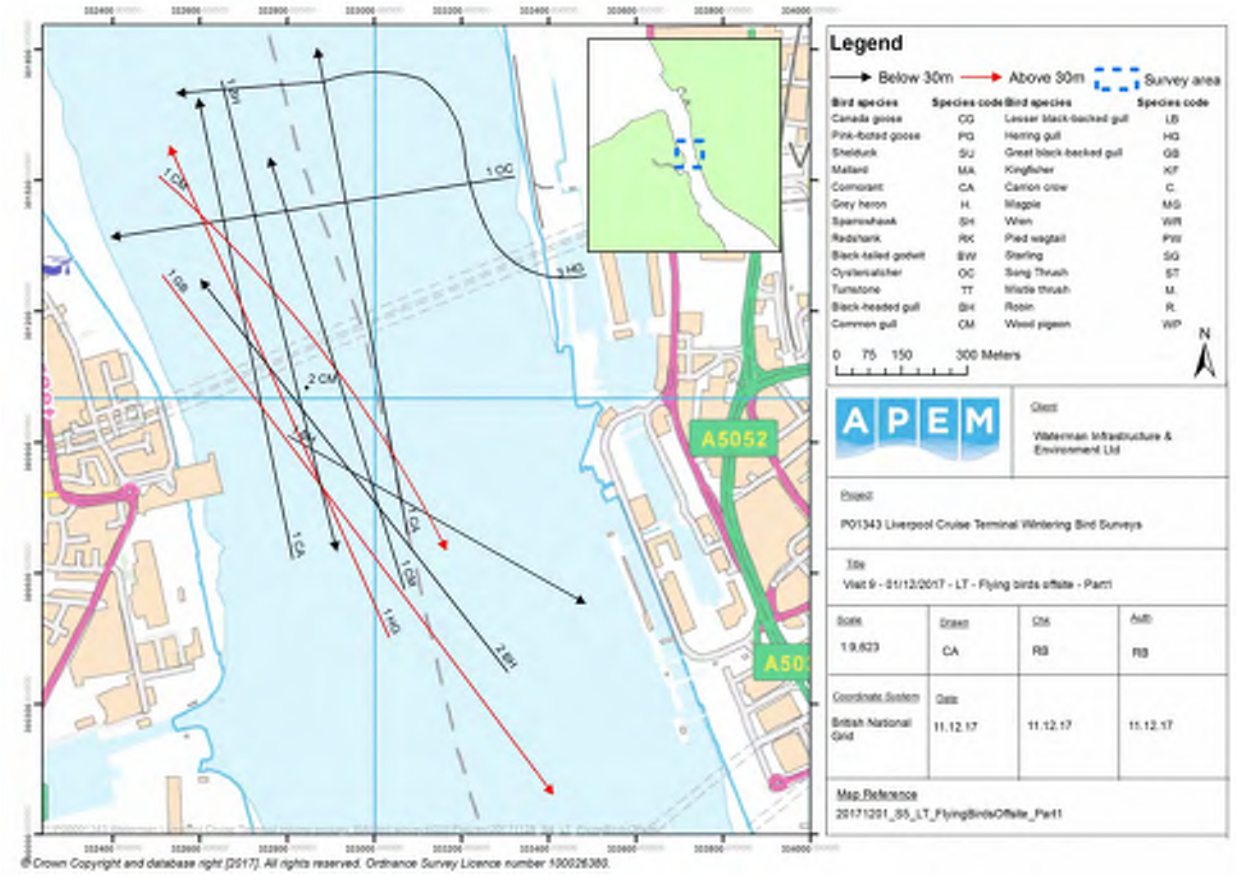


Figure 38: Visit 9 01/12/2017 Low Tide Flying birds in 1 km zone Part 1

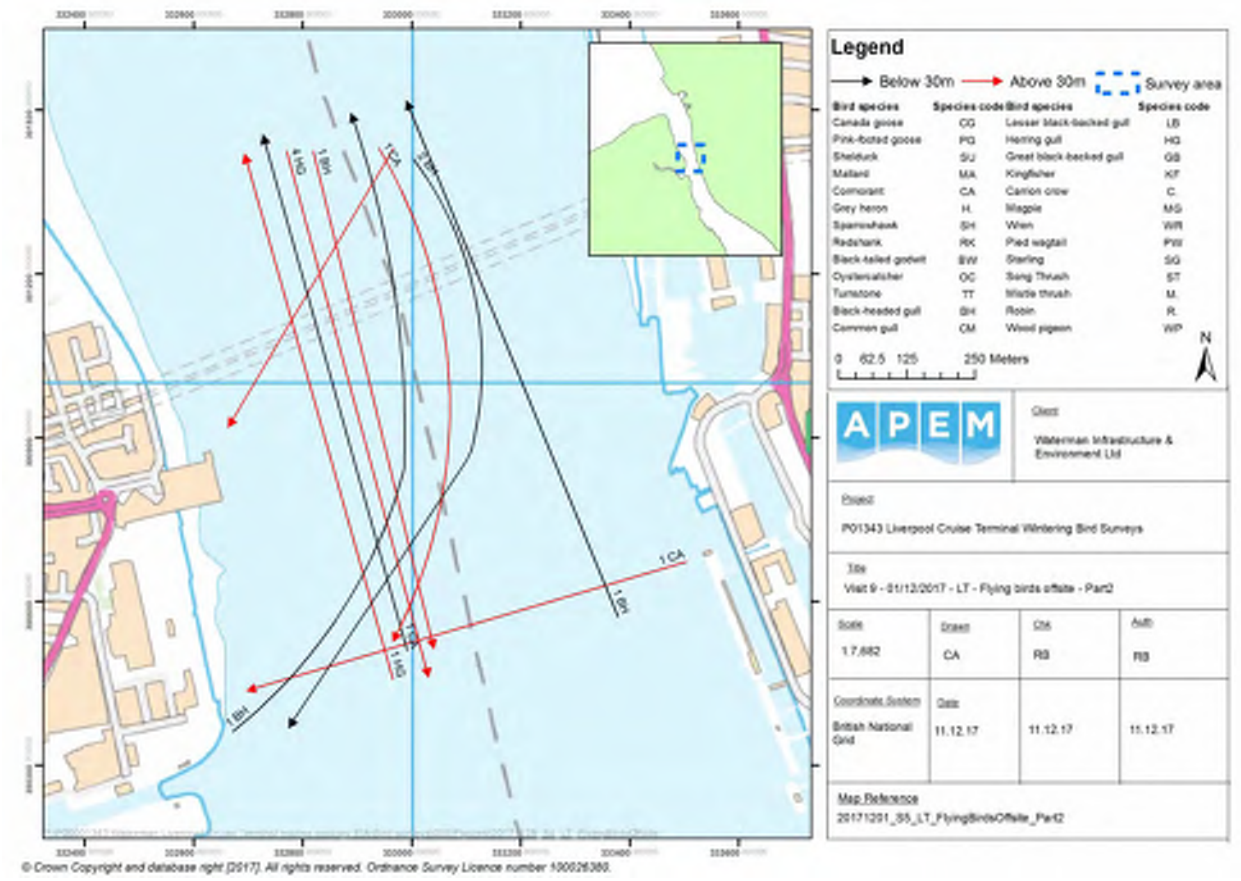


Figure 39: Visit 9 01/12/2017 Low Tide Flying birds in 1 km zone Part 2

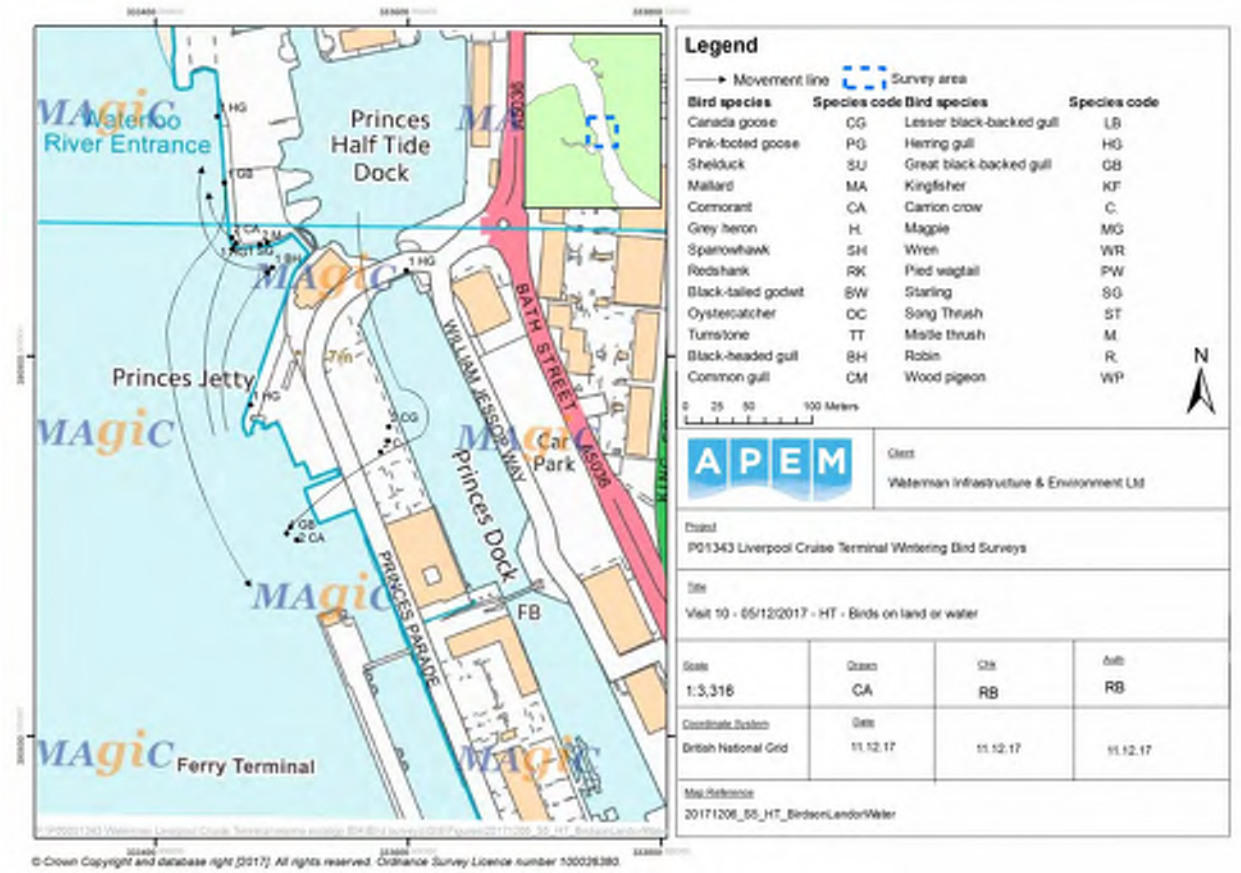


Figure 40: Visit 10 05/12/2017 High Tide Birds on land and water

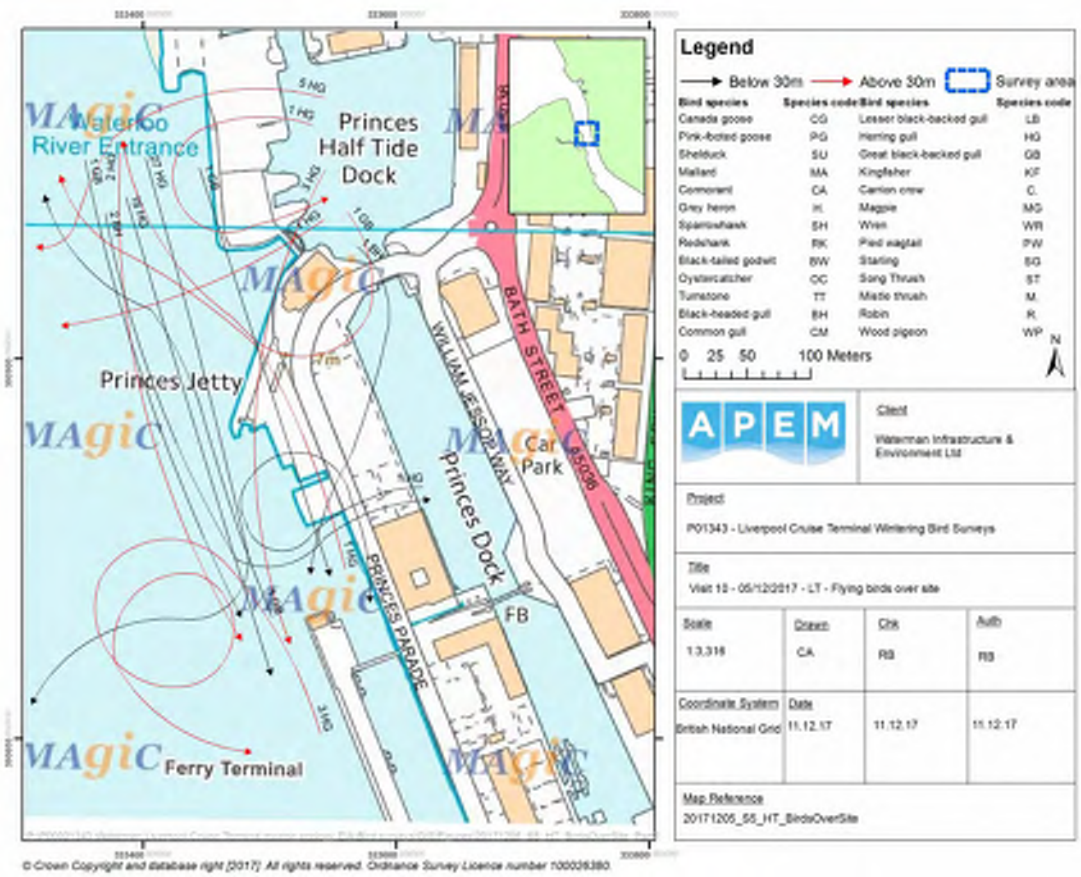


Figure 41: Visit 10 05/12/2017 High Tide Flying birds adjacent to site Part 1

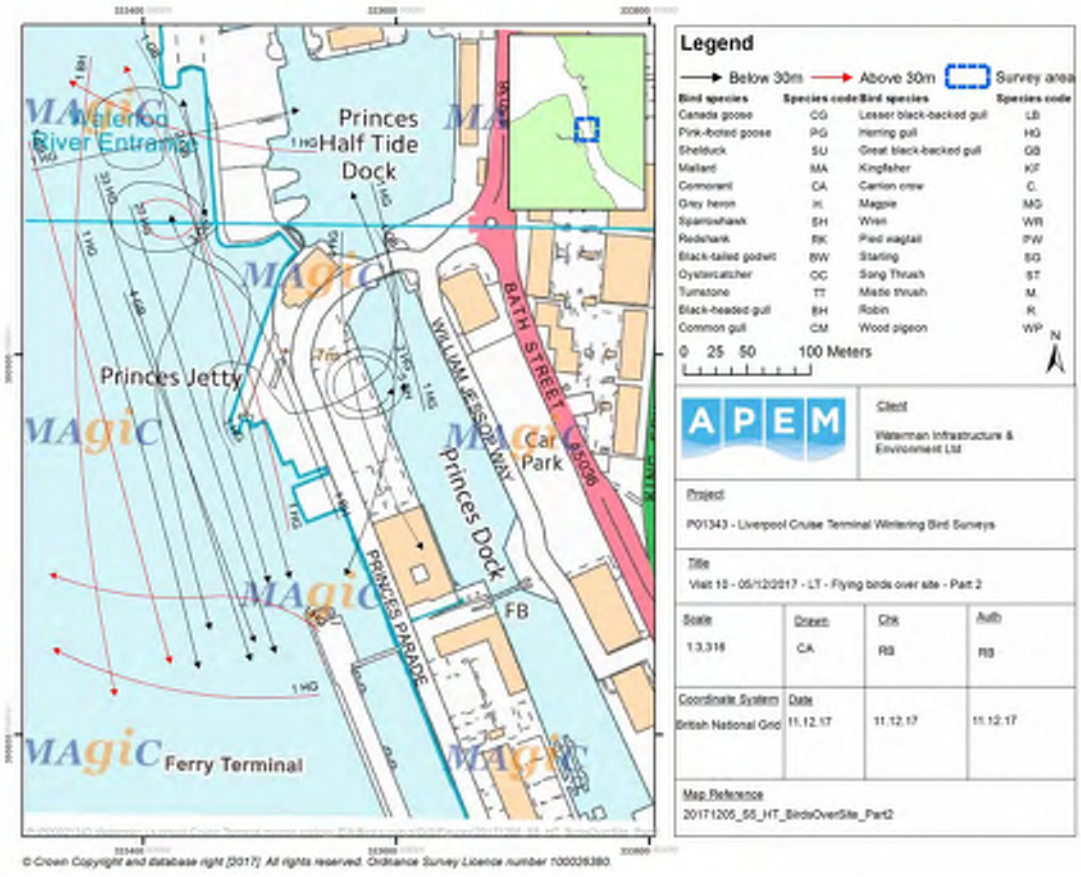


Figure 42: Visit 10 05/12/2017 High Tide Flying birds adjacent to site Part 2

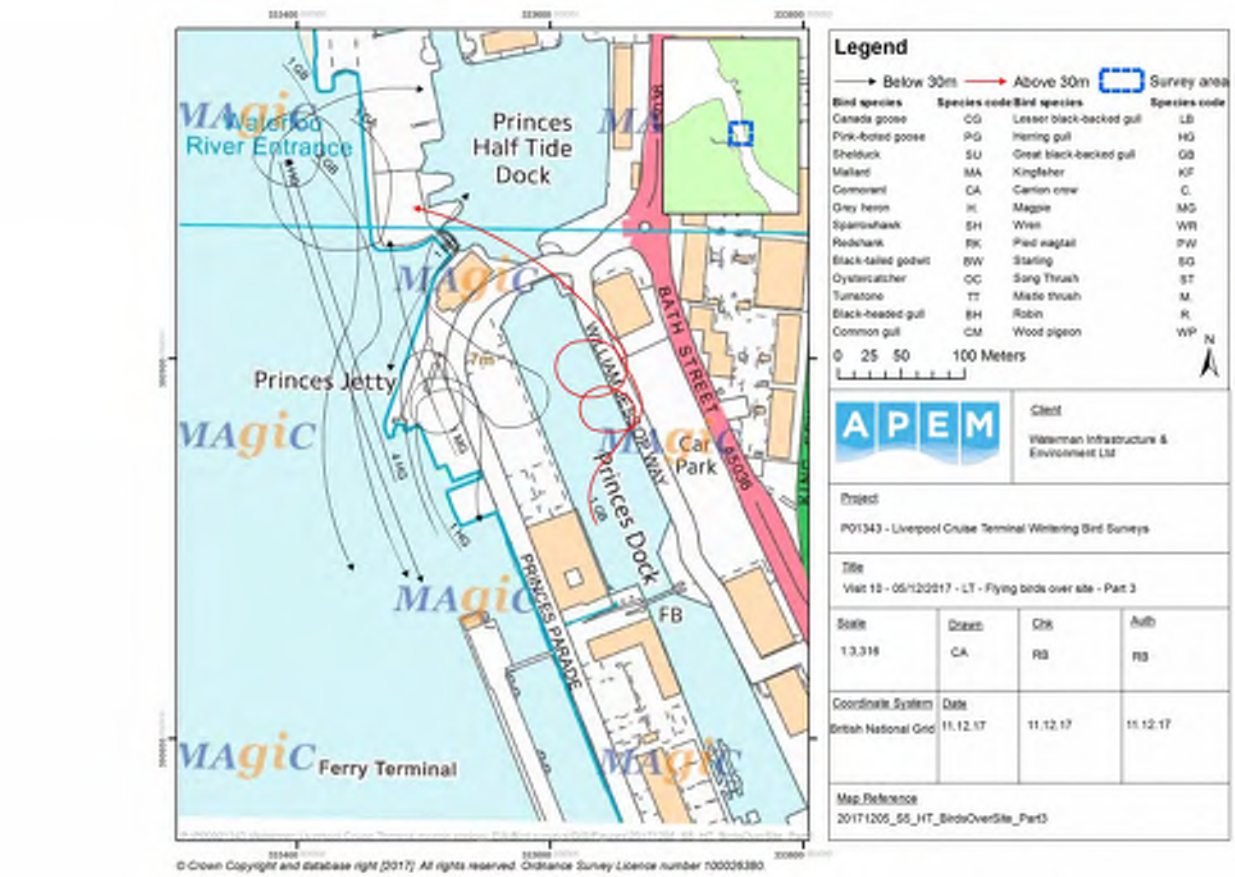


Figure 43: Visit 10 05/12/2017 High Tide Flying birds adjacent to site Part 3

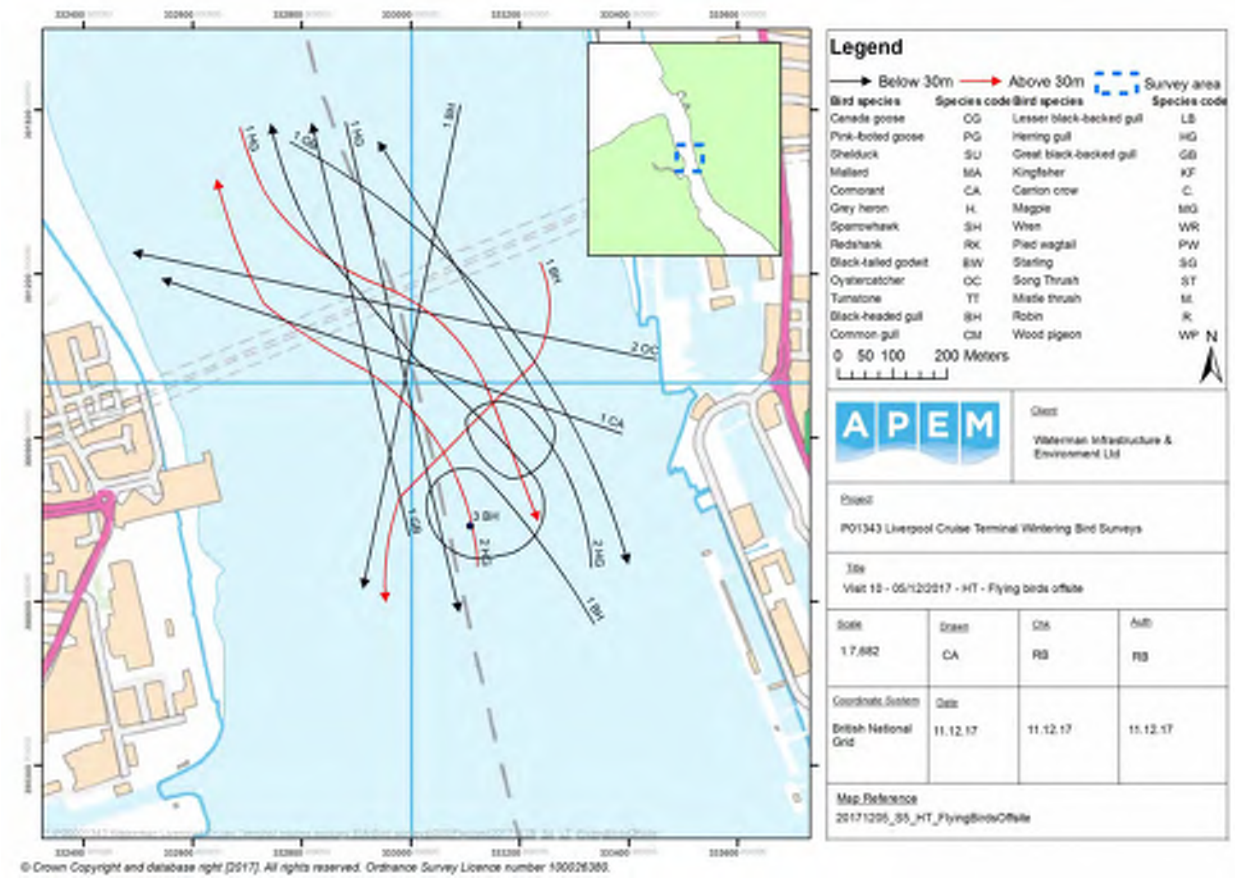


Figure 44: Visit 10 05/12/2017 High Tide Flying birds in 1 km zone

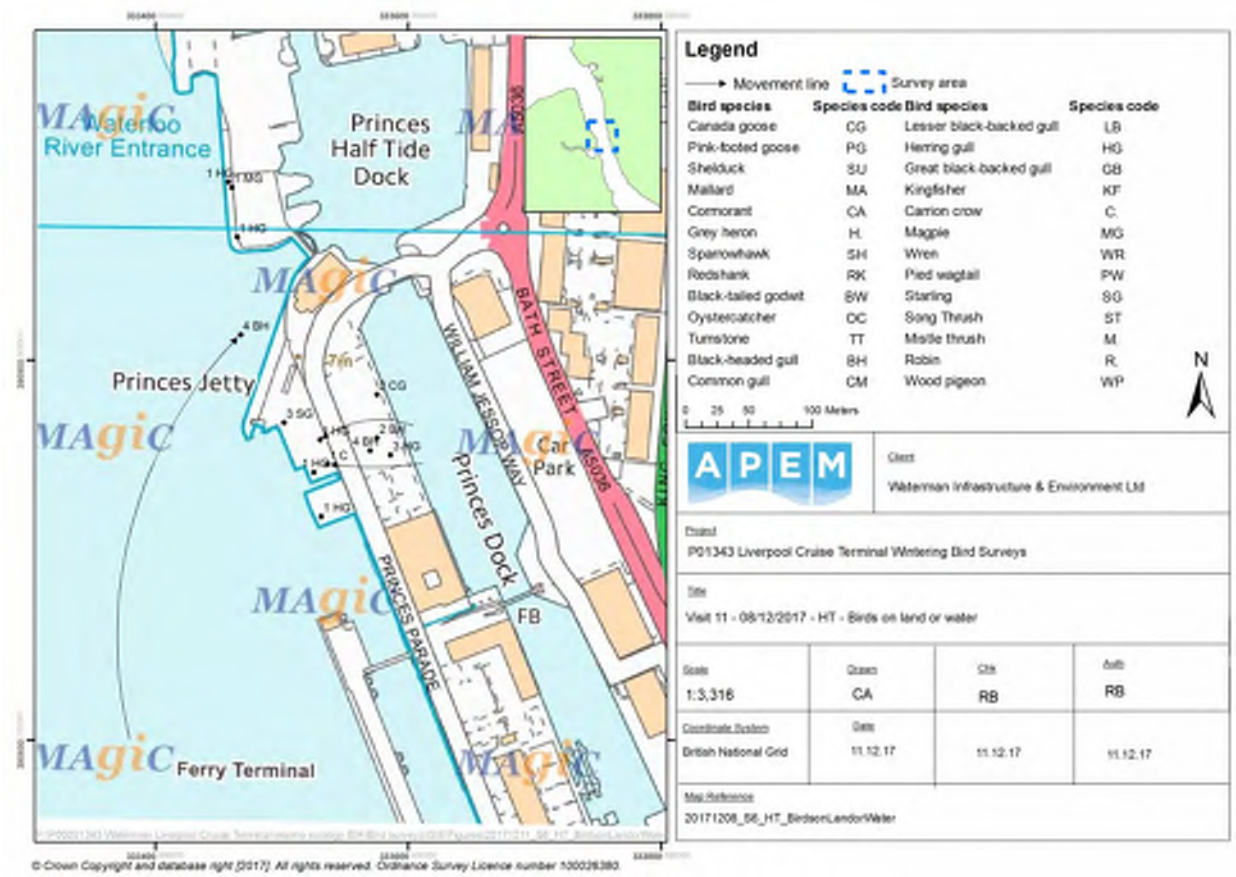


Figure 45: Visit 11 08/12/2017 High Tide Birds on land and water

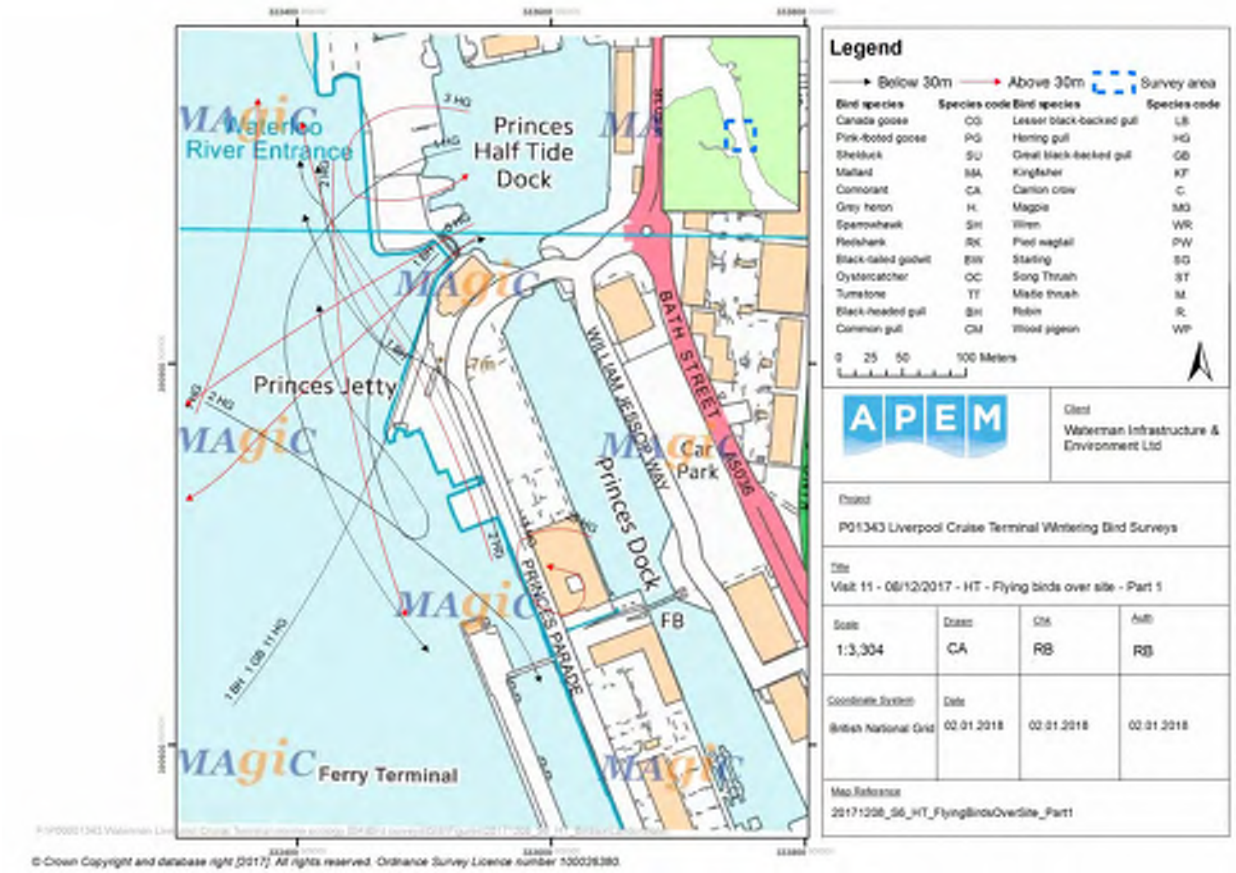


Figure 46: Visit 11 08/12/2017 High Tide Flying birds adjacent to site Part 1

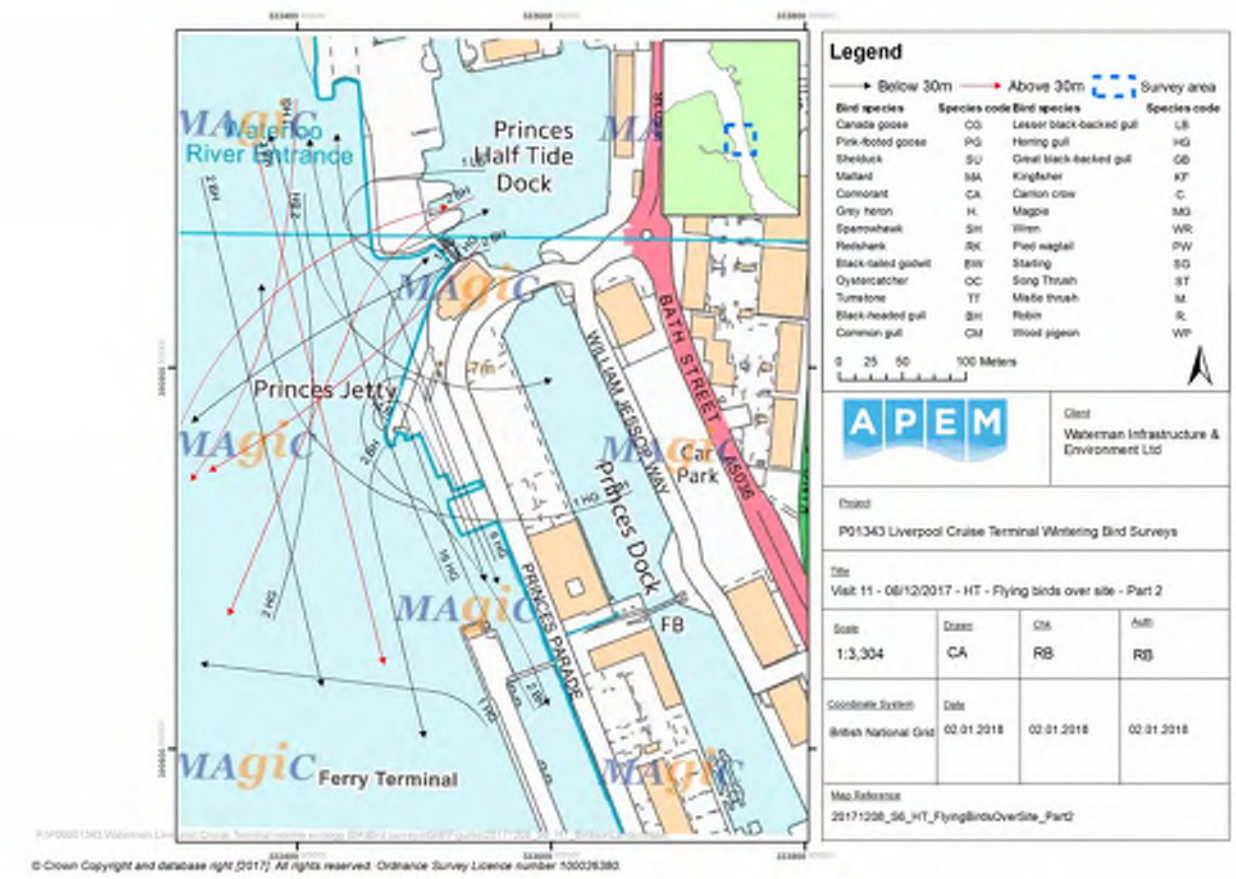


Figure 47: Visit 11 08/12/2017 High Tide Flying birds adjacent to site Part 2

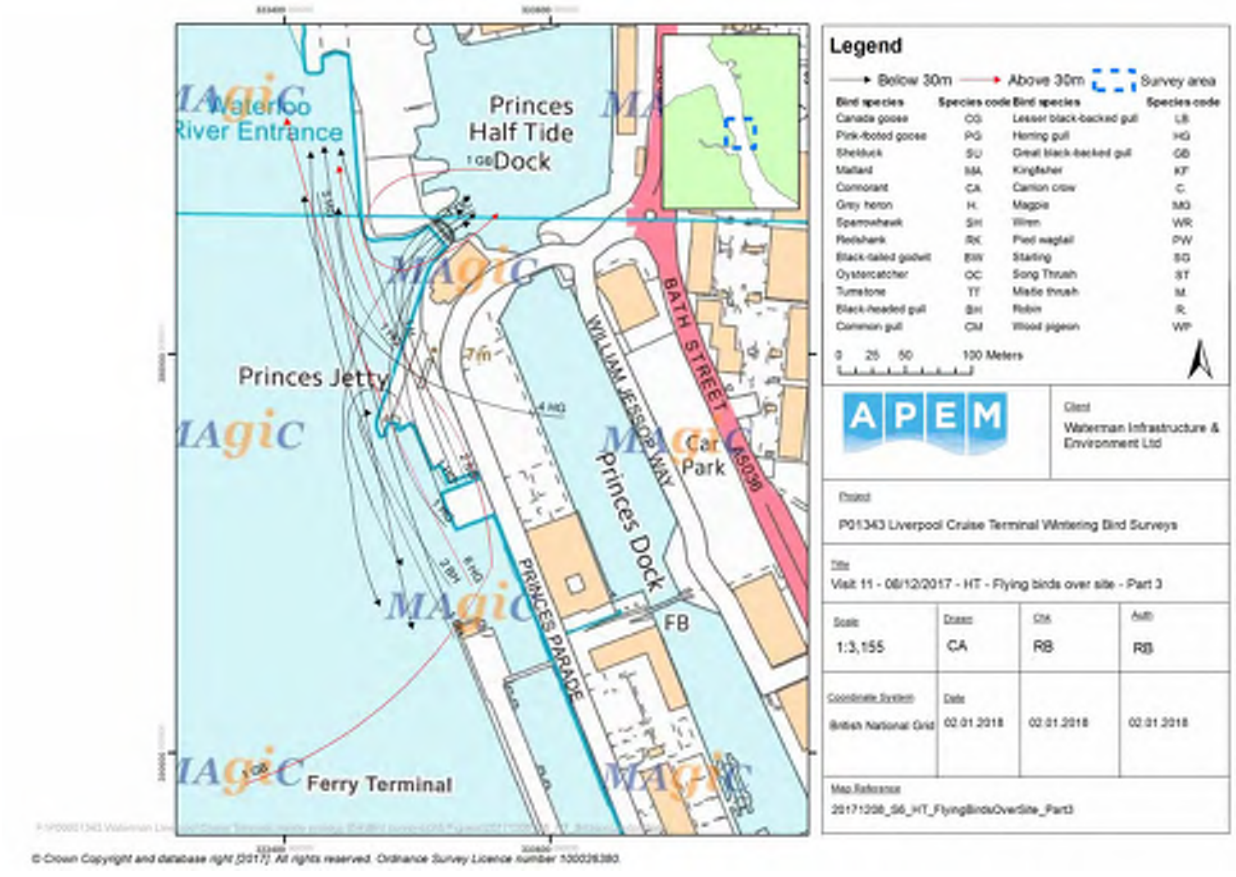


Figure 48: Visit 11 08/12/2017 High Tide Flying birds adjacent to site Part 3

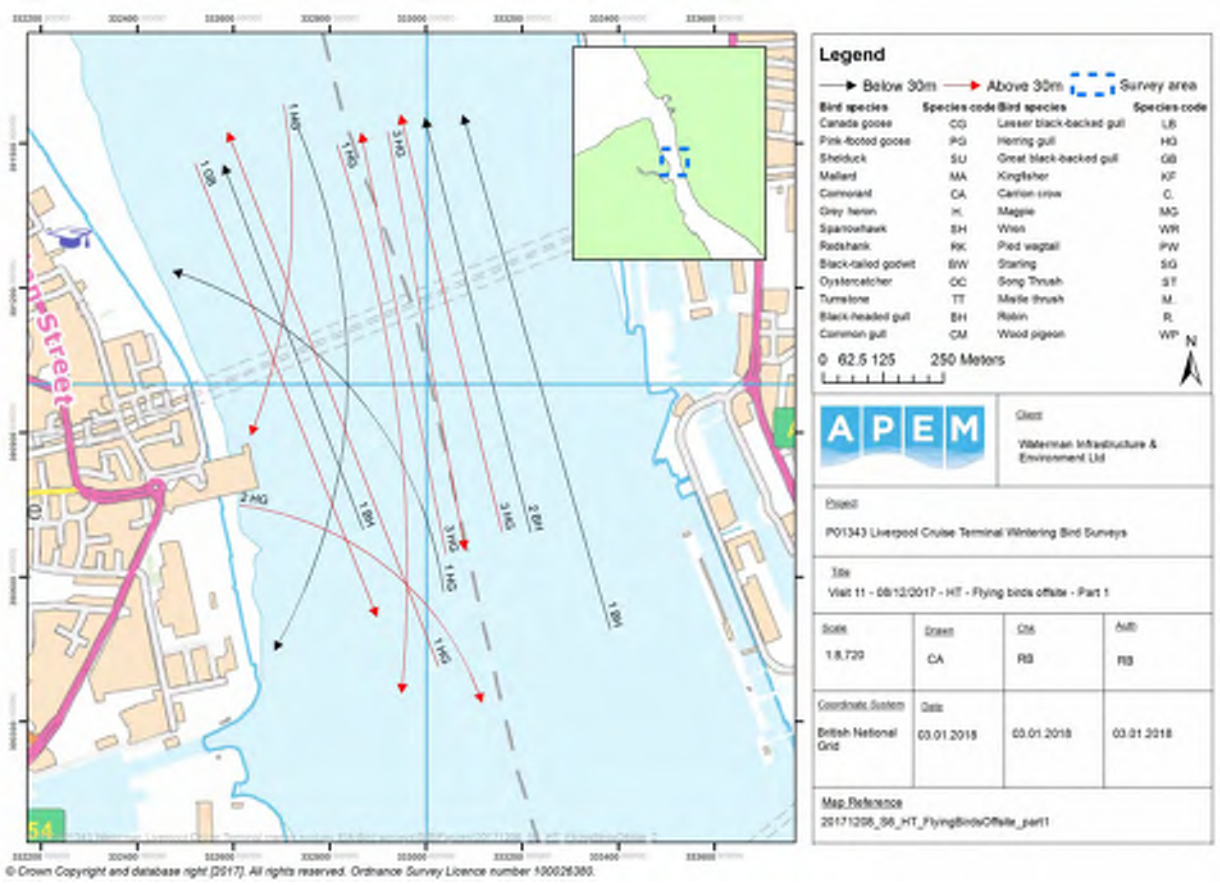


Figure 49: Visit 11 08/12/2017 High Tide Flying birds in 1 km zone Part 1

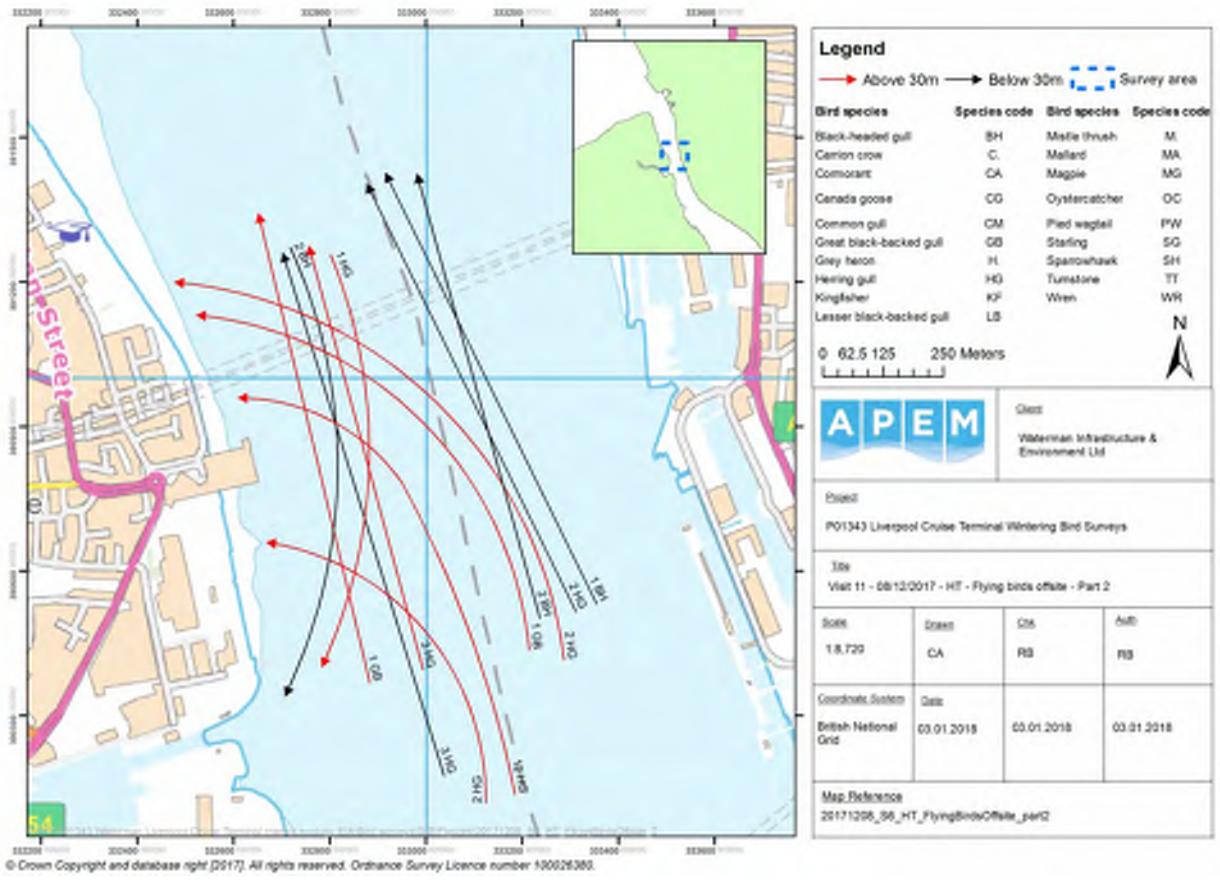


Figure 50: Visit 11 08/12/2017 High Tide Flying birds in 1 km zone Part 2

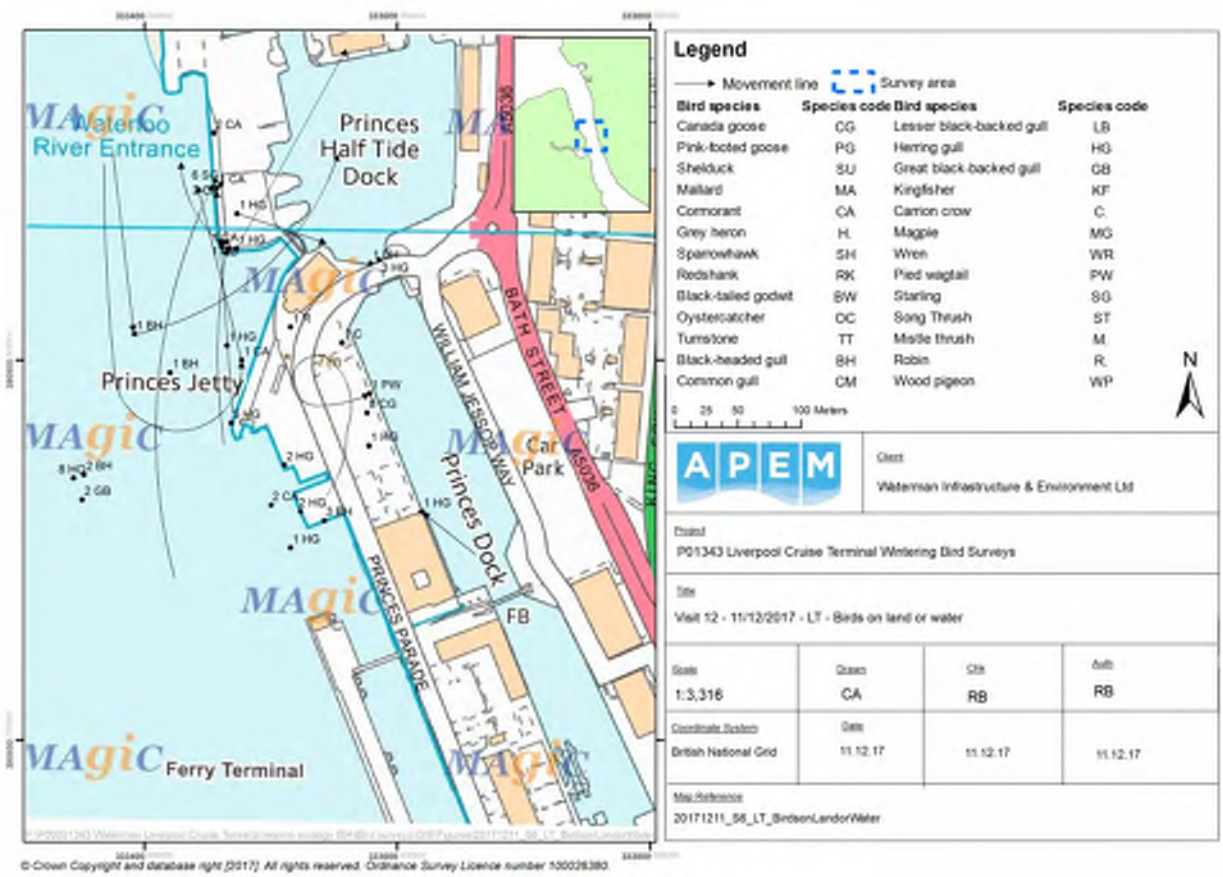


Figure 51: Visit 12 11/12/2017 Low Tide Birds on land and water

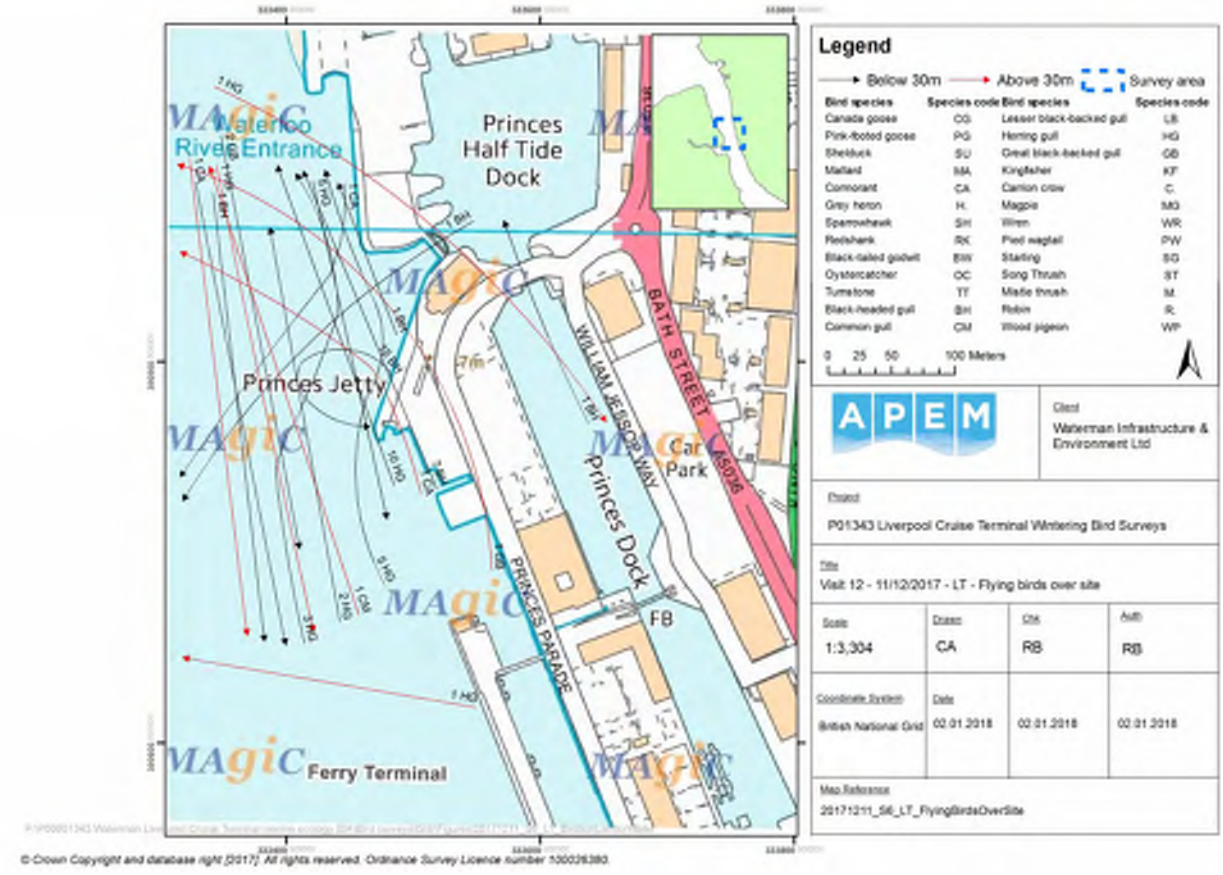


Figure 52: Visit 12 11/12/2017 Low Tide Flying birds adjacent to site Part 1

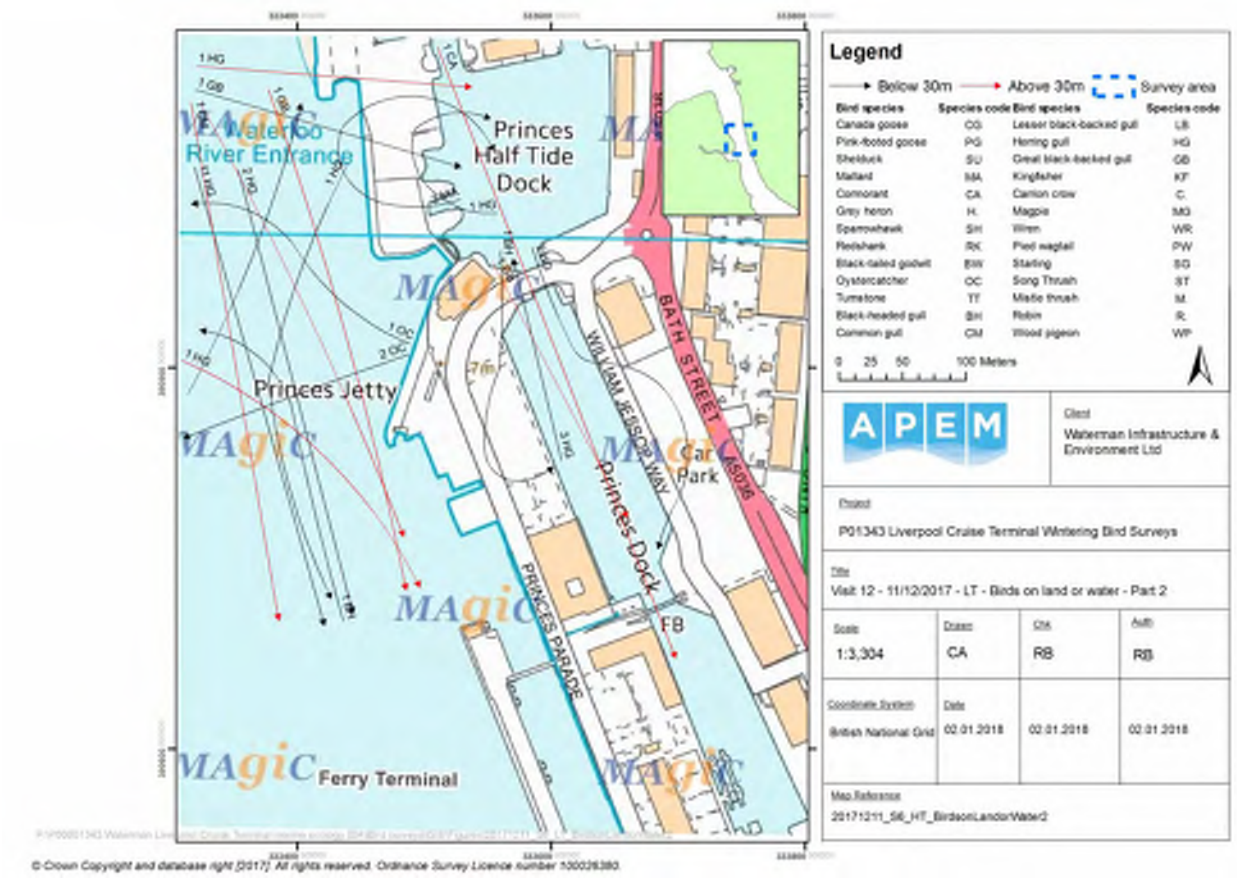


Figure 53: Visit 12 11/12/2017 Low Tide Flying birds adjacent to site Part 2

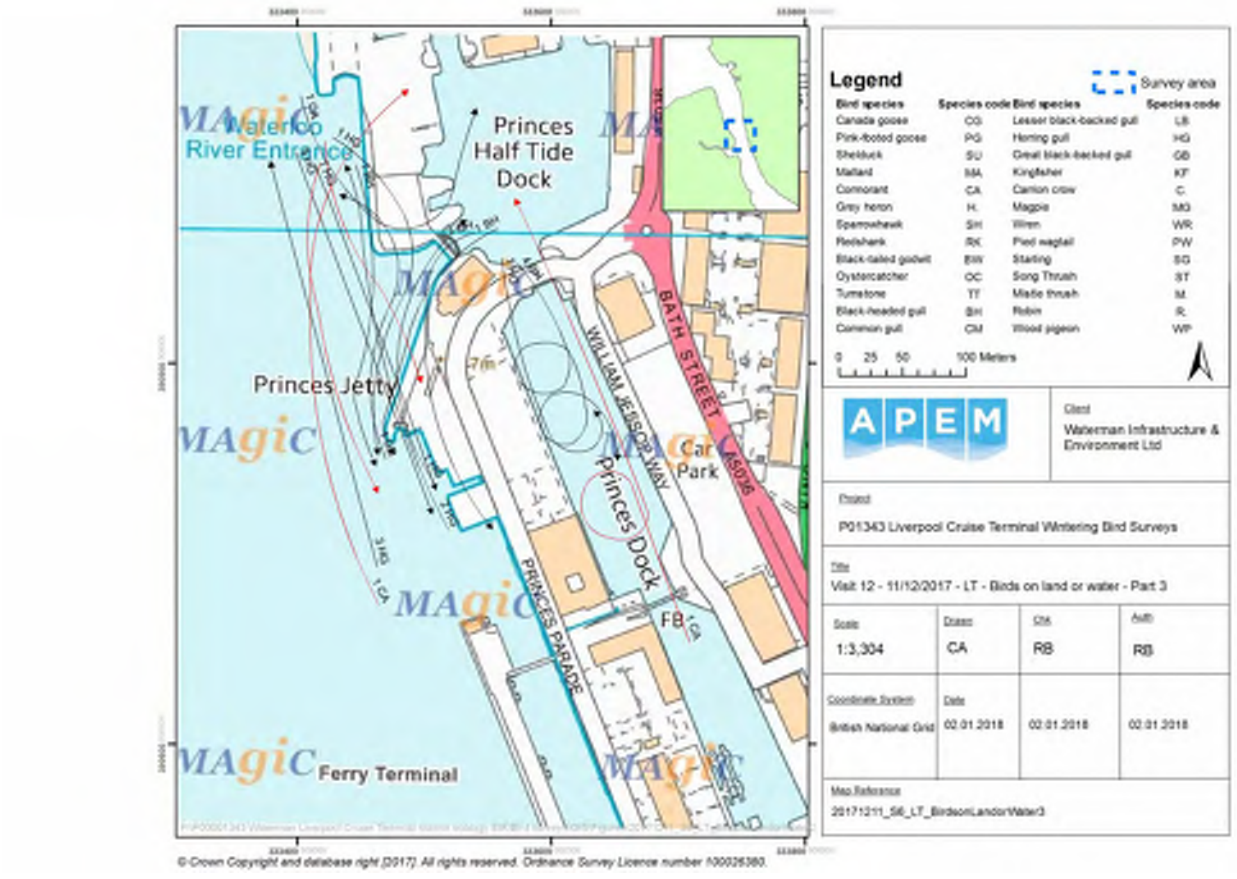


Figure 54: Visit 12 11/12/2017 Low Tide Flying birds adjacent to site Part 3

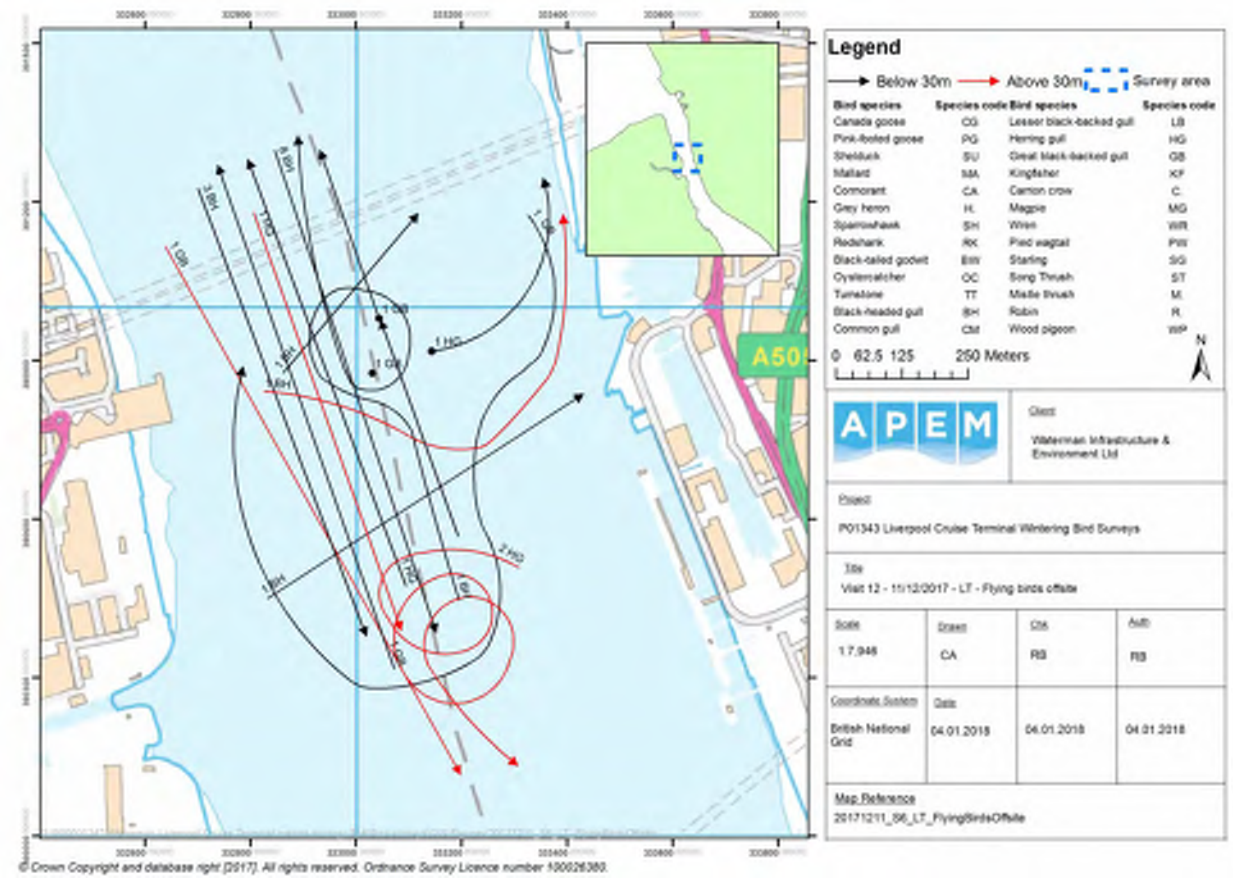


Figure 55: Visit 12 11/12/2017 Low Tide Flying birds in 1 km zone

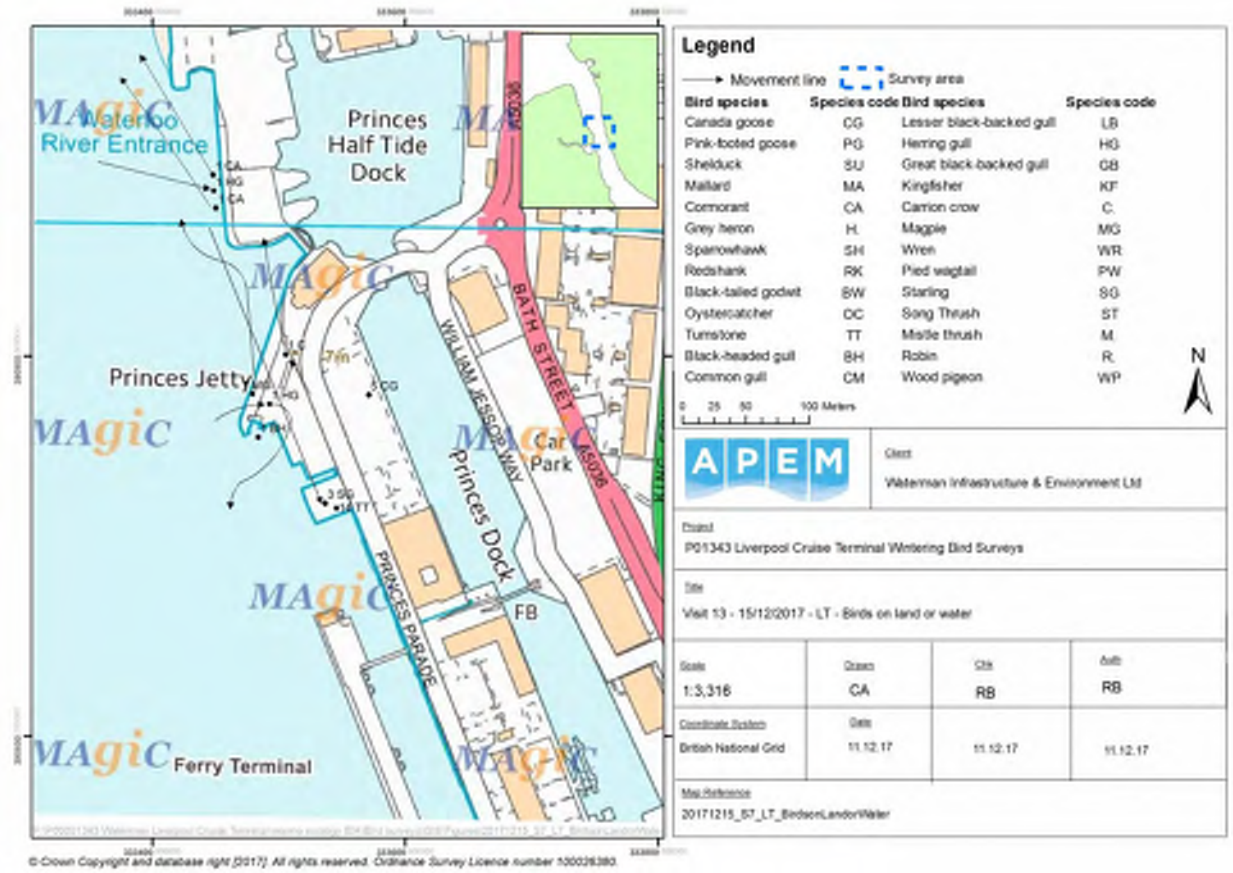


Figure 56: Visit 13 15/12/2017 Low Tide Birds on land and water

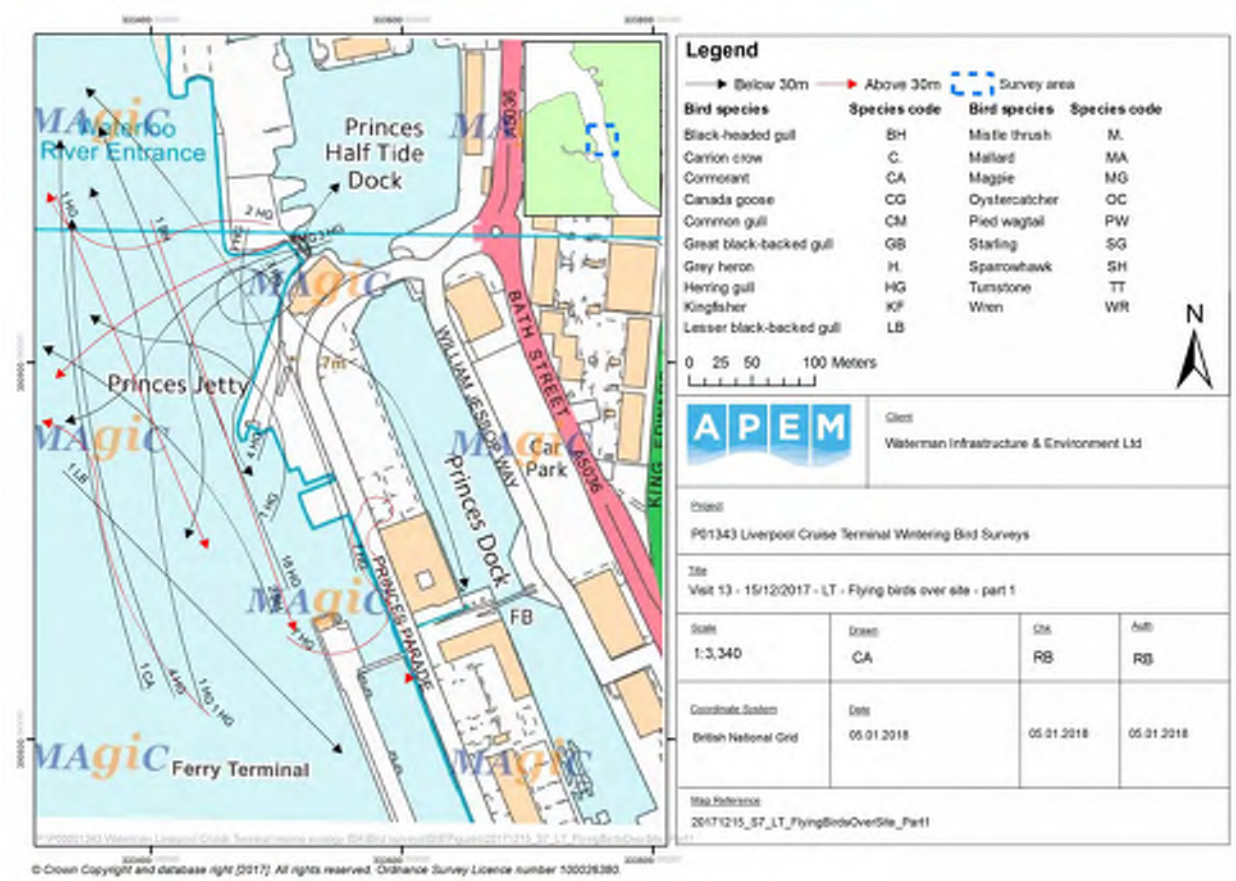


Figure 57: Visit 13 15/12/2017 Low Tide Flying birds adjacent to site Part 1

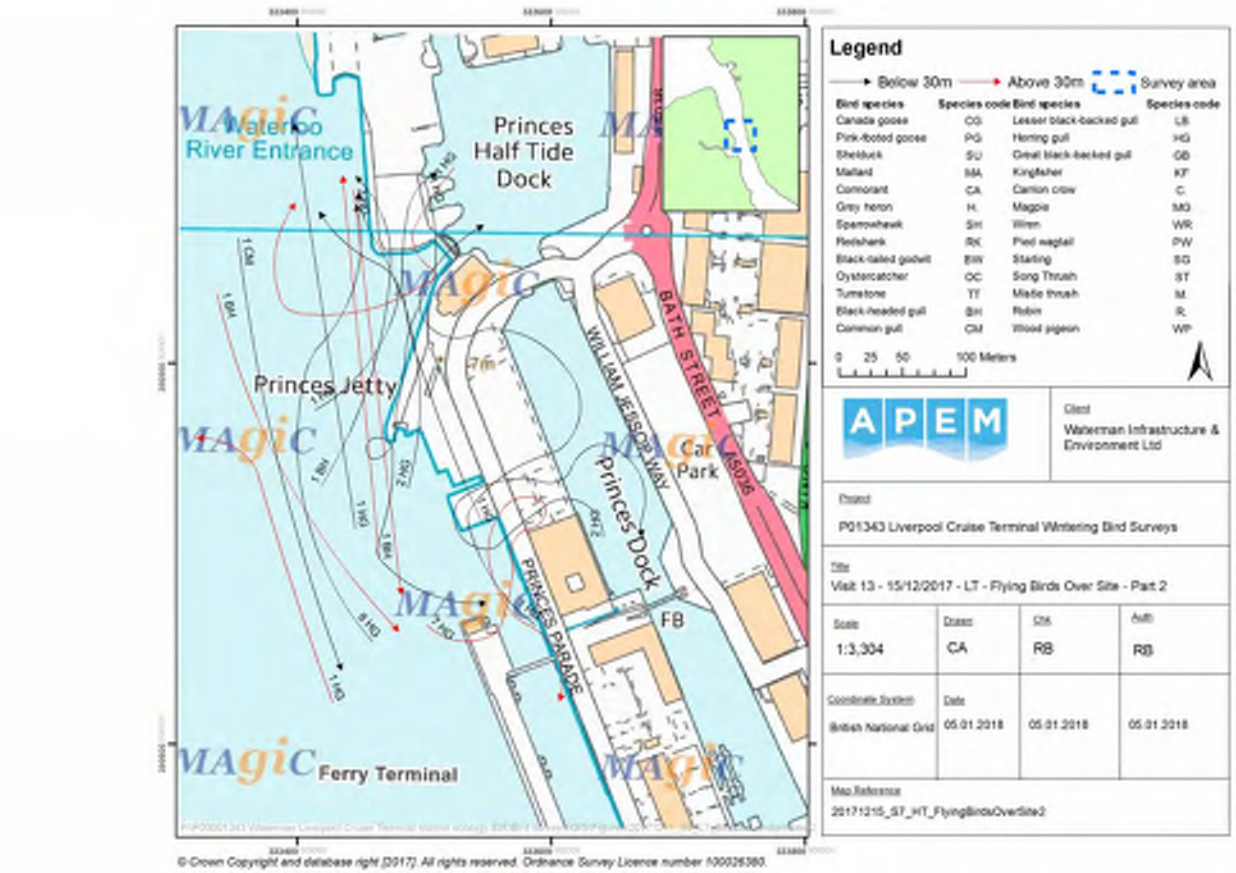


Figure 58: Visit 13 15/12/2017 Low Tide Flying birds adjacent to site Part 2

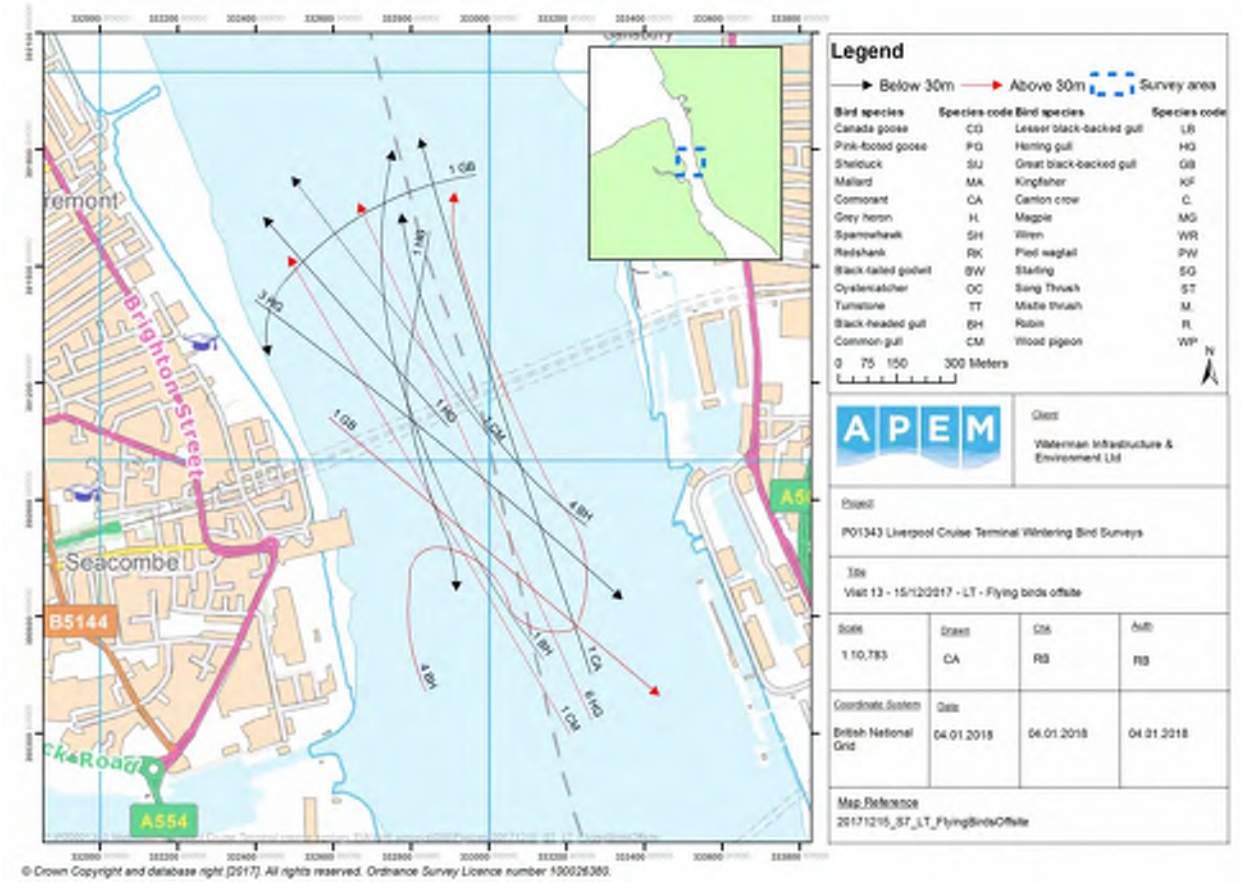


Figure 59: Visit 13 15/12/2017 Low Tide Flying birds in 1 km zone

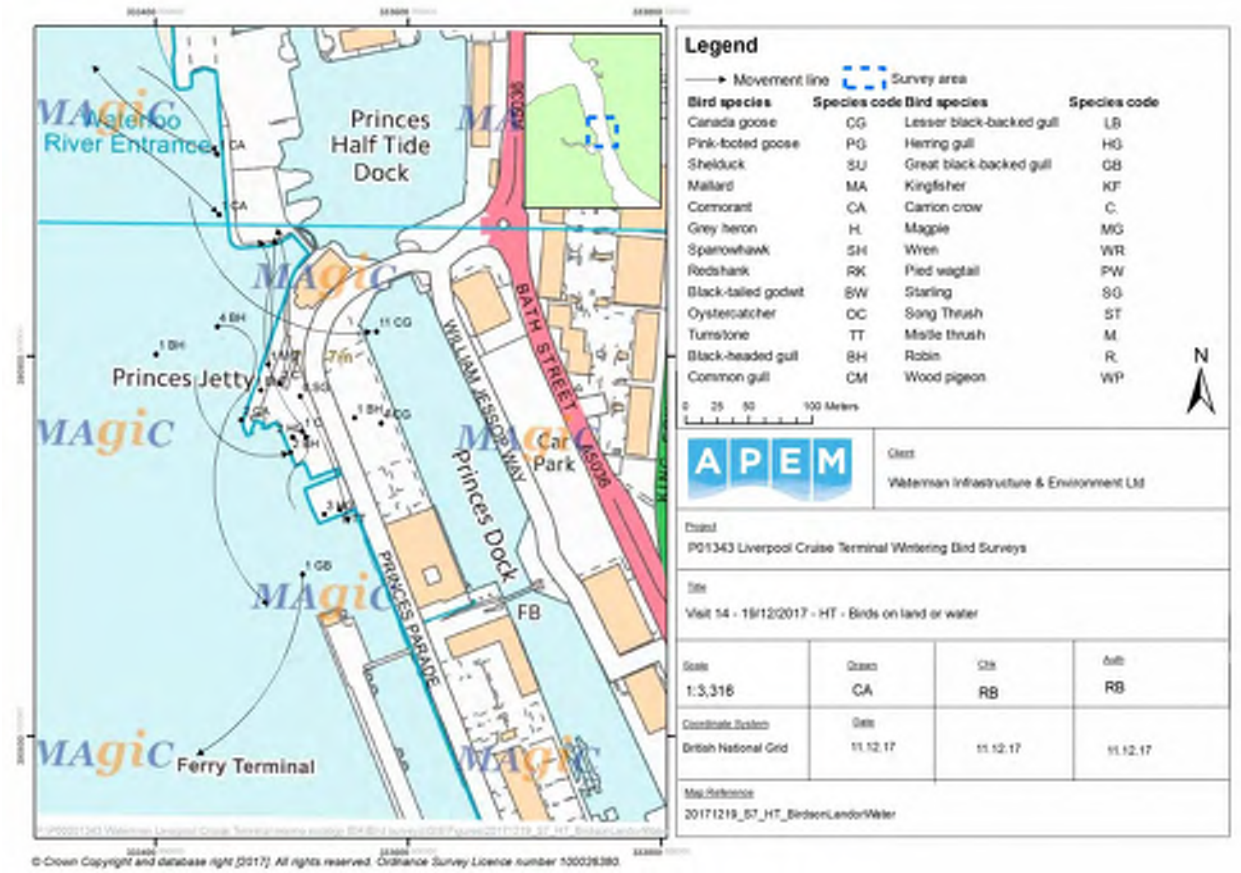


Figure 60: Visit 14 19/12/2017 High Tide Birds on land and water

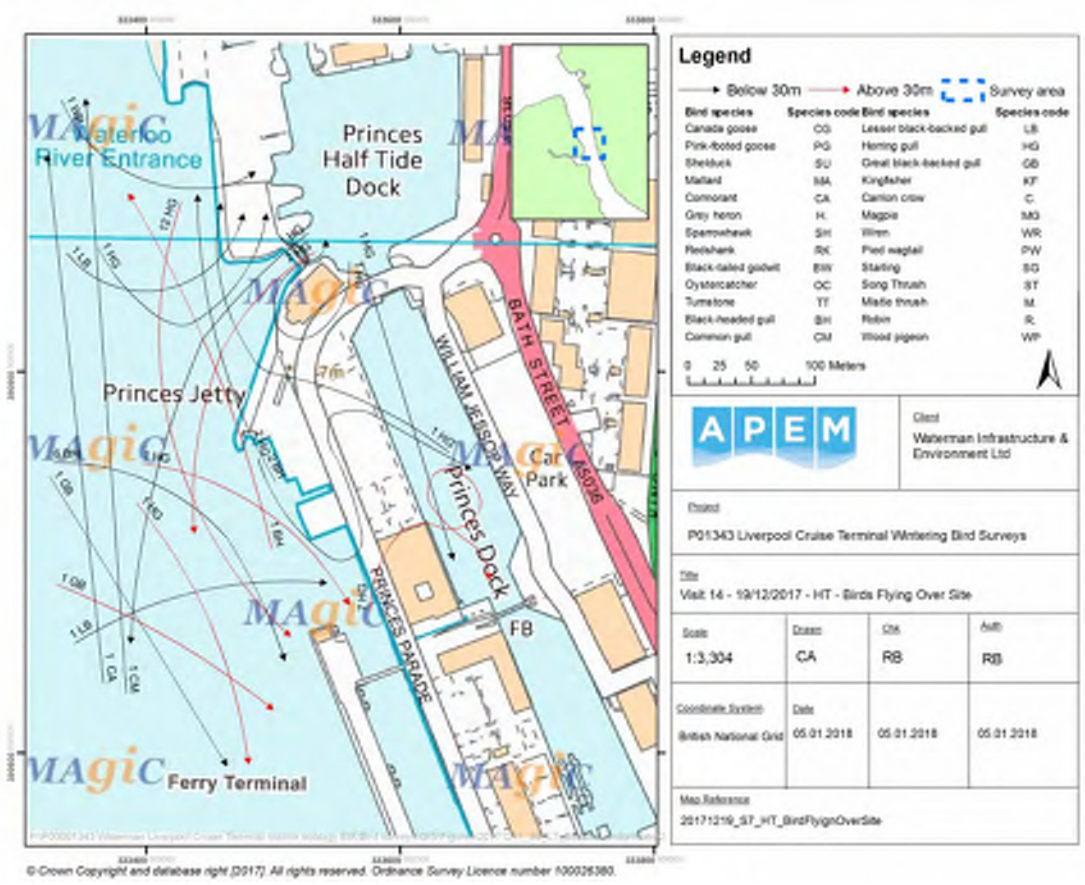


Figure 61: Visit 14 19/12/2017 High Tide Flying birds adjacent to site Part 1

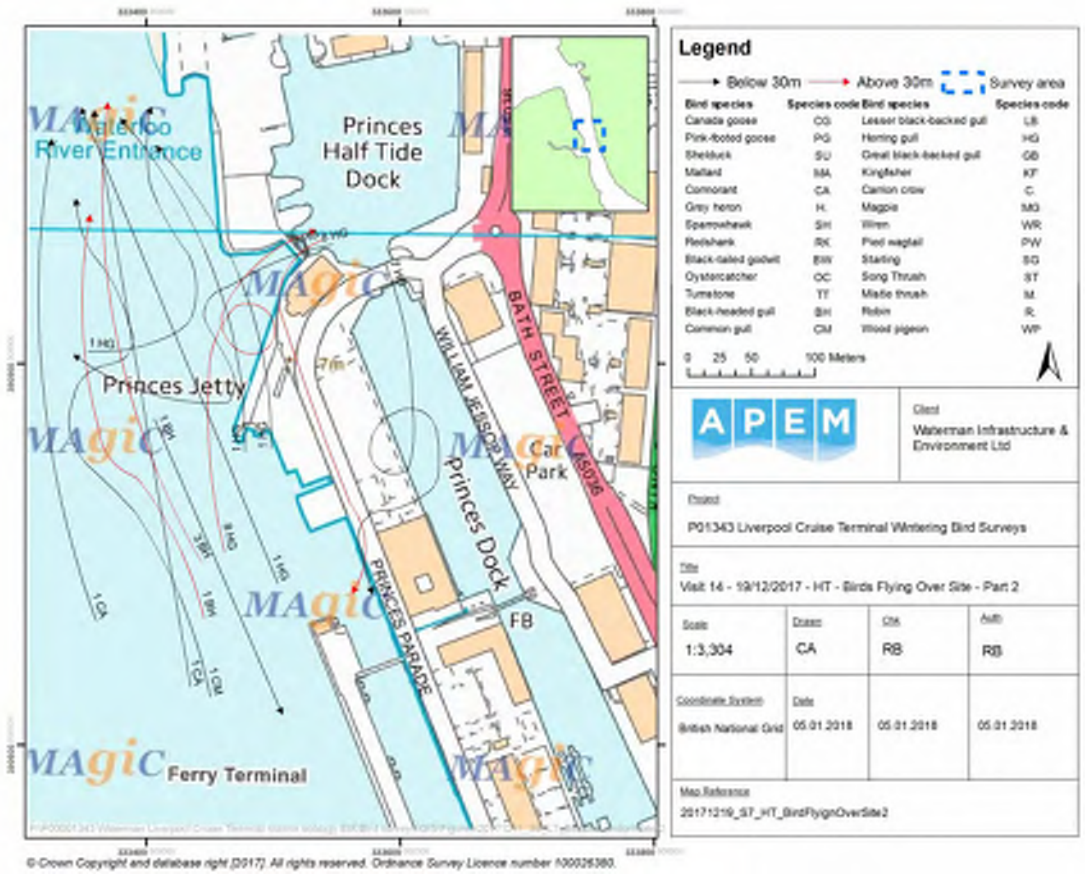


Figure 62: Visit 14 19/12/2017 High Tide Flying birds adjacent to site Part 2

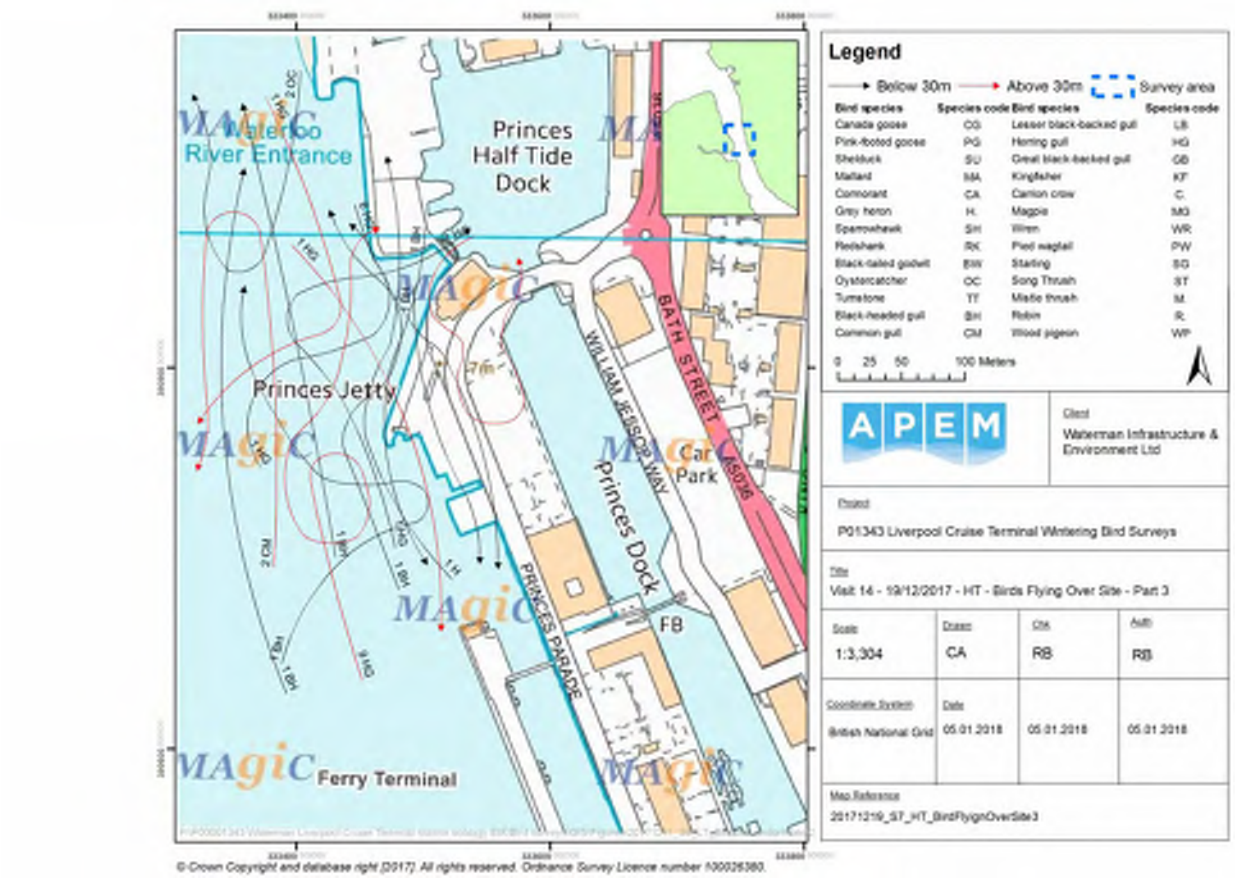


Figure 63: Visit 14 19/12/2017 High Tide Flying birds adjacent to site Part 3

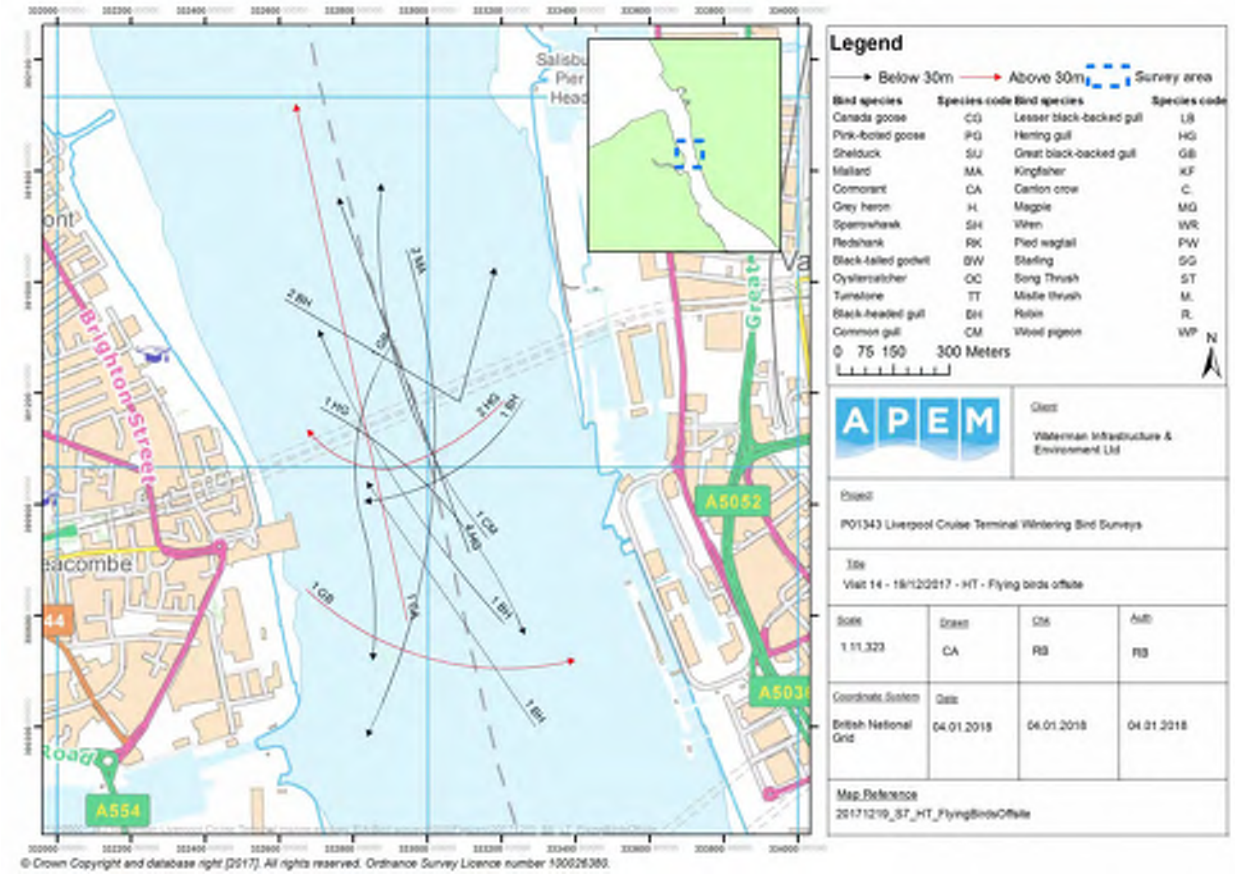


Figure 64: Visit 14 19/12/2017 High Tide Flying birds in 1 km zone Part 1

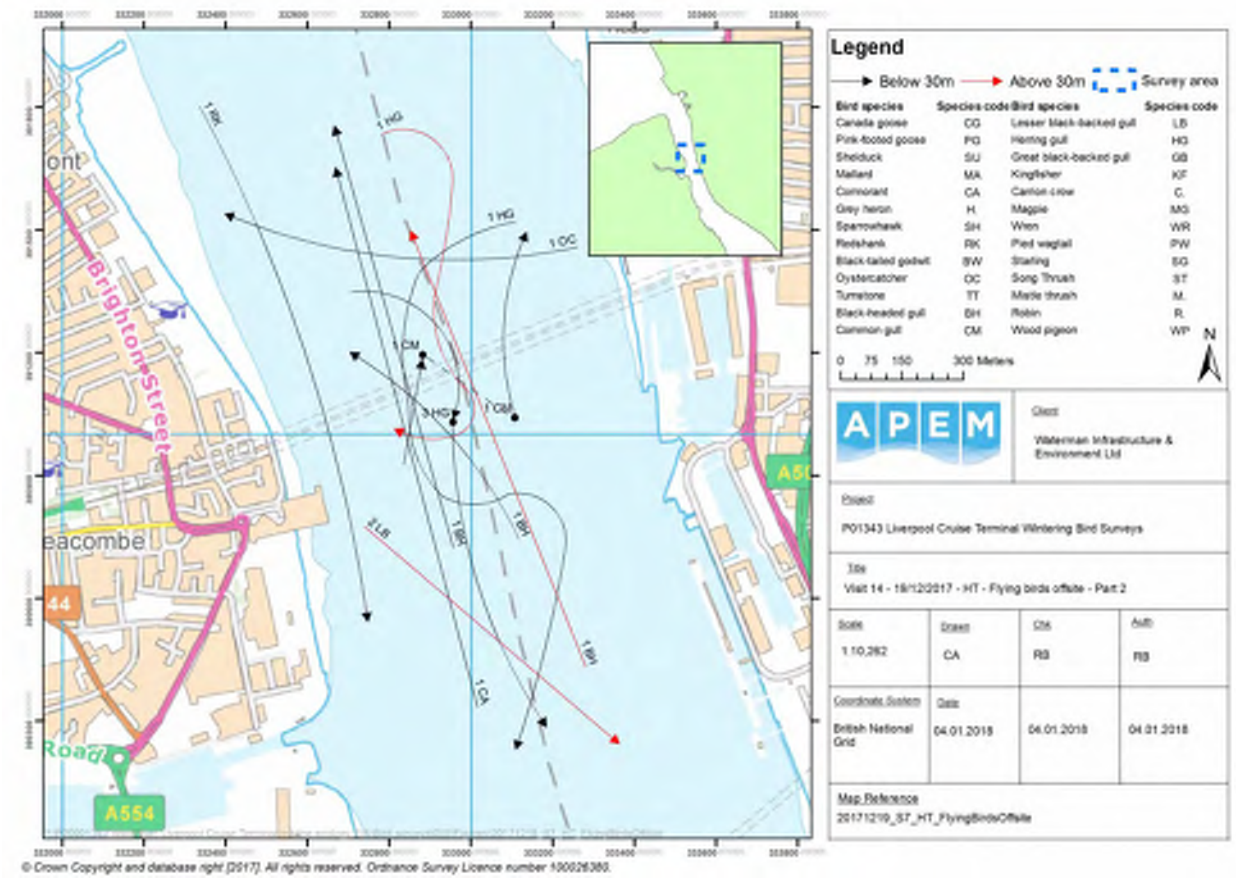


Figure 65: Visit 14 19/12/2017 High Tide Flying birds in 1 km zone Part 2

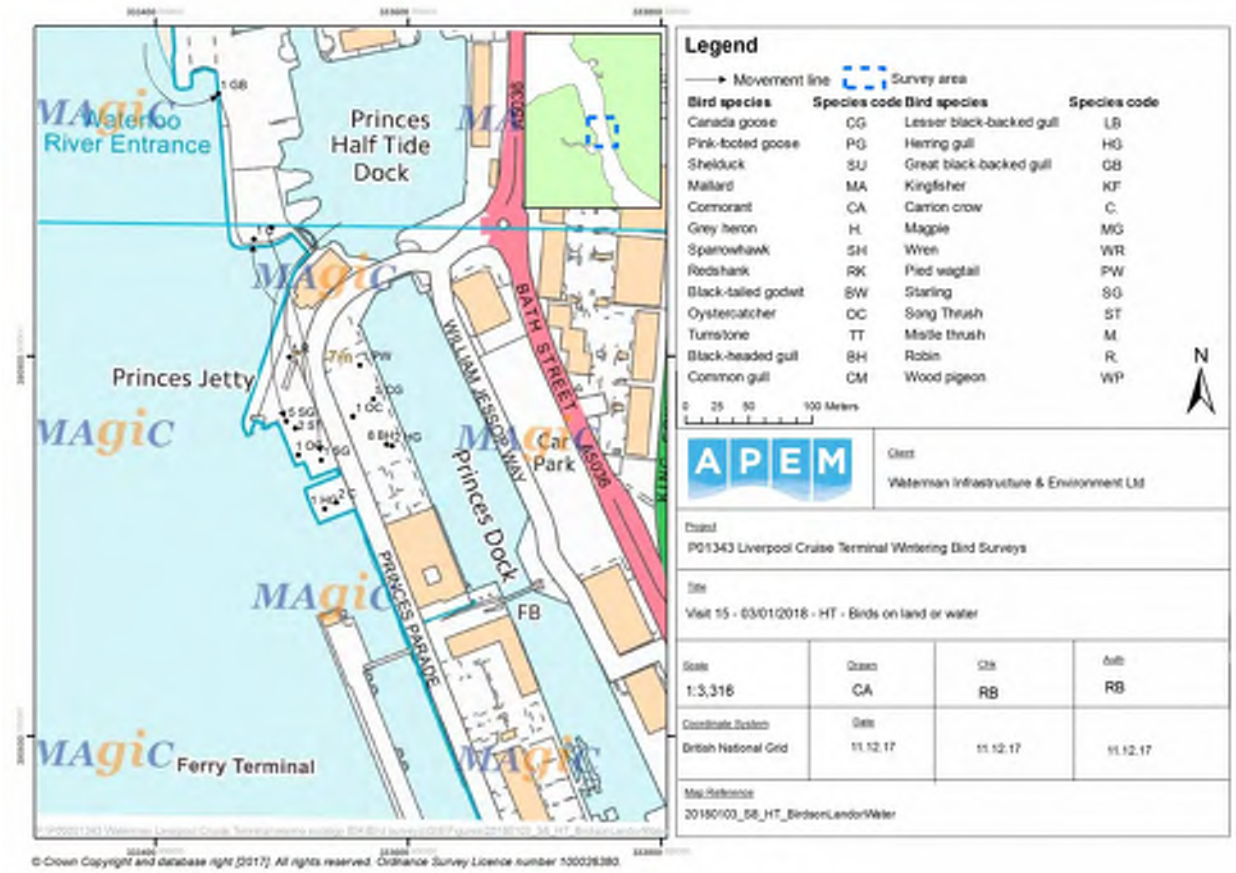


Figure 66: Visit 15 03/01/2018 High Tide Birds on land and water

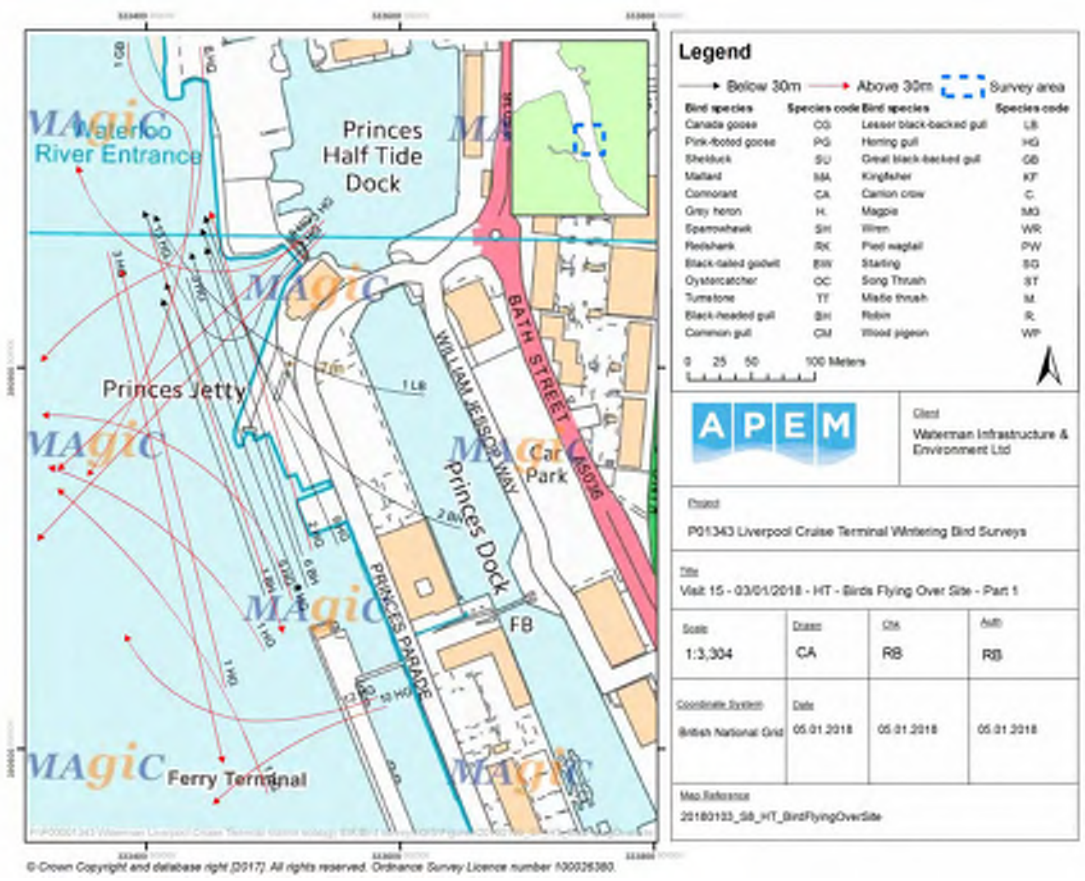


Figure 67 Visit 15 03/01/2018 High Tide Flying birds adjacent to site Part 1

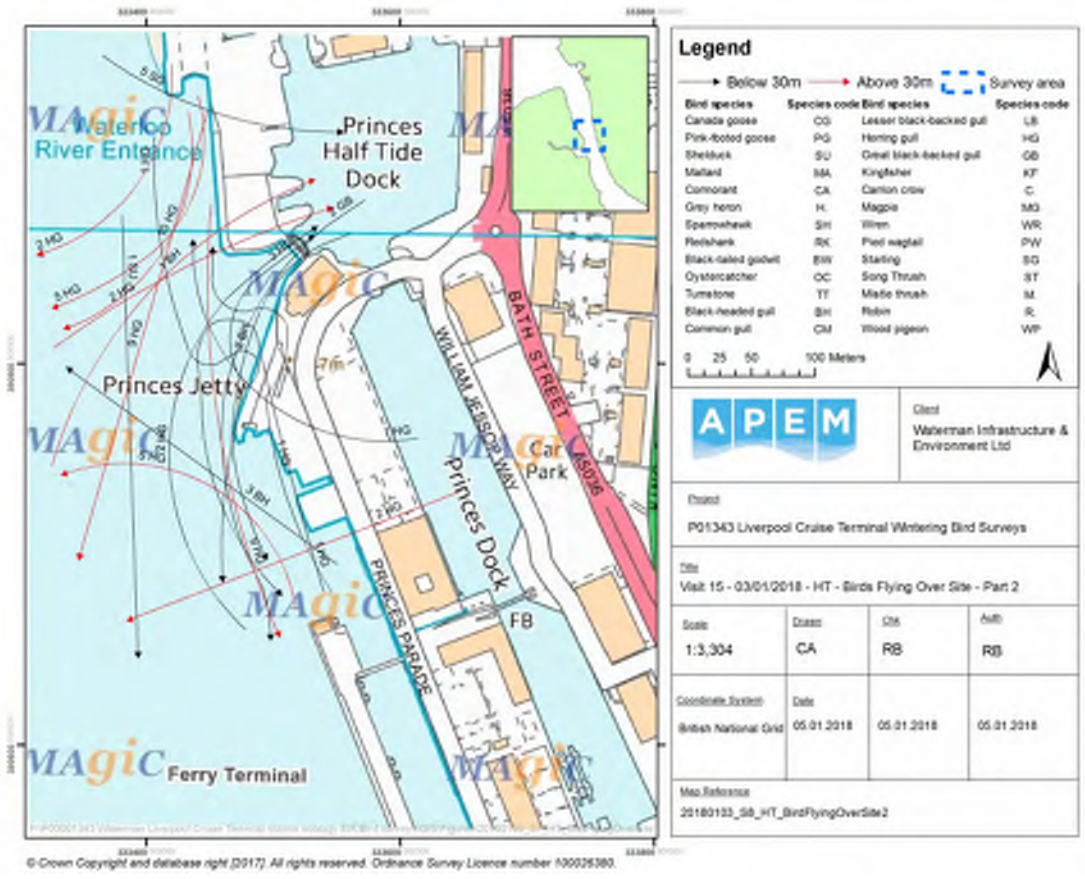


Figure 68: Visit 15 03/01/2018 High Tide Flying birds adjacent to site Part 2

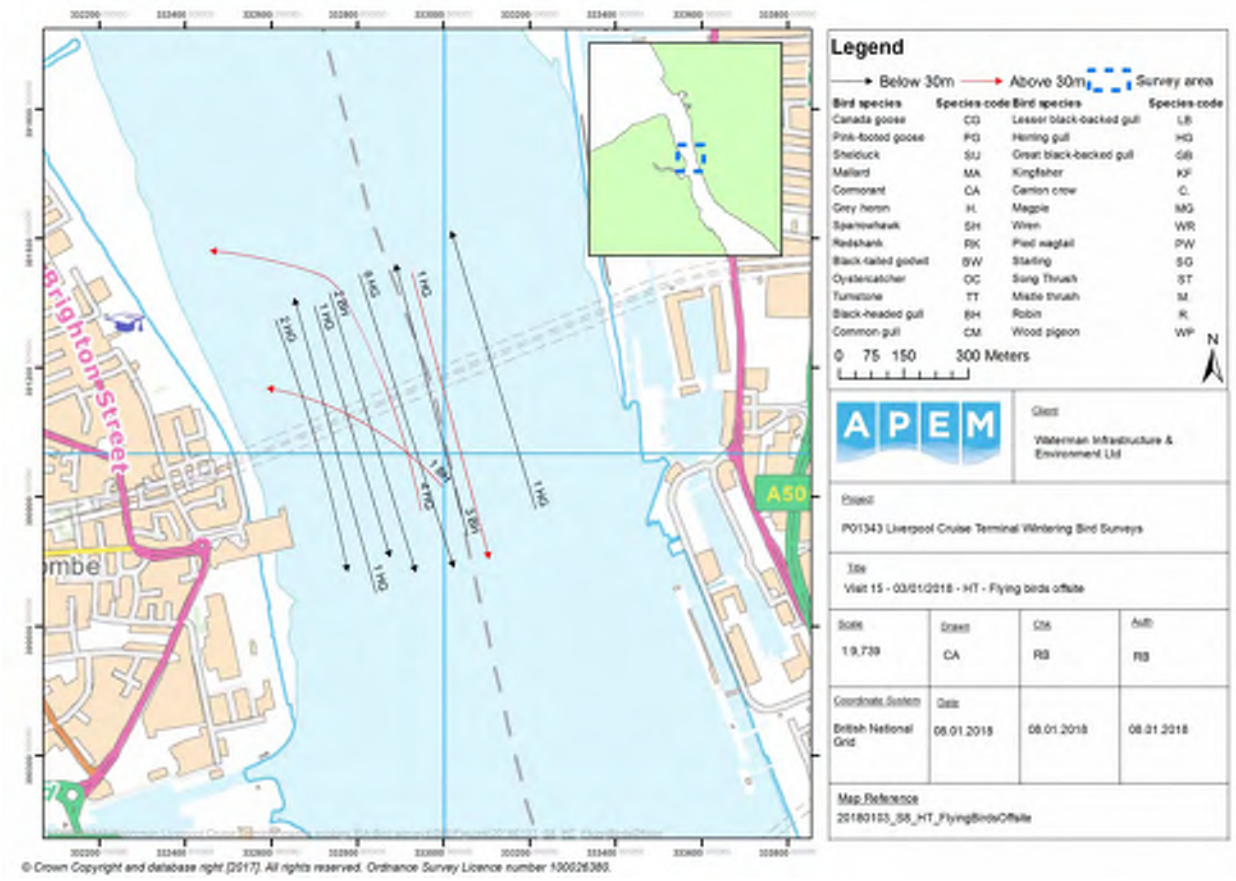


Figure 69: Visit 15 03/01/2018 High Tide Flying birds in 1 km zone Part 1

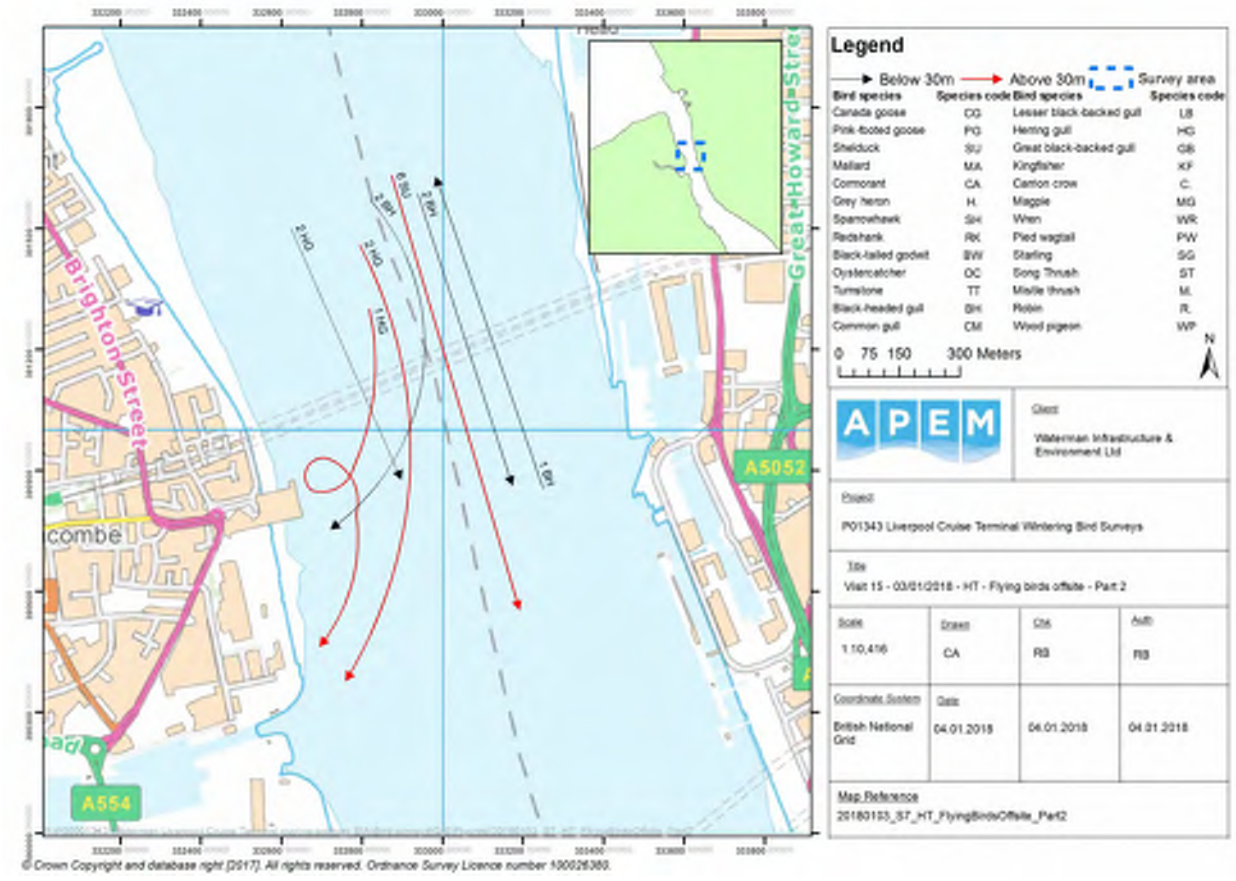


Figure 70: Visit 15 03/01/2018 High Tide Flying birds in 1 km zone Part 2

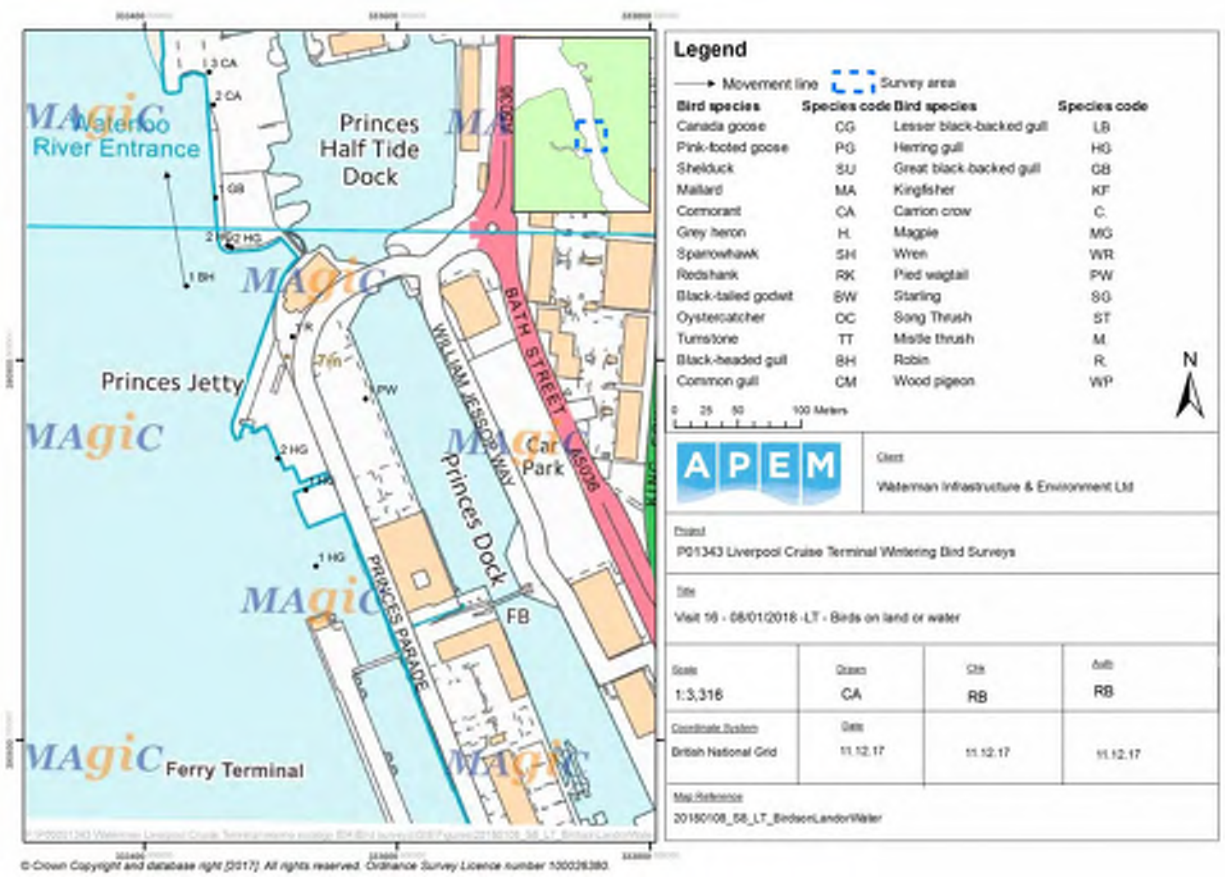


Figure 71: Visit 16 08/01/2018 Low Tide Birds on land and water

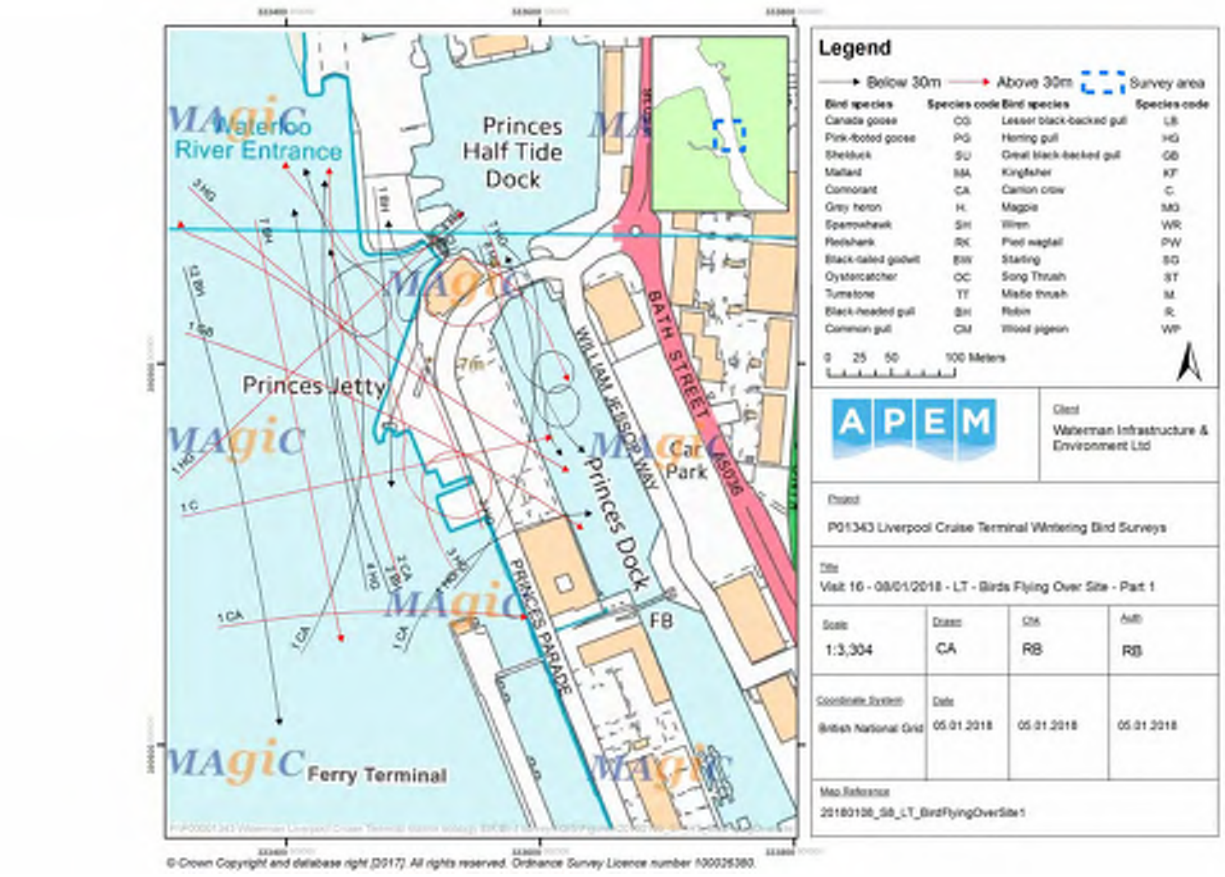


Figure 72: Visit 16 08/01/2018 Low Tide Flying birds adjacent to site Part 1

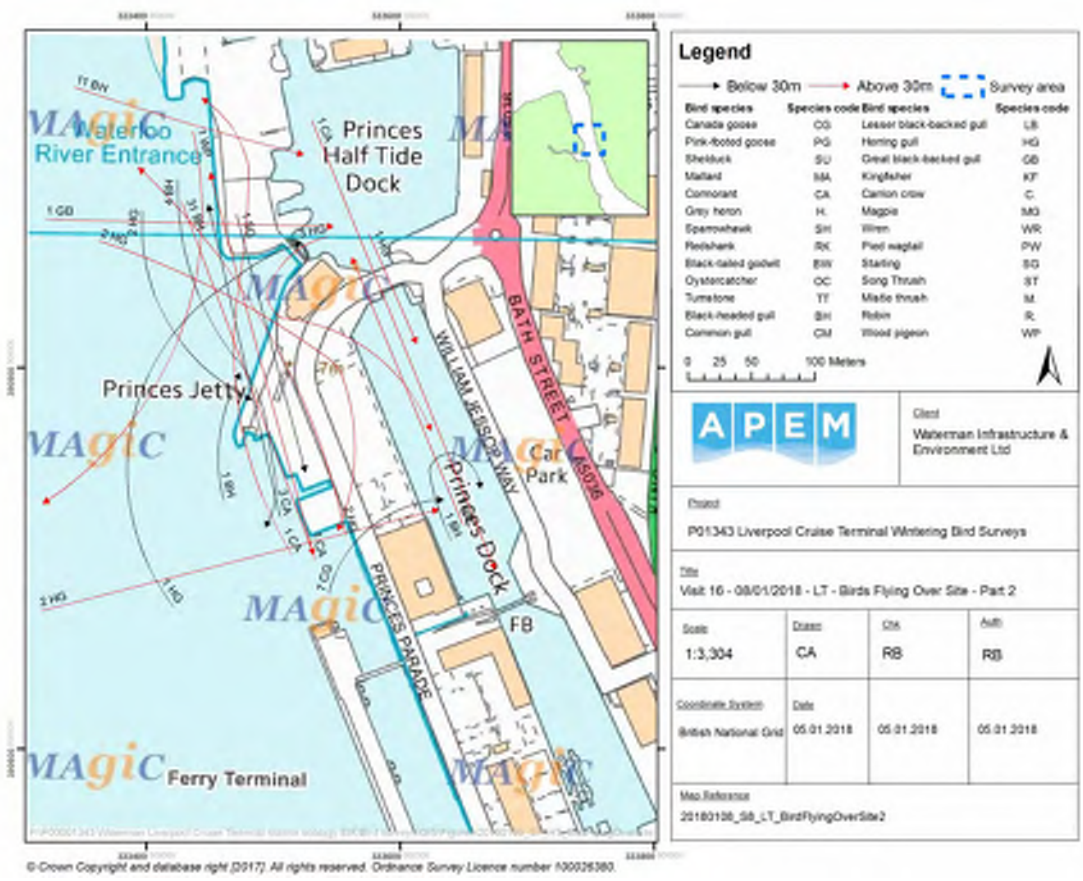


Figure 73: Visit 16 08/01/2018 Low Tide Flying birds adjacent to site Part 2

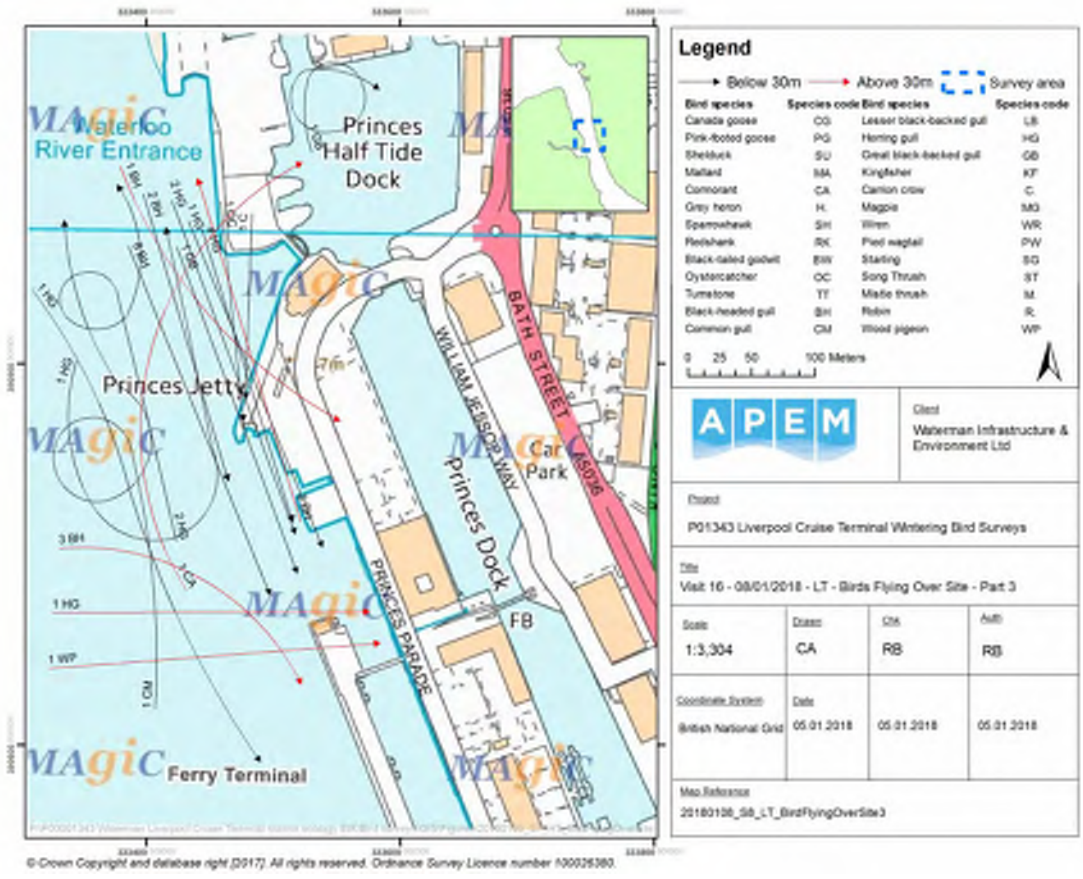


Figure 74: Visit 16 08/01/2018 Low Tide Flying birds adjacent to site Part 3

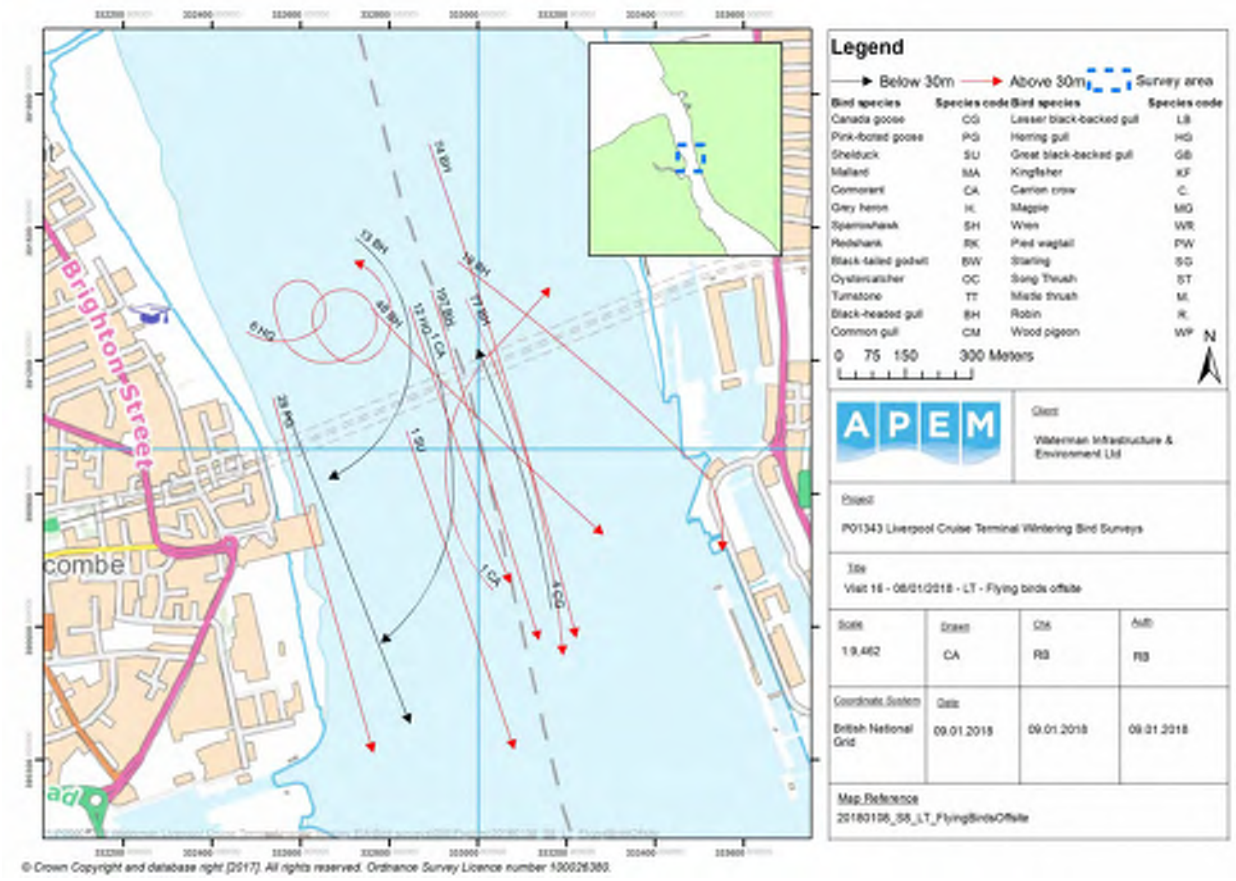


Figure 75: Visit 16 08/01/2018 Low Tide Flying birds in 1 km zone Part 1

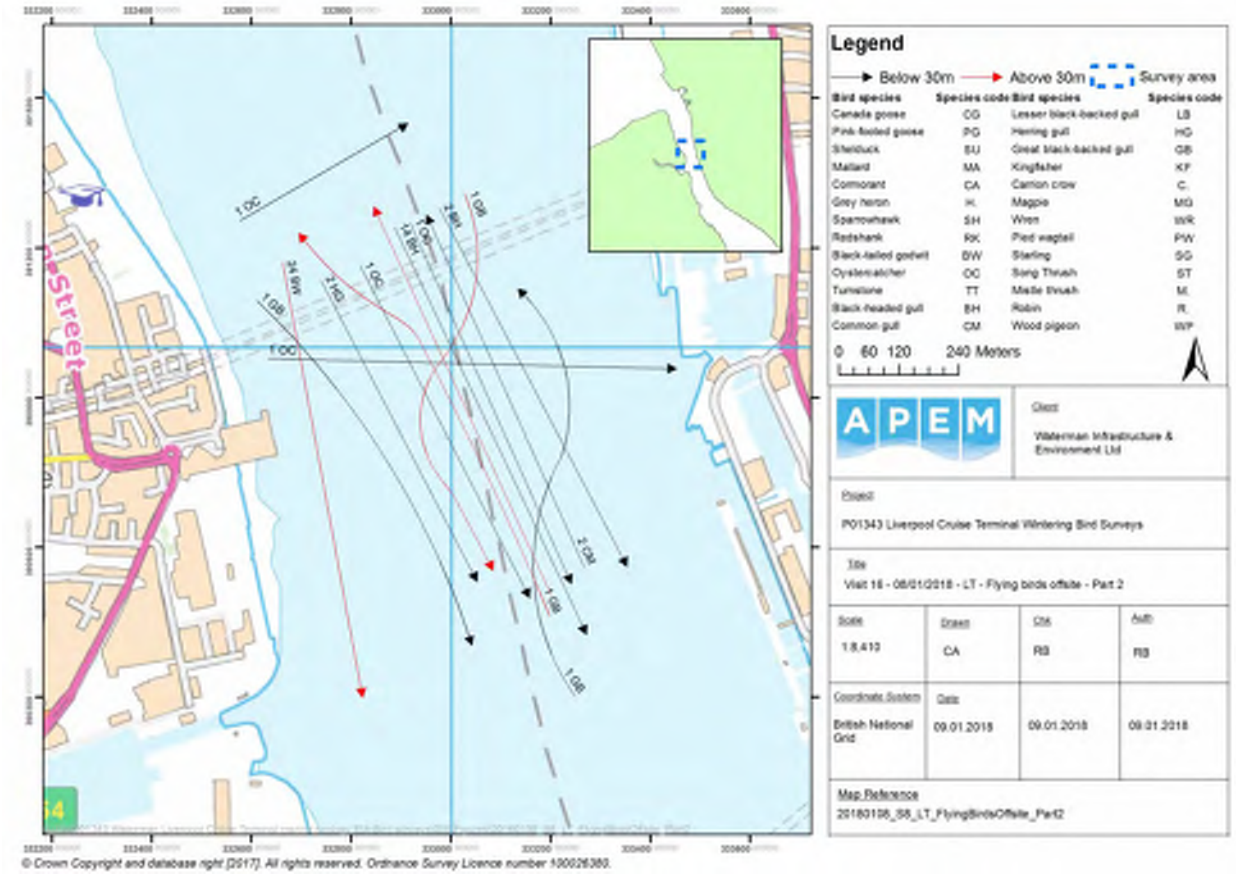


Figure 76: Visit 16 08/01/2018 Low Tide Flying birds in 1 km zone Part 2

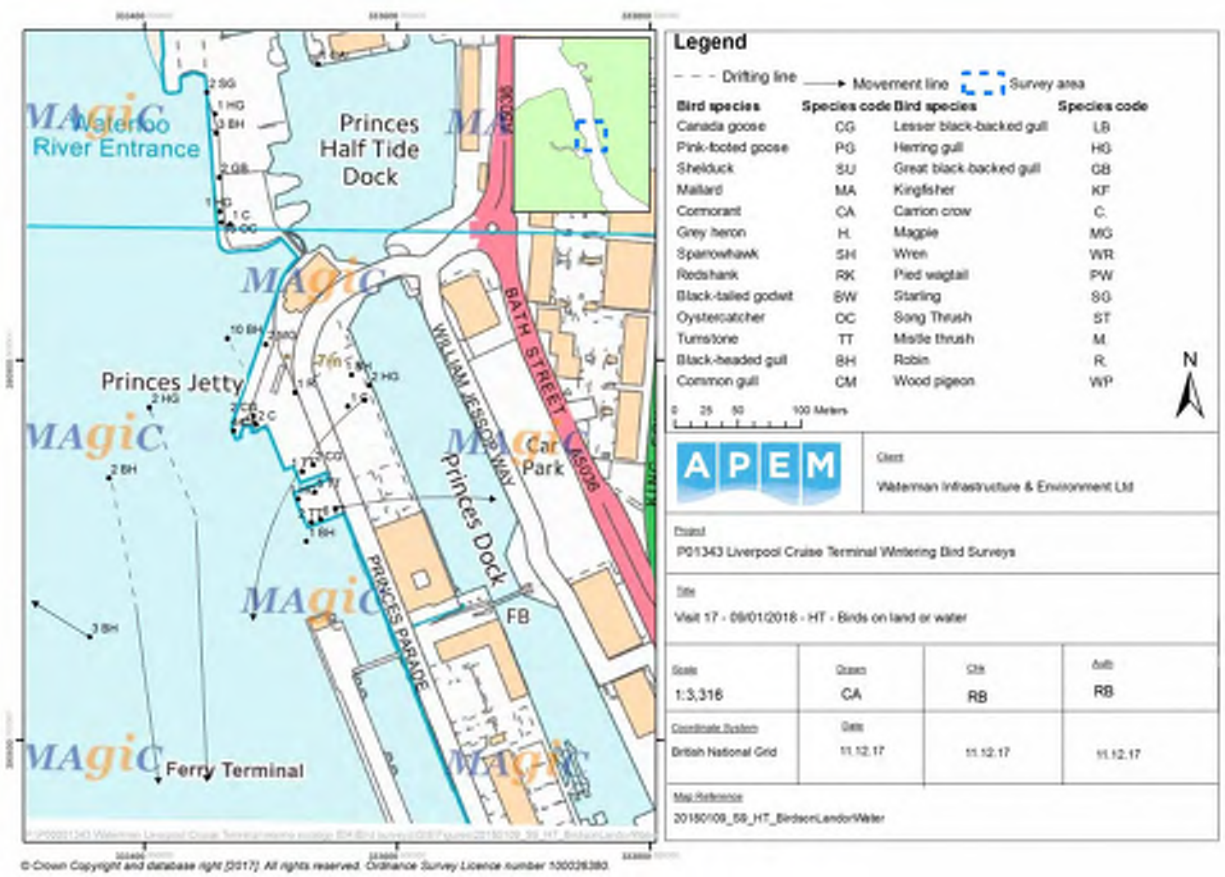


Figure 77: Visit 17 09/01/2018 High Tide Birds on land and water

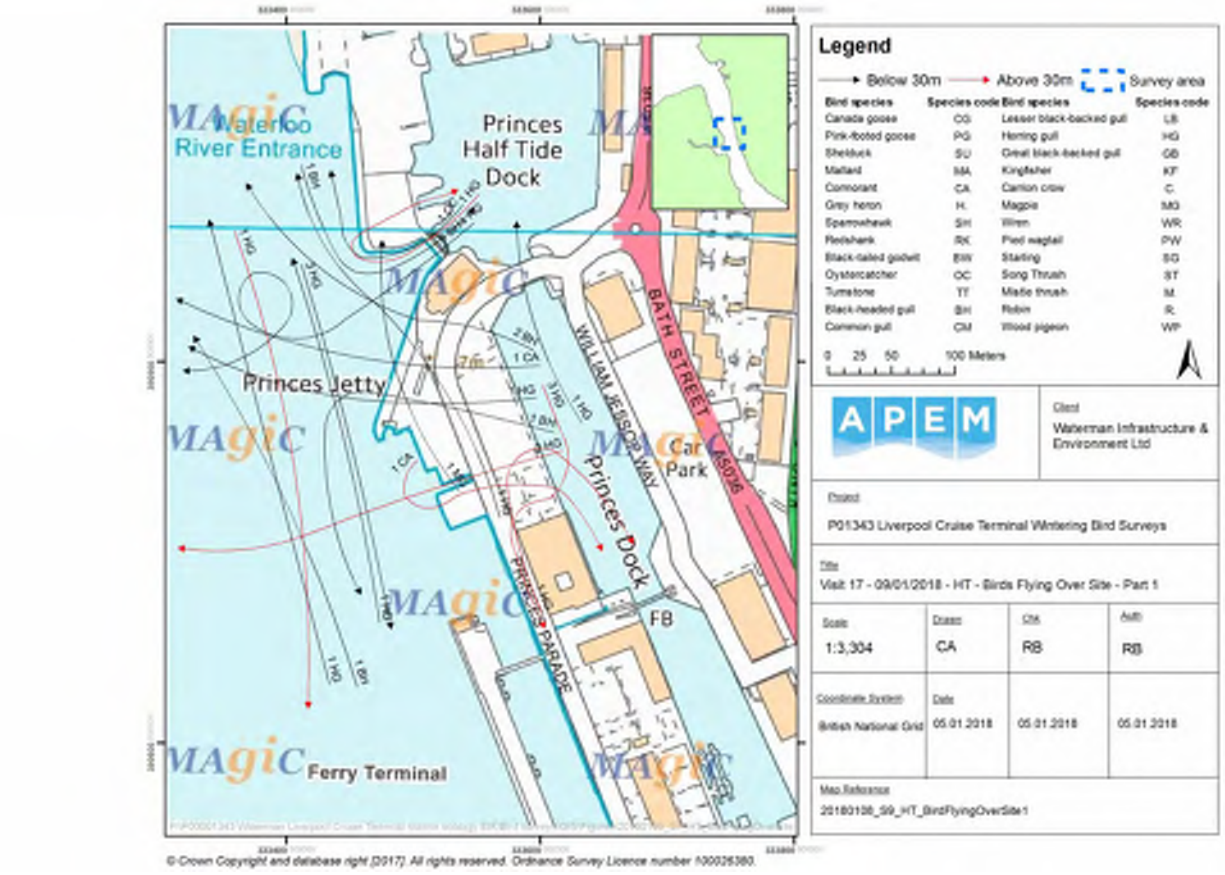


Figure 78: Visit 17 09/01/2018 High Tide Flying birds adjacent to site Part 1

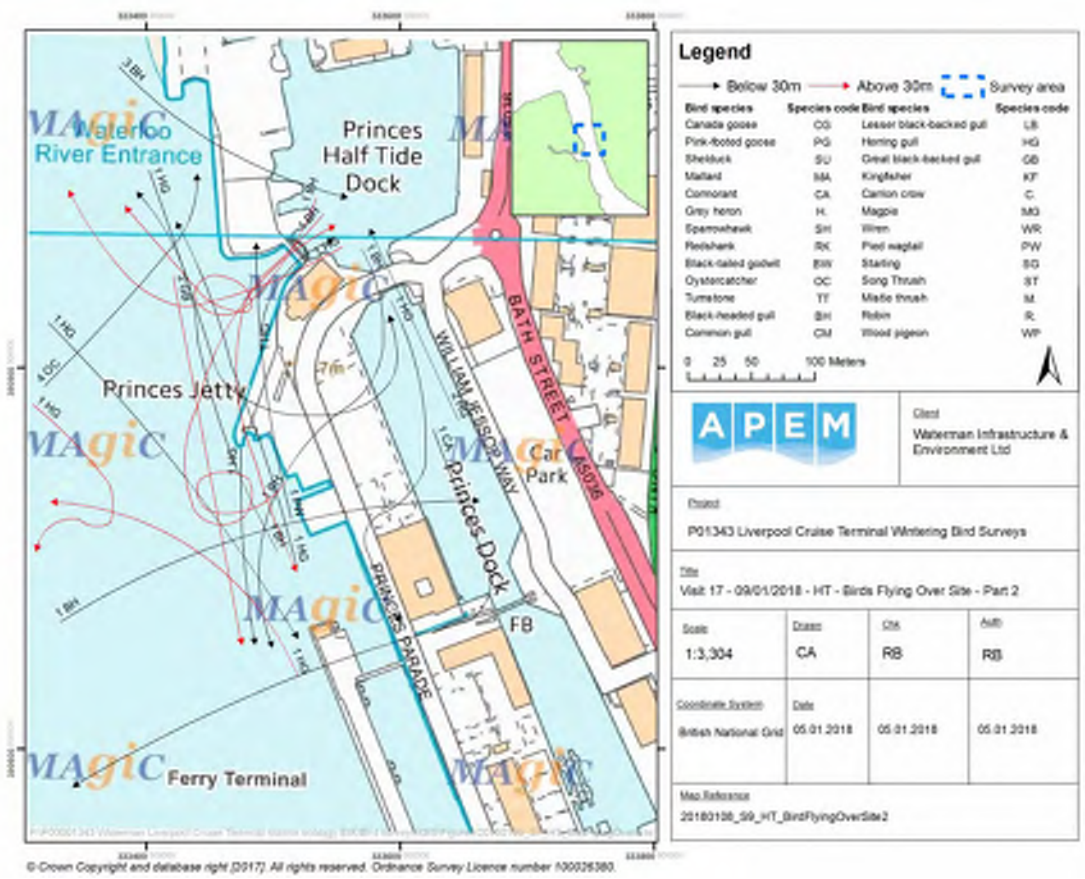


Figure 79: Visit 17 09/01/2018 High Tide Flying birds adjacent to site Part 2

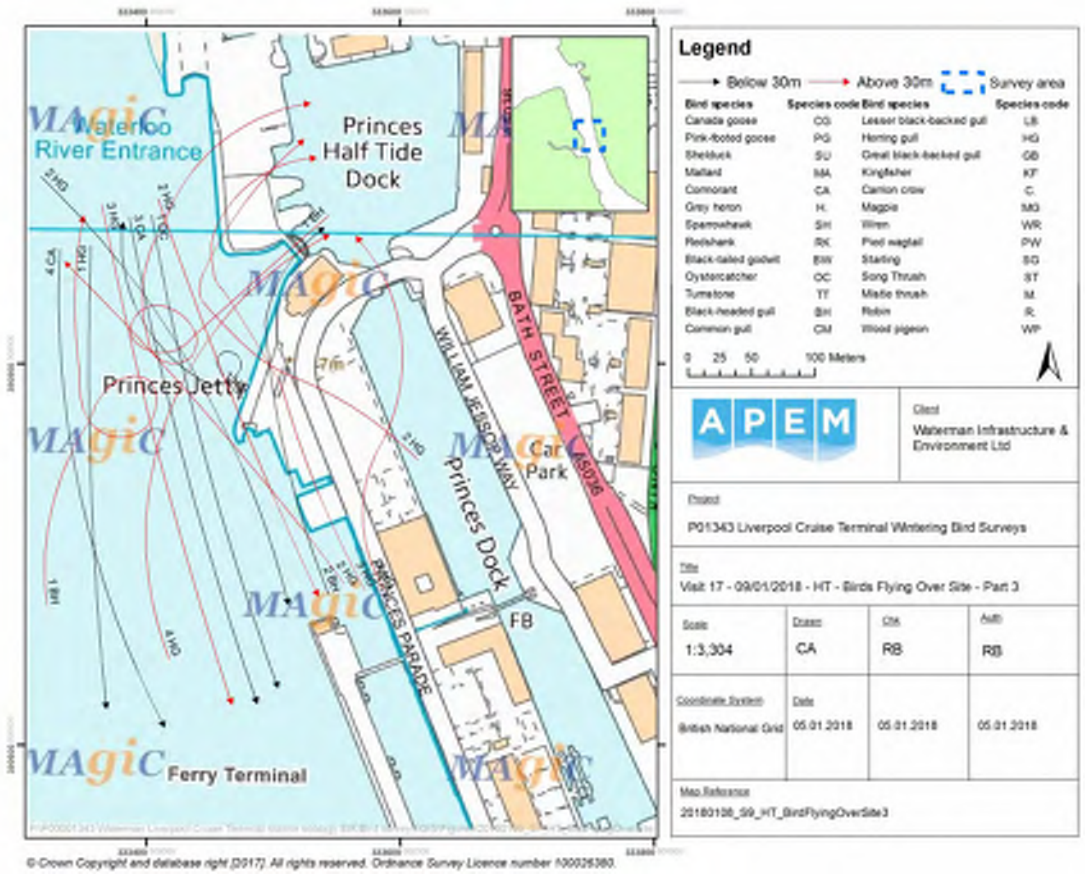


Figure 80: Visit 17 09/01/2018 High Tide Flying birds adjacent to site Part 3

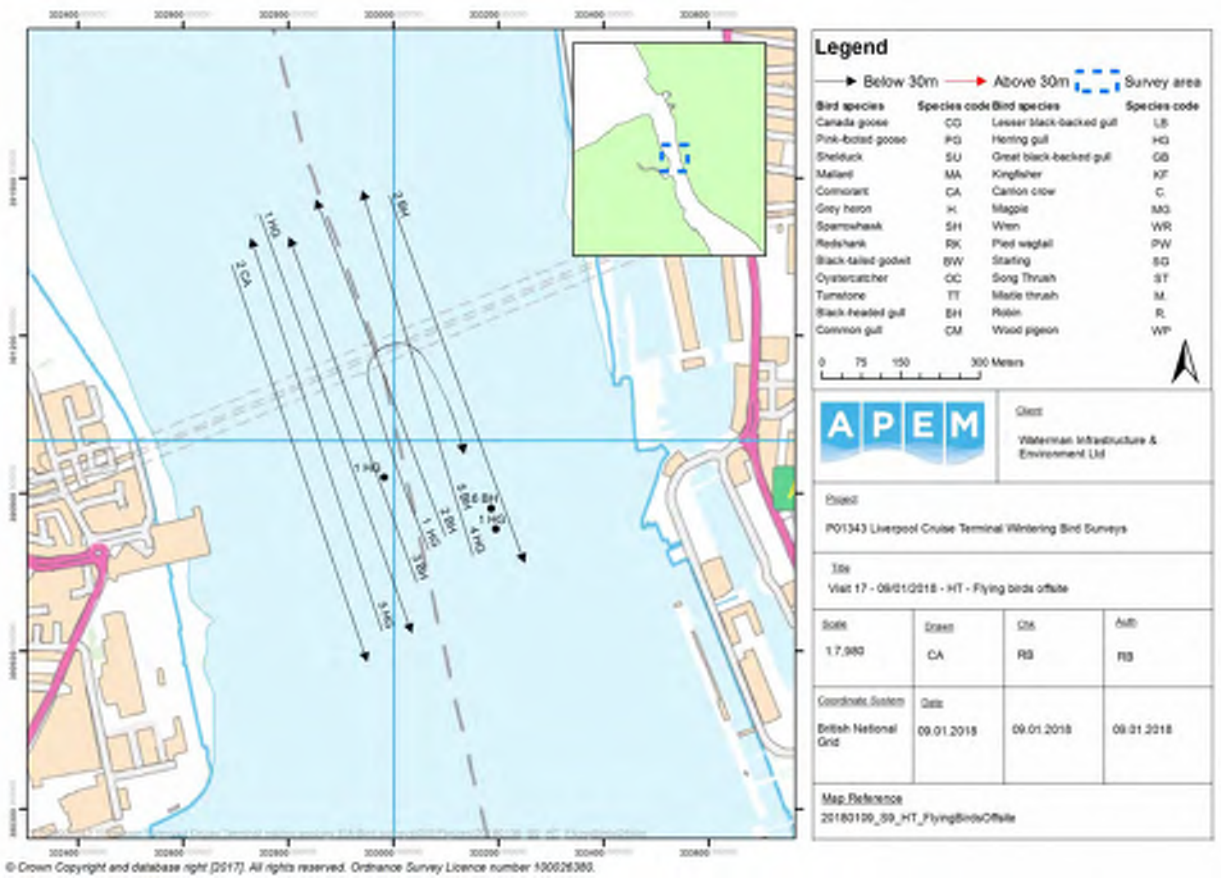


Figure 81: Visit 17 09/01/2018 High Tide Flying birds in 1 km zone Part 1

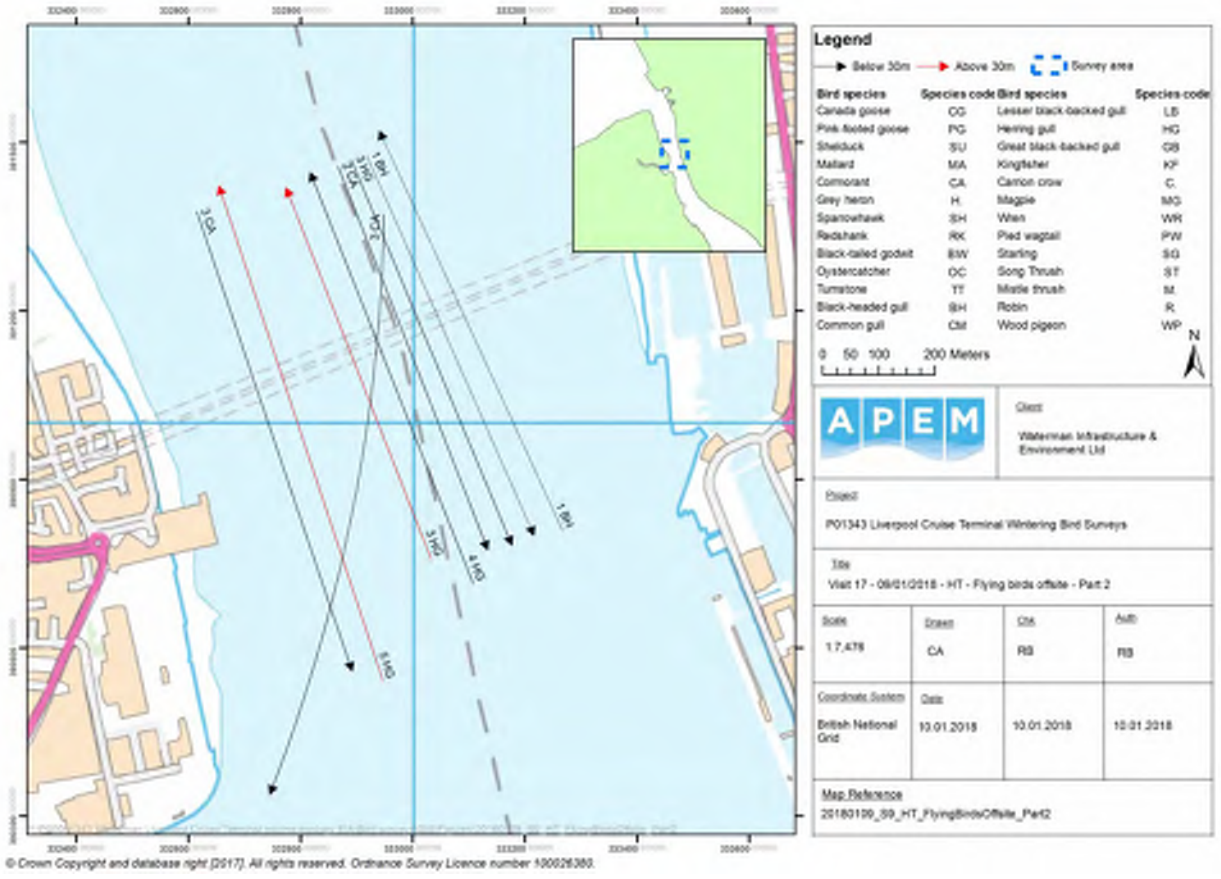


Figure 82: Visit 17 09/01/2018 High Tide Flying birds in 1 km zone Part 2

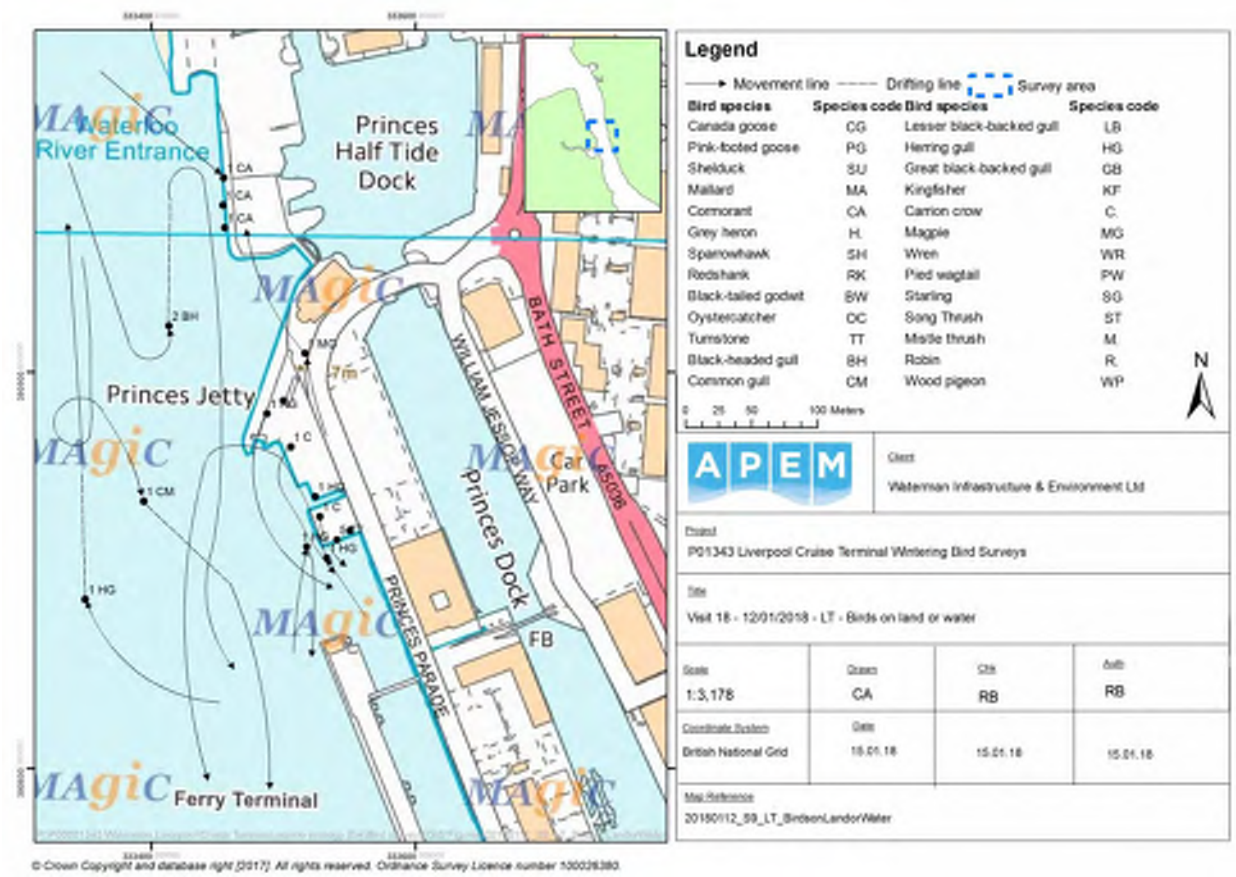


Figure 83: Visit 18 12/01/2018 Low Tide Birds on land and water

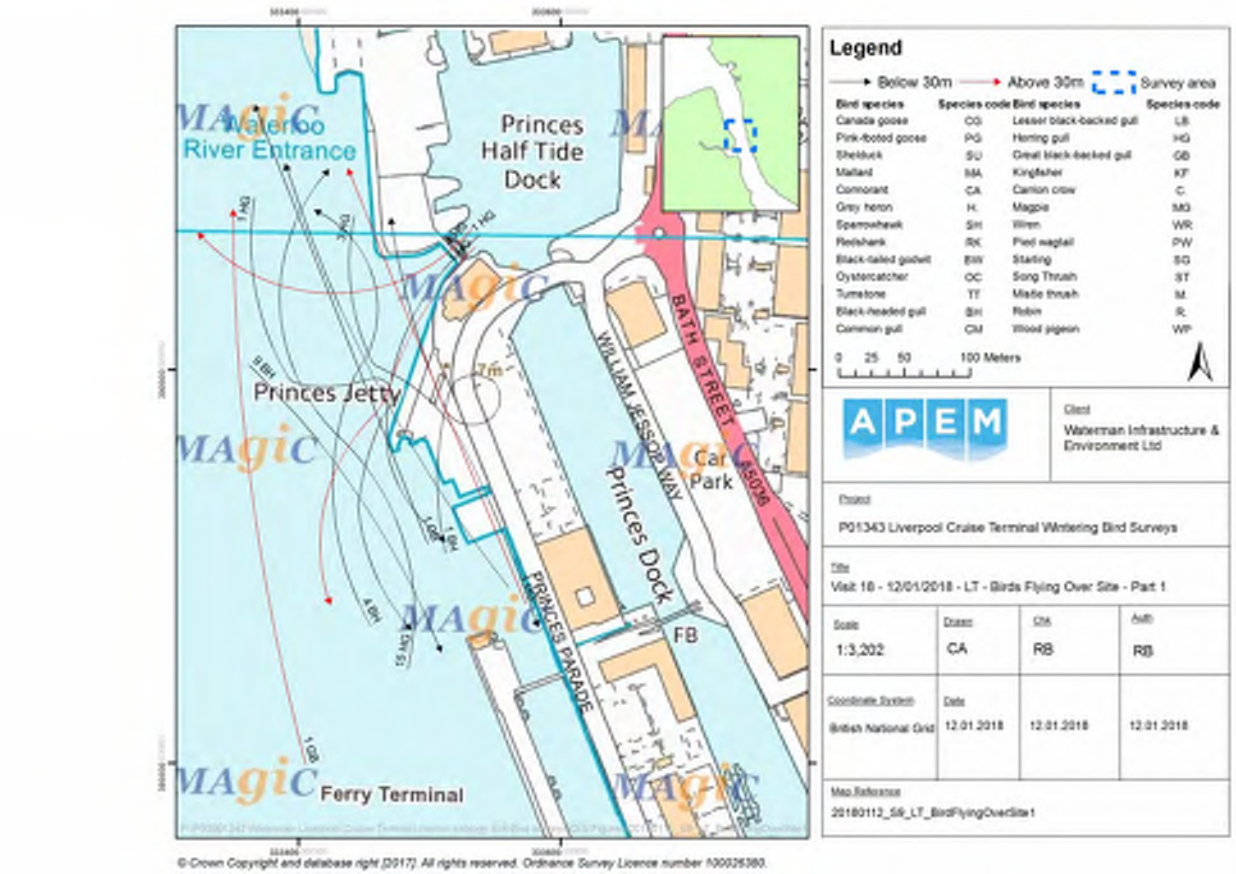


Figure 84: Visit 18 12/01/2018 Low Tide Flying birds adjacent to site Part 1

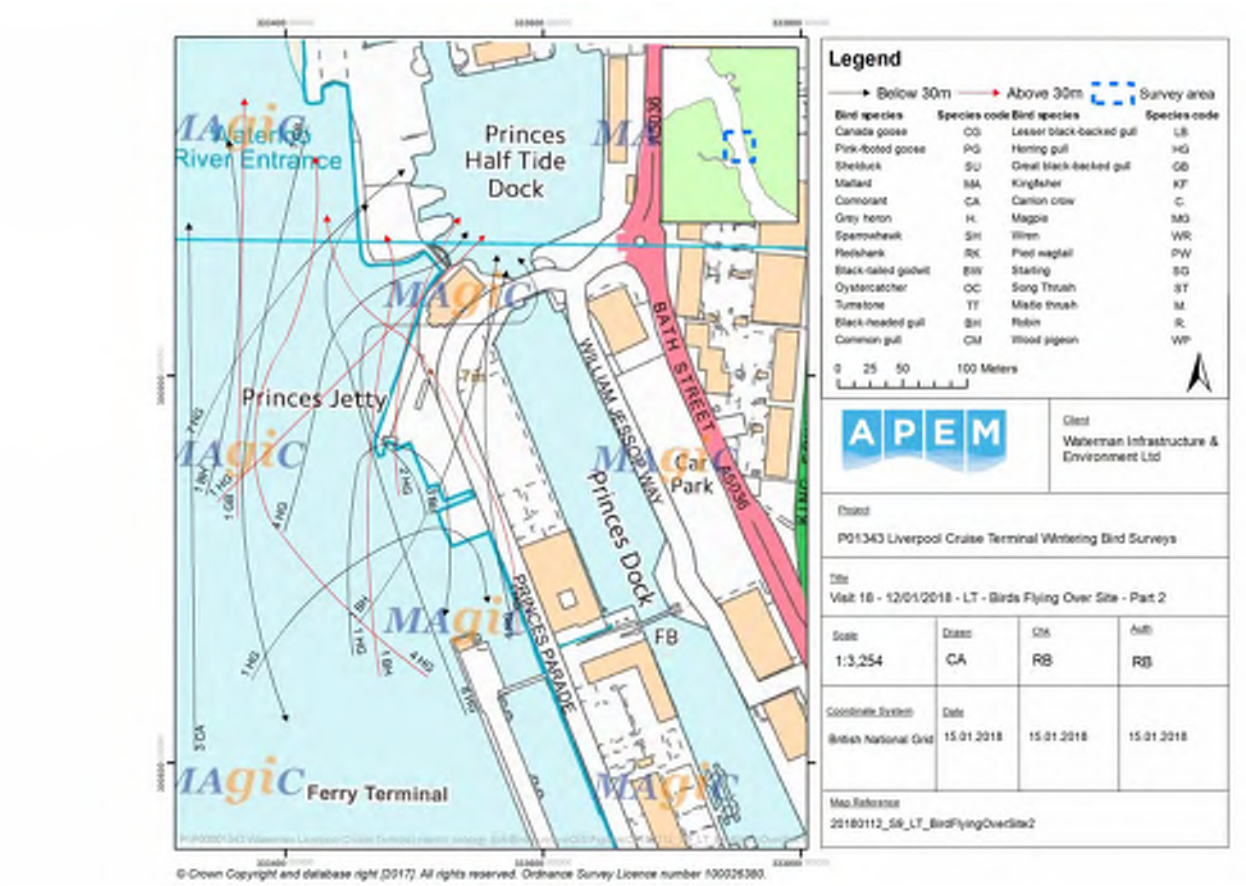


Figure 85: Visit 18 12/01/2018 Low Tide Flying birds adjacent to site Part 2

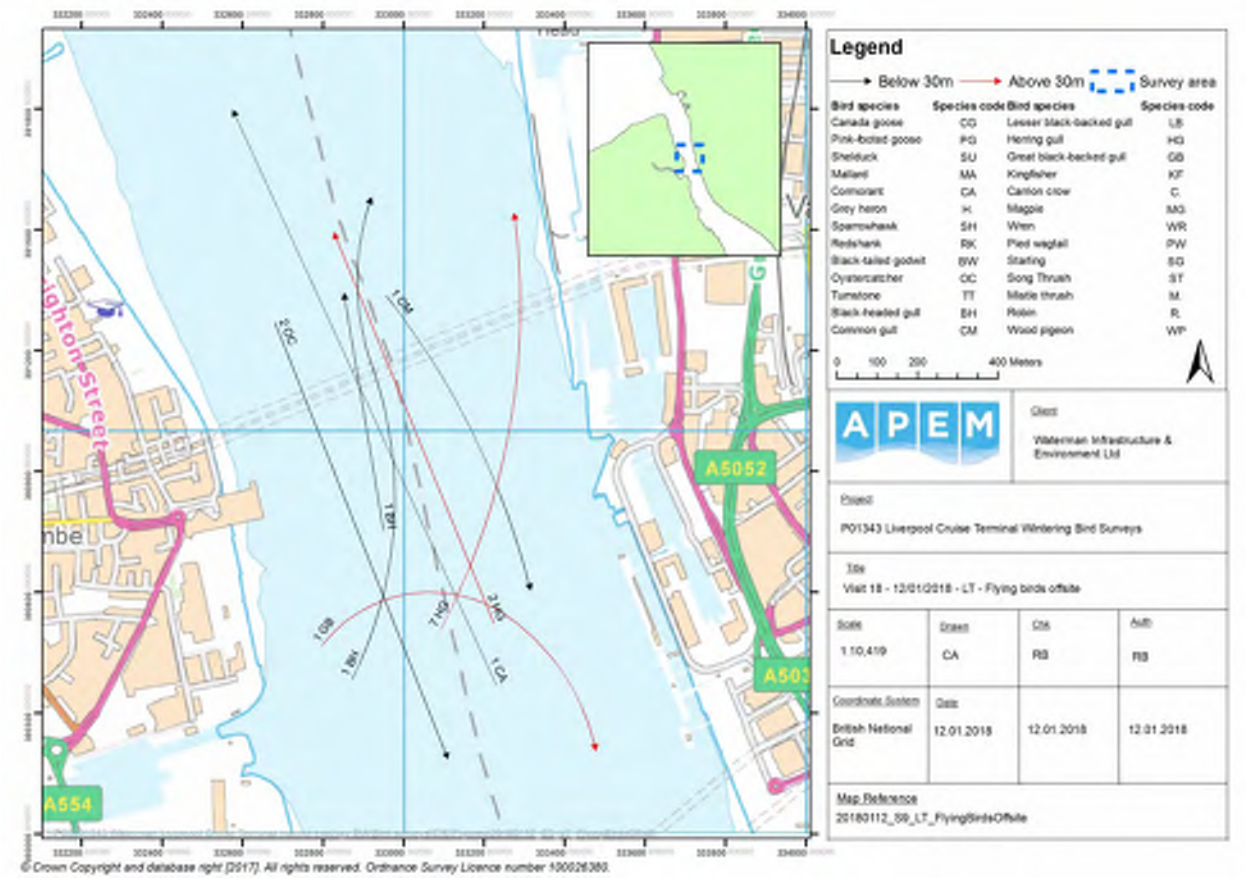


Figure 86: Visit 18 12/01/2018 Low Tide Flying birds in 1 km zone Part 1

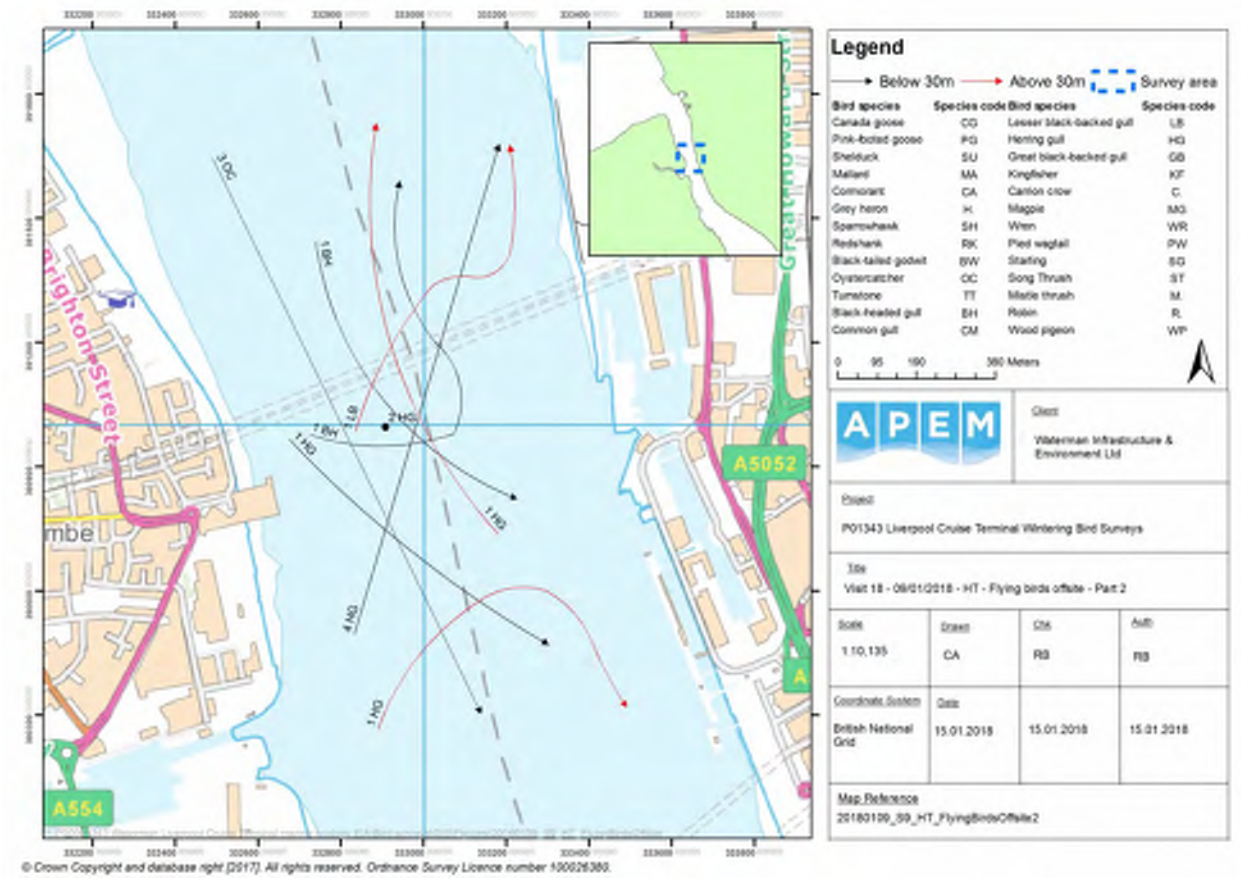


Figure 87: Visit 18 12/01/2018 Low Tide Flying birds in 1 km zone Part 2

Appendix 13.10a: Biosecurity Risk Assessment

Liverpool Cruise Terminal Biosecurity Plan

Waterman

APEM Ref P000003991

October 2019

Ashley Cordingley and Dr Marc Hubble

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Address:	**Waterman Group Plc.** **Pickfords Wharf** **Clink Street** **London** **SE1 9DG**
Project reference:	**P00003991**
Date of issue:	**October 2019**

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Revision and Amendment Register

Version Number	Date	Section(s)	Page(s)	Summary of Changes	Approved by
01	08/10/2019	All	All	Document creation	DH

Contents

1 Project background

A non-native species (NNS) (also known as alien, non-indigenous, foreign or exotic) is a species or subspecies occurring outside its native range i.e. the range it occupies naturally without the intervention of human activity. This includes any part of the species that might survive and subsequently reproduce (*Cook et al*. 2015).

The number of marine non-native species in the UK and Ireland is increasing each year, with their spread primarily due to shipping (ballast water, biofouling of hulls) and imported consignments of cultured species (Nall *et al*. 2016, Cook *et al*. 2015). Current estimates suggest that approximately 10–12 new non-native species are established annually in both the terrestrial and aquatic environments (GB NNSS 2015, Kakkonen *et al*. 2019). It is estimated that there are currently over 100 marine non-native species in the UK (Payne *et al*. 2014, Kakkonen *et al*. 2019).

According to the Convention on Biological Diversity, 'invasive' NNS (INNS) are one of the greatest threats to biodiversity as they can rapidly colonise a wide range of habitats and exclude native flora and fauna. It is important to understand, however, that the majority of NNS are not 'invasive' (i.e. they are not defined as INNS which is a NNS that has the ability to spread causing damage to the environment, the economy and our health (GB NNSS 2019)).

A new Liverpool Cruise Terminal LCT is proposed to be constructed in the Mersey Estuary adjacent to Princes Dock. This Biosecurity Plan was produced for the Marine Management Organisation to address comments from a range of statutory consultees and was required for planning purposes and for the Harbour Revision Order (HRO). It has been produced to indicate the potential risks of introduction of NNS/INNS during the Construction and Operation Phases of the project and measures to reduce these risks which will be implemented during construction and operation. This Biosecurity Plan will be part of the Construction Environmental Management Plan (CEMP) and the Operational Environmental Management Plan (OEMP) for the project.

The main aim of the plan is to minimise the risk of introduction and establishment of NNS at the Project location during the construction phase and to help prevent the spread of NNS already present at the site to new locations.

1.1 Relevant Policy/Legislation

National and international policy/legislation set out requirements for compliance with the implementation of biosecurity[1] measures and the control of NNS. In the UK at present the primary drivers include:

[1] The term biosecurity, in relation to INNS, is defined by cook *et al* 2014 as "taking action in order to minimise the introduction, spread and establishment of invasive non-native species"

- **EC Marine Strategy Framework Directive (2008/56/EC)** - Requires 'Good Environmental Status' (GES) of marine waters by 2020. Requires that Non-Native species introduction is at levels that do not adversely alter ecosystems.
- **EU Water Framework Directive (2000) (2000/60/EC)** – achieve 'Good Ecological Status' by 2020, no deterioration in ecological status is permitted.
- **The Wildlife and Countryside Act: Section 14 (1981)** – it is illegal to allow any animal which is not ordinarily resident in Great Britain, or that is listed on Schedule 9 to the Act, to escape into the wild, or to release it into the wild. It is also illegal to plant or otherwise cause to grow in the wild any plant listed on Schedule 9 of the Act.
- **The EU invasive alien species regulation** - came into force in January 2015. The list of species to which the regulation applies is still being developed. However, a requirement of the legislation is to have in place pathways action plans to control the introduction and spread of listed species. Pathways action plans for marine species may include future requirements for biosecurity plans.

2 Methodology

This plan has been prepared following guidance in Cook *et al*. (2015) which indicates there are two types of biosecurity plans which are 'Site' and 'Operations' plans:

- A 'Site' Biosecurity Plan covers the long-term, on-going activities at a single location such as a marina (e.g. vessel activity or routine dredging activities).
- The 'Operations' Biosecurity Plan is for a particular activity or set of activities which are time-limited (e.g. construction of marine infrastructure or one-off dredging activities) (Cook *et al.* 2015).

This assessment has been conducted following this guidance taking account of both types of plan to cover the construction and operation phases for the development.

The preparation of the Biosecurity Plan involved the following aspects:

- Defining the construction works to be undertaken – methods, frequency, size of operation, location etc.
- Defining the operational usage of the project:
  - Number and frequency of vessels to facility
  - Itinerary of vessels (e.g. arriving from, travelling to and time in port)
- Site description – including environmental information (water flow, salinity etc.).
- Review of NNS recorded in the vicinity of the Project site.
- Assigning a risk level for each activity (High, Medium, Low).
- Proposing biosecurity control measures for the medium and high-risk tasks associated with the construction works and with operation, along with instructions for staff and contractors.
- Proposing a contingency plan, e.g. rapid response and containment measures if there is any evidence of high-risk incidents or if new NNS are detected.

3 Marine Biosecurity Plan

3.1 Description of construction activities

3.1.1 Jetty removal and installation

The Applicant has obtained planning consent and is seeking a Marine Works Licence and a Harbour Revision Order to construct a new cruise liner terminal facility and supporting infrastructure to replace the existing temporary cruise terminal. The proposed new cruise terminal is to be constructed at the site of the existing redundant Princes Jetty. The existing Princes Jetty will be demolished and a new Cruise Terminal will be built on a concrete suspended deck supported by steel piles in the River Mersey. The existing landing stage/berth for cruise ships which is constructed from four floating pontoons will remain unaltered. The new cruise terminal will be connected to the existing landing stage by a vehicular and pedestrian link-span bridge. The existing cruise operations will remain unaltered during the construction of the new Cruise terminal (see Figure 1).

Figure 1: Aerial image indicating the location of the proposed Cruise Liner Terminal with respect to the Existing Cruise Liner Terminal.

The main elements of the proposed Development of relevance to this Biosecurity Plan are:

Demolition of buildings and structures, including the controlled removal of Princes Jetty

Deconstruction and removal of the existing redundant concrete and timber -decked Princes Jetty. Due to the condition of the existing structure it is anticipated that these works would predominantly take place from within the Mersey Estuary using barges. Once the Jetty has been removed it is anticipated that the existing timber piles will be removed from the river

bed (where practicable). It has been assumed that the existing jetty has in the region of 140 wooden posts.

Construction of a new suspended deck for the new Cruise terminal

For the purposes of assessment, it is considered that there would be 178 piles for the new suspended deck for the new cruise Terminal (which includes 15 piles for an abeyance region), each 965 mm in diameter. Piles will be installed via socketing and drilling.

3.1.2 Vessel activity during construction

Within the UK, pathways of introduction involving vessel[2] movements (fouling of hulls and ballast water) have been identified as the highest potential risk routes for the introduction of non-native species.

This could either be from the discharge of ballast water at site or via transportation on vessel hulls.

The construction works above would involve activity of a small number of construction vessels such as barges, tugs and pilot vessels. No dredgers would be present as dredging will not be undertaken for the LCT development.

The number of construction vessels to be operating in the area has not yet been finalised, however, it is anticipated that one or more jack-up barges would be used to remove the wooden jetty piles. These barges place spud legs on the estuary bed to anchor the vessel.

In addition, marine piling (new deck piles) would be carried out using marine plant consisting of a jack up barge with 180t crawler crane and Casagrande B300 rotary bored piling rig (or similar). Prefabricated piles would be delivered to the jackup by a service barge and lifted by the crane.

3.2 Description of operational activities

3.2.1 Routine vessel usage

There would be two types of cruise liner visit:

- Transit (or 'Port of Call') relates to cruises berthing at Liverpool Cruise Terminal to allow passengers to have a day trip ashore locally or beyond.

- Turnaround:
    - Turnaround disembarkation relates to a cruise ship berthed to allow passenger to leave the ship at the end of their cruise (and to replenish ship's stores). This generally takes place in the morning.
    - Turnaround embarkation relates to the same cruise ship remaining berthed to allow passengers to board the ship at the start of their cruise. This generally

[2] For the purpose of this Biosecurity Plan, 'vessel' refers to any boat, barge or floating crane.

takes place in the afternoon to avoid overlapping with the disembarkation operations.

Typical hours for turnaround activities would be a three hour disembarkation period in the morning (typically between 8 am and 11 am) and a four hour embarkation period in the early afternoon.

The vessels will mainly be from round Britain cruises with some European ports as last call, although some could be from destinations worldwide. The ships will belong to established global cruise lines including Carnival, Royal Caribbean, Norwegian cruise lines and a number of independent lines such as Fred Olsen, Ponant, Cruise and Maritime, Viking, Disney, Saga and Crystal.

Ships will stay in port for 8-12 hours and will use positioning thrusters for berthing/unberthing.

All vessels will have strict biosecurity procedures in place in accordance with best-practice regulations and will adhere to recommendations outlined by the ballast water International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM).

In addition, all ships will spend a number of weeks in dry dock annually and during this time antifouling will take place.

The predicted vessel usage for future years is indicated in

Table **1**, with 2022 being the opening year. It is predicted that for the opening year there would be a 'worst case' of 14 cruise ships in the busiest month which is just two more cruise ships than currently use the existing terminal. In 2027, there is predicted to be a slight increase to 16 cruise ships in the busiest month. It should be noted that the new Cruise Terminal would replace the existing temporary Cruise Terminal, which would close when the new facility becomes operational.

Table 1: Estimated Cruise Liner Visits 2020-2027

Year	Target Transit Vessels	Target Turnaround Vessels (Medium)	Target Turnaround Vessels (Large)	Target Turnaround Vessels (Extra Large)	Target Total
2020	37	10	19	1	**67**
2021	38	8	19	4	**69**
2022	39	8	20	4	**71**
2023	39	8	22	5	**74**
2024	40	8	24	6	**78**
2025	42	8	24	6	**80**
2026	42	8	24	6	**80**
2027	42	8	24	6	**80**

3.2.2 Non-routine vessel usage

Non-routine vessel usage is not expected at the LCT ferry terminal, but has been considered in this Biosecurity Plan as a precautionary measure. The occurrence will be sporadic in frequency and duration. No other freight or passenger vessels are expected at the terminal during operation although the berth could potentially be used as an emergency 'safe haven'.

3.2.3 Maintenance vessel activity

Vessels will be used occasionally to access the area for minor basic maintenance e.g. cleaning, painting and scheduled checks.

3.3 Plan period

3.3.1 Construction phase

The jetty demolition and removal is anticipated to have a duration of five and a half months. The marine-based drilling to install the piles for the new landing stage and suspended deck is anticipated to have a duration of nine months.

The time of year of the works is yet to be finalised.

3.3.2 *Operational phase*

The current operational life span of the LCT is predicted to be between 2020 (the predicated year of opening) until 2027, however, it could be a longer period. Operation would be seasonal from March to November and peak-season would be July and August.

3.3.3 Biosecurity Manager

It is anticipated that the Biosecurity Manager will be the Ecological/Environmental Clerk of Works for the Construction phase and during the Operation phase ensuring appropriate management measures are in place and being implemented would be the responsibility of the Site Manager. The name, address and contact number for the Biosecurity Manager and subsequently the Site Manager will be provided once confirmed.

3.4 Environmental Information

3.4.1 Site Description

The proposed Liverpool cruise terminal development is situated in the Mersey Estuary adjacent to Princes Dock on the northern shore between the Kingsway and Queensway tunnels (

Figure **2** and Figure 3). The Mersey Estuary is a busy industrial estuary with large commercial dockyards and the Port of Liverpool is one of the largest and busiest ports in the UK receiving substantial shipping traffic from Europe and ports worldwide. Furthermore, the planned cruise terminal will receive the same vessel traffic received by the current terminal but numbers of vessels are anticipated to increase.


Liverpool
Birkenhead
Wirral Country Park
Legend
Project Area
N
0 2 4 6 8
Kilometres
APEM
Project P3991 LCT Biosecurity Risk Assessment
Title
Location of survey area
Scale 1:60,000
Drawn MW
Chk RA
Auth MH
Coordinate System
British National Grid (OSGB 1936)
Date 21/09/17
Contains Aerial Imagery Courtesy of Channel Coastal Observatory (www.channelcoast.org).

Figure 2: Location of the proposed Liverpool Cruise Terminal within the lower Mersey Estuary.

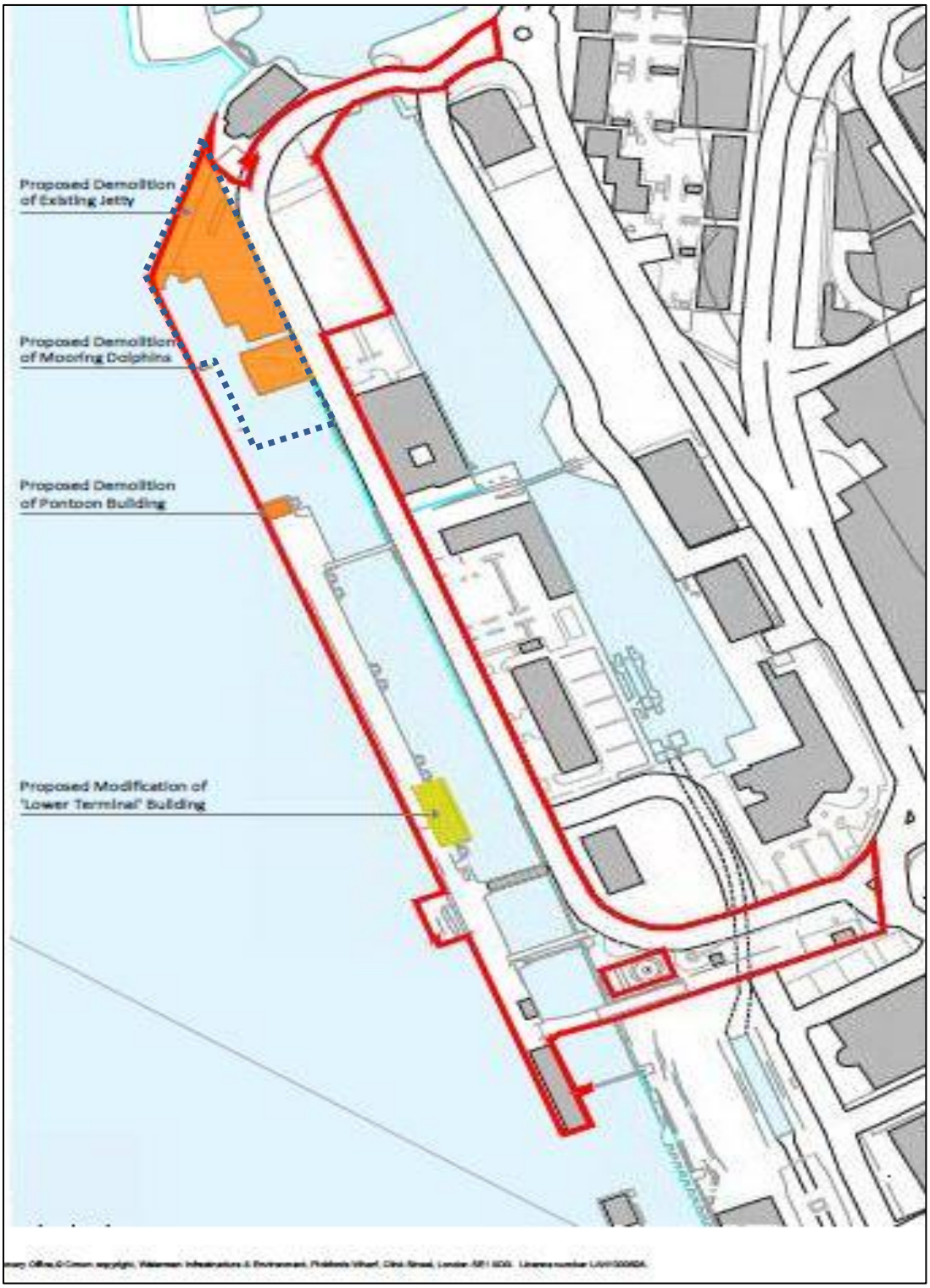

Figure 3: Red line boundary for the proposed Liverpool Cruise Terminal works. Orange shading = Location of current Princes Jetty (proposed demolition works area); Yellow shading = Proposed building modification area. Blue dotted line = outline of proposed new terminal area. Figure adapted from Liverpool Cruise Terminal Environmental Statement Volume 2: Waterman Infrastructure and Environment Limited.

3.4.2 Tidal flow, salinity, temperature

Tidal flushing refers to the systematic replacement of water in a bay or estuary as a result of tidal flow and the extents of the tidal excursion. The seaward movement of water in an estuary is governed by the input of freshwater at its head, from tributaries entering along its length and from effluent outfalls. The flushing time of the whole of the Mersey Estuary has been estimated at between 20 and 50 days. However, the flushing time for the area around the LCT site (located in the Mersey Narrows) has been estimated at approximately 5 days indicating a high tidal flow rate (LCT Ferry Terminal Environmental Statement). A strong tidal current may increase the chances of flushing NNS from an area, however, its influence on risk of NNS colonisation would depend on the NNS being considered and preferences for sheltered or exposed environments.

The Mersey Estuary is considered to be well-mixed due to strong tidal currents and low freshwater inputs (Halcrow 2011) and salinity can vary from fully marine conditions to brackish depending on the location in the estuary and stage of the tidal cycle.

3.4.3 Site habitats and features

A project-specific benthic ecology survey was conducted in June 2017. The Particle Size Analysis results indicated that the subtidal sediments were quite heterogeneous overall with five different sediment classifications across the nine grab sampling stations. A total of 69 taxa were identified across all benthic grab stations and *M. edulis* was the most frequently recorded taxon which was recorded at all nine stations. All of the grab stations were assigned to the high level biotope 'Sublittoral mixed sediment in variable salinity (estuaries)' (SS.SMx.SMxVS) (EUNIS code A5.43) as there were no characterising species to assign a more specific biotope to any of the stations.

A total of seven taxa were identified across all wall scrape stations. *Ulva* sp. was the most frequently recorded taxon, present at all four stations. Three of the taxa were algae and therefore not countable (*Ulva* spp., *Fucus spiralis* and *Porphyra* spp.). The barnacle *A. modestus* is an INNS and this was the most abundant taxon in the wall scrapes with a total of 583 individuals recorded. Other taxa recorded were Sessilia spp. Chironomidae larvae and *Littorina saxatilis*.

The Site is located within the Liverpool Bay Special Protection Area (SPA). Other designated sites located within 5 km of the Site are:

- Mersey Narrows and North Wirral Foreshore SPA / Ramsar;
- Mersey Estuary SPA / Ramsar;
- Dee Estuary SPA / Ramsar / SAC
- North Wirral Foreshore Site of Special Scientific Interest (SSSI); and
- Mersey Narrows SSSI.

3.5 Non-native species at the LCT site

The following non-native species were recorded in samples collected during the LCT benthic ecology survey:

- Starlet sea anemone *Nematostella vectensis* - Three individuals considered to be the *N. vectensis* were recorded across two grab stations (two individuals at one station, and one at another station), both of these stations were outside the red line boundary a short distance to the north of the LCT Site. The starlet sea anemone is a non-native species that was introduced to the UK from the eastern U.S.A (Reitzel *et al*. 2008, Barfield 2016).

- Australasian barnacle *Austrominius modestus* – this species was found in three of the sediment grab samples and three of the wall scrape samples. This species was first reported in Britain in 1946 and is common across coastal habitats in the UK.

- American piddock *Petricolaria pholadiformis* – A single juvenile was recorded in one of the grab samples. *P. pholadiformis* was unintentionally introduced to the UK with the American oyster *Crassostrea virginica* by 1890.

It should be noted that none of these NNS recorded during the marine ecology survey are considered to be INNS (i.e. they does not cause damage to the environment, the economy or our health). In addition, *N. vectensis* is protected in the UK under the Wildlife and Countryside Act 1981

It should be noted that although Chinese Mitten Crab *Eriocheir sinensis* has not been recorded in the vicinity of the Project site, this species is a highly invasive species of national concern and has been previously recorded in the Mersey at Warrington.

4 Risk assessment

4.1 Construction

4.1.1 *Risk of introducing or spreading non-native species*

The construction works in the estuary has been broken down into three main activities, although they will likely be occurring simultaneously at times:

- Vessel arrival;
- Construction works (including the introduction of materials/structures to the water column); and
- Vessel departure.

For each of these activities the biosecurity risks have been identified and the level of risk has been assessed using the Marine Biosecurity Planning guidelines (Cook *et al*. 2015) and professional judgement (**Error! Reference source not found.**). The greatest risk of introducing a NNS is when a vessel (particularly slow moving barges for example), equipment or stock arrives at the site from another country region or water body with similar environmental conditions to the worksite (e.g. in terms of temperature) and is covered in biofouling or contains additional algae and animals within the equipment/stock.

For any plant or materials coming into contact with the water column in the dock, the measures indicated in Table 2 in relation to the assessment of the levels of biofouling of plant/materials should be applied.

As a precautionary approach, the overall activity risk has been categorised at the highest risk level of any of the component tasks.

4.1.2 Biosecurity Control Measures

Biosecurity control measures have been proposed for the activities/tasks assessed to be Medium and High risk in **Error! Reference source not found.**. These control measures (provided in Table 3) will be listed in a biosecurity log and the date when each control measure is carried out will be recorded in the log. This process will allow the identification of any breaches in control measures. If such a breach occurs it will be recorded in the biosecurity log and the contingency plan will be triggered as outlined in Sections 5 and 6.

Table 2: Construction Phase: Risk assessment of introduction and spread of NNS during dismantling of the current Princes jetty and construction of the new deck for the Liverpool Cruise Terminal. Risk categories were assigned using guidelines in Cook *et al.* (2015) and professional judgement.

Activity	Biosecurity risk	Risk factor assessment	Task risk (High/ Medium /Low)	Overall activity risk (High/Medium /Low)
CONSTRUCTION				
Arrival of vessels and introduction of structures				
Arrival of jack-up vessels; supply vessels; support craft	Introduction of new NNS	Vessel with no notable biofouling (just green slime (see Appendix 1))	Low	High
		Vessel with notable biofouling (more than green slime (see Appendix 1))	High	
		Vessel will remain stationary for prolonged periods of time	High	
		Vessel will be mobilised regularly	Medium	
Exchange of ballast or bilge water of vessels on site during construction	Introduction of new NNS	Any exchange of ballast or bilge water would be undertaken in the open ocean and follow stringent protocols/standards (International Maritime Organisation regulations)	Low	Low
Introduction of new construction materials/structures to the marine environment	Introduction of new NNS	Structures (e.g. piles) without antifouling coating	Medium	Medium
		Structures (e.g. piles) with antifouling coating	Low	

Activity	Biosecurity risk	Risk factor assessment	Task risk (High/ Medium /Low)	Overall activity risk (High/Medium /Low)
Pile removal and construction activities	Spreading of NNS via fragmentation or dispersal of NNS into the water column from hard structures due to physical disturbance	Disturbance of heavily biofouled construction material/plant	High	High
		Prop wash from vessel could fragment NNS from hard structures	Low	
	Dispersal of NNS from suspension of sediment	Prop wash from vessel or sediment disturbance could mobilise or displace NNS if present in sediments	Low	
Departure of vessels				
Departure of jack-up vessels, supply vessels, support craft	Spread of NNS from the LCT site due to biofouling of hulls of vessels leaving the site	Vessel with no notable biofouling (just green slime)	Low	High
		Vessel with notable biofouling (more than green slime)	High	
Exchange of ballast or bilge water of vessels before departure	Introduction of new NNS	Any exchange of ballast or bilge water would be undertaken in the open ocean and follow stringent protocols/standards (International Maritime Organisation regulations)	Low	Low

Table 3: Construction Phase: Biosecurity control measures proposed for LCT construction.

Activity and biosecurity risk	Risk	Control measure	Where	When
CONSTRUCTION				
Arrival of vessels and introduction of structures				
Arrival of vessels (e.g. jack-up barge; other barges; supply vessels & support craft)	Commercial vessels with regular movement between unknown ports, biofouling removal regime is unknown	Vessels are expected to remain within the Mersey Estuary during the Construction phase, as opposed to arriving at site, leaving to enter another water body and then returning to site	Estuary at Project site	On arrival of vessel at the Project site
		Biosecurity assessments to be undertaken for all vessels		
		Request anti-fouling treatment record (if applicable) and bio-fouling removal record from all vessel operators		
		Apply the biofouling rapid visual inspection criteria indicated in Cook *et al*. 2015 (see Appendix 1 of this document) on vessel arrival If the level of biofouling is ranked at level 3 or higher the vessel should be refused entry until biofouling is removed. Removal must be in a controlled manner with all removed material contained and not released to the marine environment An alternative to physical removal is to air dry biofouled areas for at least 48-72 hr to eradicate NNS (where air drying is possible) and/or use of appropriate chemicals to accelerate eradication of organisms		

Activity and biosecurity risk	Risk	Control measure	Where	When
Introduction of new construction materials/structures to the marine environment	Assumed construction materials/new structures are all new with no previous exposure to biofouling	Apply the biofouling rapid visual inspection criteria indicated in Cook *et al*. 2015 (see Appendix 1 of this document) to any materials/structures to be introduced to the water column at the Project site. If the level of biofouling is ranked at level 3 or higher the materials/structure should not be introduced until biofouling is removed. Removal must be in a controlled manner with all removed material contained and not released to the marine environment An alternative to physical removal is to air dry biofouled areas for at least 48-72 hr to eradicate NNS (where air drying is possible) and/or use of appropriate chemicals to accelerate eradication of organisms	Estuary at Project site	Before introduction of new materials/structures to the water column
Construction activity				
Construction - Fragmentation and dispersal of NNS	Fragmentation/spreading of INNS due to disturbance of construction materials	Addressed by measures indicated above for introduction of new construction materials/structures	Estuary at Project site	Before introduction of new materials/structures to the water column
Departure of vessels				
Departure of vessels (e.g. jack-up barge; other barges; supply vessels; support craft)	None of the NNS recorded within the estuary at the Project site are considered to be invasive	Apply the biofouling rapid visual inspection criteria indicated in Cook *et al*. 2015 (see Appendix 1 of this document) prior to vessel departure. If vessel is ranked at level 3 or higher the vessel should be refused entry until biofouling is removed. Removal must be in a controlled manner with all removed material contained and not released to the marine environment An alternative to physical removal is to air dry biofouled areas for at least 48-72 hr to eradicate NNS (where air drying is possible) and/or use of appropriate chemicals to accelerate eradication of organisms	Estuary at the Project site	After cessation of associated construction activities

Activity and biosecurity risk	Risk	Control measure	Where	When
Additional measures				
All	All	Training will be given to key staff at the Project site in the identification of key INNS from the region and using the visual inspection scheme (see Appendix 1 of this document). These reference materials should be printed off and placed in the Biosecurity Plan folder along with this plan Staff are encouraged to report any unusual sightings or suspected INNS to the Biosecurity Manager	Project site	Ongoing during construction
Chinese mitten crab	This species is highly invasive and of national concern and steps should be taken to minimise its distribution. Although not previously recorded in the vicinity of the Project site, it has been recorded in the River Mersey at Warrington	Workers on site should be familiar with identifying the crab and if one is found it should be removed, isolated and reported to either the EA or NWIFCA with photographs. Care must be taken to dispose of them properly and to not reintroduce specimens back into the estuary. If the specimen is 'berried', i.e. carrying eggs, special care must be taken in handling of the crab so that eggs are not washed into the estuary	Project site	Ongoing during construction

4.2 Operational

4.2.1 Risk of introducing or spreading non-native species

The operational phase of the project has been subdivided into three main activities:

- Vessel arrival;
- Staying alongside the terminal; and
- Vessel departure.

The main risk of introduction and spread of NNS is considered to be associated with the fact that ferries would be travelling long distances and could be arriving at the LCT from ports across the UK and worldwide.

Arriving/departing vessels could have biofouling on the hull and another primary consideration for the operational phase for large vessels such as ferries are “niche” areas on the vessel. Niche areas are intricate areas of vessels such as sea chest, seawater intake and outflows, positioning thrusters, vents and grills, prop shafts and other complex hull structures which could become biofouled.

Non-native species can also be present within ballast water used to maintain stability of vessels. This is closely managed, however, via requirements of the IMO Convention on the management of ballast water.

It is considered that the primary risk of introduction and therefore spread of NNS/INNS is associated with vessel movement between similar biogeographic regions with potential transfer of species adapted to growth and survival in similar water temperatures (e.g. in general the likelihood of colonisation is greater for a species being transported from temperate waters to temperature waters, as opposed to being transported from tropical waters to temperate waters). Challinor *et al*. (2014) developed a risk matrix to indicate the potential risk of the spread of NNS from one biogeographical region to another (Table 4). This risk has been incorporated into this Biosecurity Plan to take into consideration vessel movements between disparate or similar biogeographic regions prior to arrival at the LCT.

Within each of these activities the biosecurity risks for each task have been identified and the level of risk has been assessed using the Marine Biosecurity Planning guidelines (Cook *et al*. 2015) and professional judgement (Table 5).

4.2.2 Biosecurity Control Measures

Biosecurity control measures have been proposed for the activities assessed to be Medium and High risk in Table 5. These control measures (provided in Table 6) will be listed in a biosecurity log and the date when each control measure is carried out will be recorded in the log. This process will allow the identification of any breaches in control measures. If such a

breach occurs it will be recorded in the biosecurity log and the contingency plan will be triggered as outlined in Sections 5 and 6.

Table 4: Likelihood of colonisation of NNS, according to the matching biogeographical region (from Challinor *et al*. 2014).

Recipient region	Donor region			
	Arctic & Antarctic [e.g. Arctic Coast]	**Cold-temperate** [e.g. North Sea]	**Warm-temperate** [e.g. Mediterranean Sea]	**Tropics** [e.g. Caribbean]
Arctic & Antarctic [e.g. Arctic Coast]	High	Medium	Low	Low
Cold-temperate [e.g. North Sea]]	Medium	High	Medium	Low
Warm-temperate [e.g. Mediterranean Sea]	Low	Medium	High	Medium
Tropics [e.g. Caribbean]	Low	Low	Medium	High

Table 5: Operational Phase: Risk assessment of introduction and spread of NNS during operation of the Liverpool Cruise Terminal. Risk categories were assigned using guidelines in Cook *et al.* (2015) and professional judgement.

Activity	Biosecurity risk	Risk factor assessment	Task risk (High/ Medium /Low)	Overall activity risk (High/Medium/ Low)
OPERATION				
Arrival of vessels				
Arrival of vessels from cold temperate waters	Introduction of new NNS	Vessel in port for 8-12 hours	High	High
Arrival of vessels from warm temperate waters	Introduction of new NNS	Vessel in port for 8-12 hours	Medium	Medium
Arrival of vessels from tropical waters	Introduction of new NNS	Vessel in port for 8-12 hours	Low	Low
Arrival of vessels from polar waters	Introduction of new NNS	Vessel in port for 8-12 hours	Medium	Medium
Exchange of ballast or bilge water during Operational phase	Introduction of new NNS	Any exchange of ballast or bilge water would be undertaken in the open ocean and follow stringent protocols/standards (International Maritime Organisation regulations)	Low	Low
Introduction of new materials to the marine environment (flotsam)	Introduction of new NNS	Contaminated flotsam fall overboard	Low	Low

Activity	Biosecurity risk	Risk factor assessment	Task risk (High/ Medium /Low)	Overall activity risk (High/Medium/ Low)
Vessels In Port				
Use of positioning thrusters	Spreading of NNS via fragmentation or dispersal of NNS into the water column from hard structures due to physical disturbance	Disturbance of heavily biofouled structures Prop wash from vessel could fragment NNS from hard structures	Low	Low
	Dispersal of NNS from suspension of sediment	Prop wash from vessel or sediment disturbance could mobilise or displace NNS if present in sediments	Low	
Staying alongside terminal (exchange of sea water through the vessel)	Interaction with niche areas spreading NNS	Potential biofouling of niche areas (e.g. sea chest, seawater intake and outflows, positioning thrusters, vents and grills, prop shafts) could introduce NNS	Medium	Medium
Exchange of ballast or bilge to stabilise cargo transfer	Introduction of new NNS	Any exchange of ballast or bilge water would be undertaken in the open ocean and follow stringent protocols/standards (International Maritime Organisation regulations)	Low	Low

Activity	Biosecurity risk	Risk factor assessment	Task risk (High/ Medium /Low)	Overall activity risk (High/Medium/ Low)
Departure of vessels				
Departure to cold temperate waters	Spread of NNS from the LCT terminal site on physical structures	Vessel in port for 8-12 hours	High	High
Departure to warm temperate waters	Spread of NNS from the LCT terminal site on physical structures	Vessel in port for 8-12 hours	Medium	Medium
Departure to tropical waters	Spread of NNS from the LCT terminal site on physical structures	Vessel in port for 8-12 hours	Low	Low
Departure to polar waters	Spread of NNS from the LCT terminal site on physical structures	Vessel in port for 8-12 hours	Medium	Medium
Exchange of ballast or bilge to stabilise cargo transfer.	Spread of NNS from the LCT terminal site in ballast water	Any exchange of ballast or bilge water would be undertaken in the open ocean and follow stringent protocols/standards (International Maritime Organisation regulations)	Low	Low

Activity	Biosecurity risk	Risk factor assessment	Task risk (High/ Medium /Low)	Overall activity risk (High/Medium/ Low)
Maintenance vessels				
Arrival of vessel	Introduction of new NNS	Vessel with no notable biofouling (just green slime)	Low	High
		Vessel with notable biofouling (more than green slime)	High	
		Vessel will be mobilised regularly	Medium	
Departure of vessel	Spread of NNS from the LCT site	Vessel with no notable biofouling (just green slime). Not considered slow moving, risk of acquiring NNS while on site is low	Low	High
		Vessel with notable biofouling (more than green slime)	High	

Table 6: Operational phase: Biosecurity control measures proposed for the Liverpool Cruise Terminal.

Activity and biosecurity risk	Risk	Control measure	Where	When
OPERATION				
Arrival of vessels				
Arrival of vessels	Biofouling removal regime is unknown	Biosecurity assessments to be undertaken for all vessels	LCT in Mersey Estuary	On arrival of vessel at the site
		Request anti-fouling treatment record (if applicable) and bio-fouling removal record from all vessel operators		
Vessels In Port				
Exchange of sea water and interaction with niche areas	Introduction of new NNS via a range of dispersal methods (larval, fragmentation or other)	Regular inspection of niche areas following IMO guidance	LCT in Mersey Estuary	Whilst alongside the terminal

Activity and biosecurity risk	Risk	Control measure	Where	When
Departure of vessels				
Departure of vessels	None of the NNS recorded within the estuary at the Project site are considered to be invasive	Biosecurity assessments to be undertaken for all vessels (covered by criteria for vessel arrival)	LCT in Mersey Estuary	On vessel departure
		Request anti-fouling treatment record (if applicable) and bio-fouling removal record from all vessel operators (covered by criteria for vessel arrival)		
Maintenance vessels				
Arrival of vessel	Biofouling removal regime is unknown	Biosecurity assessments to be undertaken for all vessels	LCT in Mersey Estuary	On arrival of vessel at the terminal
		Request anti-fouling treatment record (if applicable) and bio-fouling removal record from all vessel operators		
		Apply the biofouling rapid visual inspection criteria indicated in Cook *et al*. 2015 (see Appendix 1 of this document) on vessel arrival If the level of biofouling is ranked at level 3 or higher the vessel should be refused entry until biofouling is removed. Removal must be in a controlled manner with all removed material contained and not released to the marine environment		

Activity and biosecurity risk	Risk	Control measure	Where	When
Additional measures				
All	All	Training will be given to key staff at the Project site in the identification of key invasive NNS from the region and using the visual inspection scheme (see Appendix 1 of this document). These reference materials should be printed off and placed in the Biosecurity Plan folder along with this plan. Staff are encouraged to report any unusual sightings or suspected INNS to the Biosecurity Manager.	LCT in Mersey Estuary	Ongoing during operation
Chinese mitten crab	This species is highly invasive and of national concern and steps should be taken to minimise its distribution. Although not previously recorded in the vicinity of the Project site, it has been recorded in the River Mersey at Warrington.	Workers on site should be familiar with identifying the crab and if one is found it should be removed, isolated and reported to either the EA or NWIFCA with photographs. Care must be taken to dispose of them properly and to not reintroduce specimens back into the estuary. If the specimen is 'berried', i.e. carrying eggs, special care must be taken in handling of the crab so that eggs are not washed into the estuary.	LCT in Mersey Estuary	Ongoing during operation

5 Contingency Plan

5.1 Construction

In the event of any of any control measures being breached or the detection of a new INNS all necessary steps should be taken to control the spread and dispersal of the INNS. Contingency plans for specific scenarios are provided in Table 7.

Table 7: Isle of Man Ferry Terminal Construction Phase Contingency Plan.

Issue	Action	Responsibility	Equipment
Fragmentation or dispersal of conspicuous INNS into the water column – most likely source is during cleaning/removal of biofouling	Remove INNS from the water column and dispose to landfill.	The Biosecurity Manager should inform Project staff to inform them of any observed fragmentation/dispersal into the water column.	Hand nets
Vessel biofouling is ranked at class 3 or above in the visual inspection (Appendix 1).	The vessel is not allowed entry to the Project site. Remove vessel from water at home port or appropriate designated alternative port, clean and antifoul (if appropriate). Biofouling removal must be in a controlled manner with all removed material contained and not released to the marine environment.	Biosecurity Manager/Project staff to carry out visual inspection of all vessels prior to entry to the Project site.	Laminated copy of visual inspection table to be readily available.
Vessel leaves site without visual biofouling inspection (i.e. where this represents a breach of protocol)	Recommended visual inspection at next port of call to minimise risk of spread of INNS to other areas.	Vessel owner	NA
New records of INNS at Project site during construction or operation, or identified by project team in wider area.	The GB Non-native Species Secretariat should also be informed so they can update species distribution and abundance databases for NNS. Relevant details are located on their website: http://www.nonnativespecies.org	Workforce to inform the Biosecurity Manager.	NA

6 Monitoring, site surveillance and reporting procedure

The Marine Biosecurity Planning guidelines (Cook *et al*. 2015) require the use of a biosecurity logbook to record training, surveillance, control measures carried out and any other activities of concern regarding the biosecurity of the operation. Formal steps should be put in place to quickly inform the Biosecurity Manager of any potential introduction of INNS.

Information to be recorded in the logbook includes:

- Any routine inspections of vessels, construction equipment, materials and structures in the water column;
- Inspections of 'high risk' vessels;
- Details of when the Biosecurity Manager was informed if any INNS were found;
- Any biosecurity measures that were taken if INNS were found;
- Which organisations were notified when INNS were found (e.g. GB NNSS (non-native species secretariat);
- The application of any antifouling or cleaning of vessels, equipment and materials/structures undertaken on site;
- Any events undertaken to raise NNS/INNS awareness.

All logbook entries should be dated and signed by the Biosecurity Manager.

A table template indicating the key information required in the Biosecurity Plan to be completed on site is provided in Section 6 of Cook *et al*. (2015).

7 Key sources of advice

The following sources provide additional information relating to NNS and the control of the spread of NNS.

- Guidance on Marine Biosecurity planning
  - England and Wales (Cooke *et al*. 2015) - www.nonnativespecies.org/downloadDocument.cfm?id=1401

- GB NNSS Website
  - Biosecurity in the field (including biosecurity for boat users, submerged structures and event biosecurity support pack) http://www.nonnativespecies.org/index.cfm?pageid=174

- National Biodiversity Network
  - Distribution maps and information about species: NBN Atlas www.nbnatlas.org

- European Commission
  - EC Alien Species Information http://ec.europa.eu/environment/nature/invasivealien/index_en.htm

- Royal Yachting Association (RYA)
  - www.rya.org.uk/go/alienspecies

- The Green Blue
  - Antifoul and Invasive Species https://www.thegreenblue.org.uk/Boat-Users

- Invasive Species Ireland
  - Marina Operators Code of Good Practice http://invasivespeciesireland.com/cops/marina-operators/
  - Water Users Code of Good Practice http://invasivespeciesireland.com/cops/water-users/

- IMO (International Maritime Organization) Guidelines For The Control And Management Of Ships' Biofouling To Minimise The Transfer Of Invasive Aquatic Species
  - http://www.imo.org/blast/blastDataHelper.asp?data_id=30766&filename=207(62).pdf

- IMO Guidance For Minimizing The Transfer Of Invasive Aquatic Species As Biofouling (Hull Fouling) For Recreational Craft
    - http://www.imo.org/en/OurWork/Environment/Biofouling/Documents/MEPC.1-Circ.792.pdf

- DEFRA – http://jncc.defra.gov.uk/page-5150

- DASSH - The Archive for Marine Species and Habitats Data - www.dassh.ac.uk/

- IOM Wildlife Trust NNS Guide

    - http://www.manxwt.org.uk/sites/default/files/files/marine_InvasiveNon-NativeSpeciesList.pdf

    - http://www.manxwt.org.uk/sites/default/files/files/marine_invasive_idguide_Sept2015.pdf

8 Glossary

Biofouling: Biological growth which develops on manmade structures in the aquatic environment.

Biosecurity: Taking action in order to minimise the introduction or spread of invasive non-native species or disease.

Biosecurity Plan: A written document which details site / operation activities and actions that will be undertaken to minimise the introduction or spread of a specified threat (i.e. invasive non-native species).

Control Measures: Refers to actions which are undertaken in order to prevent the introduction or spread of an invasive non-native species.

Establishment: Refers to the process of a non-native species in a new location successfully producing viable offspring with the likelihood of continued survival.

Introduction: Refers to the movement by human means, indirect or direct, of a species outside its natural range. This movement can be within a country or between countries.

Native Species: Also known as indigenous species, means a species occurring within its natural range (past or present) and dispersal potential, i.e. within the range it occupies naturally or could occupy without direct or indirect introduction or intervention by humans.

Non-Native Species: Non-native species (also known as alien, non-indigenous, foreign or exotic) means a species or subspecies occurring outside its native range i.e. the range it occupies naturally without the intervention of human activity. This includes any part of the species that might survive and subsequently reproduce.

Invasive Non-Native Species: An invasive non-native species (INNS) is defined as a 'non-native species that threatens native biological diversity, human health or economic activity.

Prop Wash: An aviation and nautical term used to define a mass of air or water pushed aft or fore by the propeller of an aircraft or propeller-driven watercraft. This term is synonymous with any water disturbance created by a vessel's propulsion systems.

9 References

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GB NNSS (The Great Britain Non-native Species Secretariat). 2015. The Great Britain Invasive Non-native Species Strategy. PB 14324: 42 pp

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Kakkonen, J. E., Worsfold, T. M., Ashelby, C. W., Taylor, A. and Beaton, K. 2019. The value of regular monitoring and diverse sampling techniques to assess aquatic non-native species: a case study from Orkney. Management of Biological Invasions, 10(1): 46-79.

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Appendix 1

Criteria for visual assessment of the extent of biofouling (Cook *et al.* 2015).

Rank	Description	Visual estimate of biofouling cover
0	No visible fouling. Hull entirely clean, no biofilm on visible submerged parts of the hull.	Nil
1	Slime fouling only. Submerged hull areas partially or entirely covered in biofilm, but the absence of any plants or animals.	Nil
2	Light fouling. Hull covered in biofilm and one to two very small patches of one type of plant or animal.	1–5 % of visible submerged surfaces
3	Considerable fouling. Presence of biofilm, and fouling still patchy, but clearly visible and comprised of either one or more types of plant and/or animal.	6–15 % of visible submerged surfaces
4	Extensive fouling. Presence of biofilm and abundant fouling assemblages consisting of more than one type of plant or animal.	16–40 % of visible submerged surfaces
5	Very heavy fouling. Many different types of plant and / or animal covering most of visible hull surfaces.	41–100 % of visible submerged surfaces

Appendix 13.11a: Responses to HRO Consultation Issues

Appendix 13.11a

Liverpool Cruise Terminal HRO – Responses to Statutory Consultee comments

Consultee	Comment	LCC's Response
NW IFCA Letter dated 4th June 2019	Noise and vibration (page 1 & 2) The width of the river at the location of the project is approximately 950m, this is within the 100's of meters of a moderate risk to behaviour suggested in Popper et al (2014), and as such it is still possible that an acoustic barrier could be created across the river. Furthermore, Turnpenny and O'Keeffe (2005) present best practice for using sound as a behavioural barrier for deterring fish from installations, and using the dBht(species) concept(as described in s.13.161 ES Addendum 2019)advise that+30 dB is the threshold for a visible reaction in more sensitive individuals, at+50dB most fish swim away and at +70dB there is a strong aversive reaction. Whilst there are limitations to the dBht (species) concept and the assessment guidelines suggested in Popper et al (2014), it seems clear to NWIFCA that there is at least a moderate risk to an adverse behavioural reaction from sound that may extend across the width of the river. And that these changes in behaviour may prevent fish from visiting preferred sites for feeding and reproduction. NWIFCA accept that there will be periods each day where extraction or installation of piles will not occur, but there is no evidence to suggest whether the fish will immediately return to the area as the applicant suggests, or learn to avoid them during and following 9 months of daily noise generation on the river bed. The length of time required to remove existing piles and install 167 new marine piles presents a risk that the reproductive cycles of numerous species that use the Mersey Estuary as a spawning and nursery area may be interrupted. Fish are known to return to the same grounds to spawn, and if this is interrupted it may have significant and long-term effects on the fish populations that utilise the Mersey Estuary.	The Project has committed to installing all piles using rotary auger drilling rather than percussive or vibro-piling methods. Rotary auger drilling is a continuous noise source like shipping noise. The source pressure level (SPL) produced by rotary auger drilling has been calculated for the machinery that will be used for this Project as 163.3 dB re. 1 µPa (RMS) @ 1m (as indicated in ES Chapter 13). For comparison, the SPL of crew boats has been recorded as 166 dB re. 1 µPa (RMS) at 1m (as indicated in ES Chapter 13). As such it is considered that this installation method can be quieter than vessels frequenting the Mersey Estuary. Fish may become habituated to continuous noise associated with a range of sources including vessel noise or rotary drilling. Behavioural effects cover a wide range of responses and the risk that a behavioural effect may occur does not necessarily indicate that fish will flee and not return. Behavioural effects include changes in communication between individuals of the same species, detection of predators and prey, changes in swimming behaviour and orientation, including startle reactions, 'freezing' momentarily, and changing direction, and changes in schooling patterns and distribution. Further, the behavioural response may habituate with repeated presentations of the same sound as indicated above (Popper et al. 2014). The distances stated in Popper et al. (2014) are provided as a guide only. As the paper sets out, one number for a guideline or criteria can never fit all fish species, since species vary greatly in so many ways. The article further states that responses to a signal may vary within a species, and even a single animal, depending on factors such as sex, age, size, and motivation (feeding, mating, moving around a home range, etc.) As such, a 'relative risk' approach was taken by the authors to the guidelines for fish behaviour. This suggested relative risk levels of a behavioural effect occurring (without definition of a specific type of behavioural effect) for near, intermediate and far distances from the noise source. Near, intermediate and far is considered to be equivalent to tens of metres, hundreds of metres and thousands of metres from the source, respectively. Although the Popper et al. (2014) indicates an intermediate risk of behavioural effects within hundreds of metres, in reality the level of risk decreases continually with increasing distance from source as the noise levels attenuate rapidly with increased distance from source – so at 950 m from source the noise levels will be imperceptible above background so would not be expected to lead to any effects and at 100 m from source the noise level will be higher than baseline and the intermediate level of risk is more applicable. This represents a limitation of the Popper et al. (2014) assessment tables for continuous noise sources and is where professional judgement is applicable. Baseline underwater noise levels are available in an AECOM report produced for the LCT project as part of the Ground Investigation works (New Liverpool Cruise Terminal Ground investigation: Airborne and underwater noise monitoring (August 2018)) and this report is enclosed. Based on the results of the baseline monitoring it is expected that the noise levels from the rotary drilling would fall below baseline noise levels within 200 to 300 metres of the drilling location, again supporting the expectation that behavioural effects due to the drilling would not be expected more than a few hundred metres from the source. The dBht(species) approach has been superseded by newer methods and is not considered best practice. The information presented in Turnpenny and O'Keeffe (2005) refers to unpublished work by Nedwell et al. but does not reference a specific paper. Reviewing papers published by Nedwell et al. in 2005, 2006 and 2007, it appears that references to specific dBht levels that can elicit behavioural responses were not included (see Nedwell et al. 2007 for example). Where the response mentions +30, +50 and +70 dB we assume this is referring to +30, +50 and +70 dBht (species) (noting that the dB unit is completely different to the dBht (species) unit and +30 dBht (species) is not a +30 dB re. 1 µPa (RMS) increase in noise levels above background, but is a noise level 30 dB above the hearing threshold of the fish species being considered (with each species having a different hearing threshold)). In more recent documents published by J.R. Nedwell much larger increases in particle motion were cited as causing behavioural responses. For example, in the underwater noise modelling report for the York Potash Project Harbour Facilities the cited levels at which some individuals may exhibit avoidance reactions is given as 75 dBht(species) but habituation or context may limit the effect. Strong avoidance reactions by the majority of individuals was cited as occurring at 90 dBht(species) or above. Overall, however, as stated above the dBht approach is not considered appropriate and the behaviour of fishes in response to underwater noise and vibration is highly variable and not well understood, therefore there is currently insufficient evidence to determine a specific dBht value at which a behavioural effect could occur. The response refers to 9 months of daily noise generation on the sea bed. For clarity, in relation to the marine piling activities, the operations affecting water borne noise are primarily screwing the steel casing into the seabed and the rotary drilling of the rock socket into the seabed (which is done inside the steel casing). Combining these two activities is anticipated to generate approximately 30 - 35% of the daily working duration, therefore based on a 12 hour working day, this equates to approximately 3 to 4 hours of marine piling activity per working day (i.e. 3/4 hours per 24 hour period). The duration of these works is anticipated to be 33 weeks overall. Behavioural effects may not necessarily be adverse and there is no evidence that fish, which may temporarily avoid an area during noise generating activities, would not return to an area. As the Fisheries specialist at Cefas has stated in their advice, evidence from post-construction monitoring of offshore wind farms, which use much larger piles than those proposed for this Project and that use percussive or vibratory piling methods generating far greater noise levels, suggests that fish do return to the area shortly after construction ceases (see below). **As quoted from Cefas fisheries advice (7 June 2019)** *'In my role as a fisheries environmental impact advisor, I have reviewed the results of numerous post-construction fisheries monitoring surveys, including those of offshore windfarms where impact/percussive piling takes place on a large scale at much higher energy levels than those proposed for this development. Of those reports I have reviewed; none have identified any long-term displacement of fish as a result of piling noise.'* Nedwell, J. R., Turnpenny, A. W. H., Lovell, J., Parvin, S. J., Workman, R., Spinks, J. A. L., & Howell, D. (2007). A validation of the dBht as a measure of the behavioural and auditory effects of underwater noise. Ref: 534R1231 (Subacoustech Acoustic Research Consultancy, Southampton, Hampshire, UK).
NW IFCA Letter dated 4th June 2019	Noise and vibration (page 2, para 4) The impact of noise and vibration on established fisheries has not been adequately assessed. The commercial and charter boats fishing the Mersey have a legitimate right to earn a living, and the socio-economic effects of the development on the livelihoods of fishers has not yet been determined	The potential for underwater noise and vibration to result in impacts on commercial fishermen and charter boat vessels was taken account of in the Fishing Activity Technical Note, which noted that behavioural impacts resulting from noise on fish could in theory result in changes in their distribution and that this in turn could affect fishing operations in the Mersey. The assessment presented in the Fishing Activity Technical Note took account of information provided by fisheries stakeholders during consultation with regards to their activities, including the extent of fishing grounds available in the Mersey and of the outcomes of the assessment of underwater noise on fish presented in the Chapter 13 of the 2019 Environmental Statement (ES) Addendum. **The latter indicated that impacts on fish would be highly localised, temporary and short term in nature and concluded that impacts on fish as a result of underwater noise would be of negligible significance.** Considering the above, the Fishing Activity Technical Note points out that it is not anticipated that fishing activities would be significantly affected by the proposed works. In the context of this assessment it is important to note that no percussive "impact piling" is proposed to be undertaken as part of the construction of the Development. Instead, as an inherent mitigation measure to minimise the levels of noise and vibration during construction, rotary drilling is the proposed construction method for pile

Consultee	Comment	LCC's Response
		installation. The Applicant recognises the legitimate right of fishermen to earn a living and to make use of the Mersey. In this context it is important to note that the information presented in Chapter 13 of the 2019 ES Addendum in respect of potential effects on fish ecology, and in the Fishing Activity Technical Note with regard to fishing activity, supports the view that the construction of the Development will not prevent fishermen from earning a living in the Mersey. Furthermore, the conclusions of the assessments presented in Chapter 13 of the 2019 ES Addendum and in the Fishing Activity Technical Note are both in line with Advice provided by Cefas with regards to the HRO. Relevant extracts of Cefas's Fisheries Advice are provided below: **As quoted from Cefas fisheries advice (7 June 2019)** ***Q2. Do you believe that the impacts from the piling will cause short term adverse impacts on fish? If yes, what would the impacts be?*** *23. In my opinion avoidance by fish from the immediate development area (in the tens to hundreds of meters) is likely to occur during times of noisy construction activities i.e. drilling and piling. The impact will be short term, temporary and localised and therefore not significant.* ***Q4. Do you believe that this project could trigger a behavioural response in the fish in which they will not return to the estuary following construction?*** *26. No, as per my comments above, I am not aware of any evidence to suggest that behavioural responses in fish caused by vibro-extraction and rotary drilling will result in fish leaving the Mersey and not returning.* ***Q5. Will the use of rotary drilling to install the piles minimise the impact on fish to an acceptable level during construction?*** *27. Yes. When compared to the energy levels associated with vibro piling or percussive piling, the use of rotary drilling to install the piles will produce lower energy levels that are likely to result in localised avoidance of the site and masking impairments to fish within 10s to hundreds of metres. When taking into account the intermittent nature of the drilling (up to 4 hours per day) and the 12-hour downtime periods when drilling will not take place, I believe that impacts to fish have been minimised to an acceptable level.* ***Q6. Do you agree with the conclusions reached in the applicant's report into fishing?*** *28. Generally yes. The Fishing Activity Technical Note demonstrates that charter fishing and commercial fishing activity are both undertaken within the immediate vicinity of the development and recognises that behavioural impacts on fish could result in changes in the distribution of target species which could, in turn, affect fishing operations. The fishing ground maps for charter boats and commercial fishermen indicate that there are some alternative fishing sites both upstream and downstream of the development which can be utilised during the construction period and are already used in winter when weather conditions prevent fishing in exposed coastal areas.*
NW IFCA Letter dated 4th June 2019	Invasive non-native species (page 2) Invasive non-native species The NWIFCA appreciates the applicant's regard to invasive species, but must highlight the omission of the Chinese Mitten Crab. This is a highly invasive species of national concern that has been previously recorded in the Mersey at Warrington and appropriate steps should be taken to minimise its distribution. The NWIFCA recommends that workers on site are familiar with identifying the crab and if one is found it is removed, isolated and reported to either the EA or NWIFCA with photographs. Care must be taken to dispose of them properly and not reintroduce specimens back into the estuary. If the specimen is 'berried', i.e. carrying eggs, special care must be taken in handling of the crab so that eggs are not washed into the river.	The comments in relation to Chinese mitten crab has been noted. This species has been added to the Biosecurity Risk Assessment that is being prepared as part of the Environmental Management Plans for this Project. The recommended management measures will be included within the Biosecurity Risk Assessment.
NW IFCA Letter dated 4th June 2019	**Overall aim of the report** (page 3) It was the understanding of NWIFCA that the applicant had been directed to assess the potential socio-economic impacts on fisheries in the Mersey. Regretfully we do not feel that this is what has been produced. The MMO scoping opinion (Appendix 2.4a ES Addendum March 2019), outlined aspects to be considered further during the EIA and to be included in any resulting ES. Section 4.5.3 Commercial/non-commercial fishing, states that "The assessment should look at the socio-economics along with direct impacts on fish and shellfish stocks within the immediate area and the cumulative effects the project may have within Liverpool Bay. The River Mersey is an important fishing ground and the potential impact on stakeholders should be considered." This assessment is further referred to as a socio-economic assessment in the Framework CEMP (Appendix 2.4a ES Addendum March 2019) where a placeholder has been left in 3 locations in section 4. Neighbour and Local Community Liaison and	The Fishing Activity Technical Note identifies and describes the fishing activities that are undertaken in the Mersey by commercial fishermen and charter vessel skippers and establishes and assesses the potential for the Development to result in an impact on fisheries stakeholders. Therefore, as requested by the MMO in their scoping opinion, it is the Applicant's view that the potential impact of the Development on fisheries stakeholders has been accounted for. A socio-economic assessment has been undertaken to the extent that the socio-economic importance of fishing the Mersey has been recognised. This has been clearly stated in the introduction to the updated Fishing Activity Technical Note, to address NWIFCA concerns. As previously mentioned, the assessment presented in the Fishing Activity Technical Note took account of information provided by fisheries stakeholders during consultation with regards to their activities, including the extent of fishing grounds available in the Mersey and of the outcomes of the assessment of underwater noise on fish presented in the Chapter 13 of the 2019 Environmental Statement (ES) Addendum. **The latter indicated that impacts on fish would be highly localised, temporary and short term in nature and concluded that impacts on fish as a result of underwater noise would be of negligible significance.** Considering the above, the Fishing Activity Technical Note points out that it is not anticipated that fishing activities would be significantly affected by the proposed works. In the context of this assessment it is important to note that no percussive "impact piling" is proposed to be undertaken as part of the construction of the Development. Instead, as an inherent mitigation measure to minimise the levels of noise and vibration during construction, rotary drilling is the proposed construction method for pile installation. The Applicant recognises the legitimate right of fishermen to earn a living and to make use of the Mersey. In this context it is important to note that the information presented in Chapter 13 of the 2019 ES Addendum in respect of potential effect on fish ecology, and in the Fishing Activity Technical Note with regard to fishing activity, supports the view that the construction of the Development will not prevent fishermen from earning a living in the Mersey. Furthermore, as previously mentioned, the conclusions of the assessments presented in Chapter 13 of the 2019 ES Addendum and in the Fishing Activity Technical Note are both in line with Advice provided by Cefas with regards to the HRO. There is no detailed information on commercial and charter boat fishing activity in areas relevant to the Development which is publicly available. The original Fishing Activity Technical Note included background information from available fisheries datasets

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	Management of Complaints, with the following text. [Note: Include here introductory information with regards to the socio-economic assessment of fisheries which is currently underway –due for completion late December2018.] However there is no mention of a socio-economic assessment in the introduction to the Fisheries Technical Note, and indeed no socio-economic assessment is performed within the report. As such, NWIFCA cannot accept that the direction of the MMO has been followed and an appropriate assessment performed.	for completeness (i.e. MMO landings data, MMO sightings data, NWIFCA sightings data), AIS data). It should be noted that the limitations of these datasets where noted in the original Fishing Activity Technical Note and that no conclusions were drawn in the report with regards to potential impacts on fishing based on these datasets. To avoid confusion, the text in the Fishing Activity Technical Note has been reviewed and it has been made clear that the baseline provided in the Technical Note is primarily based on information collected during consultation with fisheries stakeholders. In addition, references to the existing fisheries datasets have been removed from the main text of the Fishing Activity Technical Note. The analysis of these datasets has been compiled under an Appendix "Appendix 7.2. Existing Fisheries Data". The limitations of each dataset have been noted under the relevant sections of Appendix 7.2.
NW IFCA Letter dated 4th June 2019	**Introduction** (page 3) NWIFCA would suggest caution in stating this report provides a baseline of fishing activity in the Mersey. At best it can be considered a summary of findings from the investigations of Brown and May Ltd. NWIFCA accept the MMO did not directly suggest an assessment of non-commercial and recreational fishing in the Mersey Estuary. However, recreational fishing from the shore and from personally owned vessels contributes a large proportion of fishing activity in the Mersey. The natural capital value of recreational activities to human health and wellbeing is a well-established concept and these stakeholders should be included in the assessment of impacts from this development.	The introduction section has been amended to make clear that the baseline information provided in the report is primarily based on the information gathered during consultation undertaken by Brown and May Marine Ltd with local fisheries stakeholders. The Applicant acknowledges the importance of recreational fishing to coastal communities. As noted by NWIFCA, however, the need for an assessment specific to recreational fishing was not identified at the scoping stage. As mentioned above with regards to charter vessels and commercial fishing, the construction of the Development will also not prevent recreational fishing from occurring in the Mersey. Impacts on recreational fishing could occur indirectly, as a result of potential impacts on fish species. In the assessment undertaken in Chapter 13 of the 2019 ES Addendum, it was however concluded that construction works, including underwater noise generated by those works, would result in impacts of negligible significance on fish, and that these would be localised, temporary and short term in nature. Furthermore, it is understood that recreational fishing occurs at numerous locations along the banks of/in the Mersey. Therefore, this activity would not be expected to be significantly affected by the works.
NW IFCA Letter dated 4th June 2019	**1.2 Study Area** (page 3) The study area assessment does not present the full character of the Mersey Estuary, focussing heavily on the industrial and urban aspects of the estuary and wider catchment. Neglecting to mention environmental designation and the ecology of the river gives the impression that it is intentional to influence the reader's perception of the river.	The study area used for assessment of fishing activities within the Technical Note was defined taking account of the location of the Development and the extent of the operational range of the fishing activities present. In line with standard practice for the undertaking of fisheries assessments, ICES rectangles (the smallest spatial unit used for the compilation of national fisheries statistics) were used to help define the study area in spatial terms. As an introduction, and with the sole objective of providing some background information on the location of the Development, reference was made to the industrial and urban nature of the area of the Mersey Estuary. No reference was made to the designation status of the river as this is not of direct relevance to fishing activity. As suggested by NWIFCA, however, the conservation designations of the River Mersey have been noted in the updated Fishing Activity Technical Note.
NW IFCA Letter dated 4th June 2019	**1.3 Data Information and Sources** (page 4) NWIFCA agree that the fisheries data used in this report has limitations and appreciate that it is mentioned here. However, what are those limitations and how they have been dealt with in interpreting the data? Table 1 does state the limitations of each dataset, but not how these limitations were dealt with. In the rest of the document careful use of the word "indication", does caveat the statements made to an extent; however when using such limited datasets the reader should be reminded of these limitations at every point in the document they are used.	As previously mentioned, it has been made clear that the baseline provided in the Technical Note is primarily based on information collected during consultation with fisheries stakeholders. In addition, references to the existing fisheries datasets have been removed from the main text of the Fishing Activity Technical Note. The analysis of these datasets has been compiled under an Appendix "Appendix 7.2. -Existing Fisheries Data", in the updated Fishing Activity Technical Note. The limitations of each dataset have been noted under the relevant sections of Appendix 7.2. In this context it is important to note that the conclusions of the assessment with regards to impacts on fisheries take account of the information provided by fisheries stakeholders during consultation and of the outcomes of the assessment of the impacts of underwater noise on fish presented in Chapter 13 of the 2019 ES Addendum. Furthermore, no conclusions with regard to the potential impact on fisheries are drawn from the analysis of existing fisheries datasets presented in the Fishing Activity Technical Note.
NW IF Letter dated 4th June 2019CA	**3.2.2 Charter Boats** (page 4) NWIFCA query how the following statement was assessed. "This is broadly supported by the observation data (Appendix 8.4) provided by the NW-IFCA which show that between 2014-2018 charter boats have been observed in the Mersey year-round but with marginally more activity observed over the winter months (Figure 15*)." Firstly it is good practice to locate the figure close to where it is mentioned in the text to allow the reader to interpret the figure independently alongside reading the text. The limitations of the observational data are not highlighted and the reader is lead to assess the increase in activity as marginal. Figure 12 is a completely inappropriate representation of the data. Averaging by month and not taking into account observational effort is not robust and renders the figure meaningless. NWIFCA does not consent the use of its data unless full description of its limitations is made.	As previously mentioned, it has been made clear that the baseline provided in the Technical Note is primarily based on information collected during consultation with fisheries stakeholders. In addition, references to the existing fisheries datasets have been removed from the main text of the Fishing Activity Technical Note. The analysis of these datasets has been compiled under an Appendix "Appendix 7.2. -Existing Fisheries Data". The limitations of each dataset have been noted under the relevant sections of Appendix 7.2. The graph with NWIFCA sightings has been removed from the Fishing Activity Technical Note to avoid potential misinterpretation of the data shown. Consequently, the statement *"This is broadly supported by the observation data (Appendix 8.4) provided by the NW-IFCA which show that between 2014-2018 charter boats have been observed in the Mersey year-round but with marginally more activity observed over the winter months (Figure 15*)"* included in the original Fishing Activity Technical Note, has also been removed. Sightings data, as provided by the NWIFCA (in a tabulated format) have been included for completeness within Appendix 7.2 "Existing Fisheries Data" of the updated Fishing Activity Technical Note.

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	*this reference to figure 15 is incorrect, the figure is actually numbered figure 12.	
NW IFCA Letter dated 4th June 2019	**3.4 Seasonality by Species** (page 4) NWIFCA is unsure why the European Federation of Sea Anglers English Species Championship is being described as a claim to fame. Would it not be more appropriate to assess the value that this annual event brings to the Mersey?	The championship was mentioned by stakeholders during consultation and it was noted in the original Fishing Activity Technical Note to further support the importance of the cod fishery in the Mersey. To avoid confusion, the text relating to the championship has been removed in the updated Fishing Activity Technical Note.
NW IFCA Letter dated 4th June 2019	**8.2 MMO Surveillance sightings** (page 5) As is stated in table 1, the MMO have limited surveillance of the inshore and the surveillance they do have does not cover the area of development. As such, it is inappropriate to include it in the report, especially with no accompanying text to remind the reader that the development area has not been surveyed, rather than give the impression that there are no fishing methods employed in the Mersey.	MMO sightings data were included in Appendix 8.2 of the original Fishing Activity Technical Note for completeness, to demonstrate that all relevant available fisheries information had been reviewed. The limitation of the dataset were clearly stated in Table 2 in the original Technical Note, including reference to the fact that it was apparent that the area of the Development was not surveyed by surveillance patrols and therefore the dataset was not considered useful to characterise fisheries in the study area. It should be noted that no conclusions or statements with regards to fishing activity in the Mersey or of the impacts of the Development on fishing were made in the original Fishing Activity Technical Report based on MMO surveillance sightings data. To avoid confusion, and in order to address NWIFCA concerns, the limitations of MMO surveillance sightings have been included in the updated Fishing Activity Technical Note directly above the figure where MMO surveillance sightings are shown.
NW IFCA Letter dated 4th June 2019	**8.4 NW-IFCA Observation Data** (page 5) The heading to table 6 is not an appropriate description of the data. They are not monthly observations, they are observations made by NWIFCA officers when on patrol in the area. The number of times the officers are patrolling the area vary and may not occur on a monthly basis due to other enforcement priorities. NWIFCA does not consent the use of its data unless full description of its limitations is made. NWIFCA comments on figure 12 are stated in the response to section 3.2.2.	The limitations of the NWIFCA sightings data were highlighted in the original Fishing Activity Technical Note in Table 2, in line with the information provided by NWIFCA at the time the sightings data were supplied. An extract of the information originally included in Table 2 is provided below: *"Sightings of charter and commercial vessels recorded by IFCA Conservation Officers on the Mersey. Data does not provide a comprehensive overview of the level of activity as sightings are limited to times when officers are present in the area".* As previously mentioned, to avoid potential misinterpretation, the graph showing NWIFCA sightings data has been removed in the updated Fishing Activity Technical Note to address NWIFCA's concerns. Sightings are now only provided in a tabulated format, exactly as provided by NWIFCA under Appendix 7.2 (section 7.2.4), where the limitations of the data have again been highlighted.
MMO Local Office	I have read through the Brown & May Marine Ltd Liverpool Cruise Terminal Fishing Activity Technical Note and have the below comments to make. In regards to MMO landings data with reference to ICES rectangles, this data may not be accurate as with vessels under 10 metres in length there is no requirement for the rectangles to be reported by the vessel using either logbooks, elogs, AIS or VMS. Therefore is section 8.2 the MMO Surveillance Sightings will probably be only for over 10 metre vessels and not an accurate recording of any under 10 metre vessel. I would like to also provide a comment in relation to 8.4 NW-IFCA Observation data. I cannot comment on whether these figures are accurately presented, I can only assume they are but like to point out that this is not a full representation of fishing activity that active in the River Mersey and Liverpool Bay. These figures are only a snap shot in time when the NW-IFCA patrol vessel has been active and in that particular area at that moment in time.	MMO landings data by ICES rectangles provided by the MMO include records for the following vessel categories: over 15m in length, 10-15m and under 10m vessels. It is however recognised that some level of under reporting may be likely, particularly for the under 10m vessel category. It should be noted, however that the landings data are only presented in the Fishing Activity Technical Note with the intention of identifying overall patterns in the seasonality of fish species in the wider area of the Development, rather than being intended to provide an accurate characterisation of landings by the under 10m commercial fishing vessels active in the study area. The limitations of the NWIFCA sightings data were noted in Table 2 in the original Fishing Activity Technical Note. These have also been noted in the updated Fishing Activity Technical Note under Appendix 7.2.
MMO Local Office	It is indicated that the marine based piling will now take place between July 2019 and April 2020. This is also mentioned in section 13.158 that 167	The Project has committed to installing all piles using rotary auger drilling rather than percussive or vibro-piling methods. Rotary auger drilling is a continuous noise source like shipping noise. The source pressure level (SPL) produced by rotary auger drilling has been calculated for the machinery that will be used for this Project as 163.3 dB re. 1 µPa (RMS) @ 1m (as indicated in ES Chapter 13). For comparison, the SPL of crew boats has been recorded as 166 dB re. 1 µPa (RMS) at 1m (as indicated in ES

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	piles will be drilled into the estuary bed between 28th October 2019 to 23rd July 2020. I have concerns that the long period of drilling will be conducted during the wintering bird season and also the cod season where some commercial, including charter vessels are reliant on the cod fishery. As well as the cod season it may also impact the bass season from April onwards. 13.79 states that a consultation with fisheries stakeholders for the project has indicated that commercial fishermen primarily target the listed species, however I believe that Skates and Rays is targeted throughout the year where increased catches can be seen in April and May and also from October over the Autumn/Winter period, yet this is not mentioned in this section. In the same section there is no mentioned of cod being caught by the charter boats in the Mersey Estuary when this has been highlighted numerous times that his is an important species that they target, in particular between October and March. 13.80 and 13.81 state that beam trawl surveys were conducted in the Mersey Estuary and no fish were recorded at the two sampling stations closest to the site (approximately 1km from the site). Some species were recorded in Autumn 2009 and spring 2010. I would like to state that all species caught by the commercial fleet and charter vessels in the area of the project do not use beam trawls but net and rod and line. Should a survey be conducted using the gear that is commonly used to fish commercially and recreationally in the area of the project to gain a representative sample of what is present and could be caught from these fishing operations. 13.128 The applicant states that fish are highly mobile and any fish physically disturbed by the work due to sediment movement/changes in habitat would be able to avoid the area during periods of disturbance and return to the area if required once disturbance has ceased. This will impact the commercial fisheries and charter vessels as it will potentially drive the fish away from their usual fishing grounds over a very long period of time. The applicant also states in a section below 13.128 that the fish will return when the piling has ceased for the evening. I don't know if this is accurate but I would like to point out that the under 10 metre commercial vessels and charter vessels may not fish in the evenings and may be further impacted due to the sediment movement. 13.157 discusses the various drilling and piling options and mentions that the rotary auger drilling is quieter than the percussion piling and vibro-piling. At the end of this section is states that although no mitigation is proposed for this, as best practice, it is intended that a soft start approach to pile removal or rotary drilling is conducted where possible. I would like this to be considered as a proposed mitigation measure that soft start and the use of the rotary drilling should be used if this is the quieter option and possible may reduce the impact on marine noise and vibrations.	Chapter 13). As such it is considered that this installation method can be quieter than vessels frequenting the Mersey Estuary. Fish may become habituated to continuous noise associated with a range of sources including vessel noise or rotary drilling. For clarity, in relation to the marine piling activities, the operations affecting water borne noise are primarily screwing the steel casing into the seabed and the rotary drilling of the rock socket into the seabed (which is done inside the steel casing). Combining these two activities is anticipated to generate approximately 30 - 35% of the daily working duration, therefore based on a 12 hour working day, this equates to approximately 3 to 4 hours of marine piling activity per working day (i.e. approximately 3 to 4 hours per 24 hour period). The duration of these works is anticipated to be 33 weeks overall. Seasonality of fish in the Estuary has been indicated in ES Chapter 13 and has been considered in the impact assessment in ES Chapter 13. In terms of assessing potential effects on cod and bass we refer to the assessment in ES Chapter 13 and consideration that behavioural effects cover a wide range of responses and the risk that a behavioural effect may occur does not necessarily indicate that fish will flee and not return. Behavioural effects include changes in communication between individuals of the same species, detection of predators and prey, changes in swimming behaviour and orientation, including startle reactions, 'freezing' momentarily, and changing direction, and changes in schooling patterns and distribution. Further, the behavioural response may habituate with repeated presentations of the same sound as indicated above (Popper *et al.* 2014). Further information is provided in our response to NWIFCA above. In relation to Paragraph 13.79 it is noted that skates and rays are targeted throughout the year with increased catches in April and May and over the Autumn/Winter period. There is also mention of cod being caught by charter boats by saying 'in addition to the aforementioned species' in Paragraph 13.79. The data referred to in the local MMO comments regarding beam trawls (paragraph 13.80 and 13.81) is in relation to historical fish catch data which was provided as a source of information for the general fish assemblage in the Mersey Estuary for site characterisation purposes, not just for consideration of commercial/recreationally fished species. It is agreed that to target such species different methods would be deployed. In relation to Paragraph 13.128, any potential disturbance to the fish will be temporary and highly localised and will not cause a significant effect on the fish population. There is no evidence that due to such highly localised and small scale disturbance of sediment that fish would not return to the area for a prolonged period of time. Fish would not have to move far at all to avoid areas of sediment disturbance and fishing is conducted in different areas throughout the Estuary. In response to Paragraph 13.157, soft start procedures will be implemented for drilling of piles and any vibro-extraction.

Cefas – Fisheries Advice Letter dated 7th June 2019	17. It is unclear why the predicted masking effects for all fish groups described in the assessment (13.167 – 13.177) do not correlate with those outlined in Popper et al. (2014). For example, fish with a swim bladder involved in hearing are considered to be at high risk from masking effects in the near, intermediate and far field. However, the applicant's assessment states that there is a 'likely risk that individuals within thousands of metres of the noise source could experience masking effects' but there is no explanation as to why this is so.	This is due to wording. Likely risk can be changed to a 'high risk' in line with Table 7.7 in Popper et al. 2014. The high risk at far field is referred to within Section 7.4 of Popper *et al.* (2014) as being in the 'thousands of metres'.
Cefas – Fisheries Advice Letter dated 7th June 2019	19. The assumption that 'fish are highly mobile... and would be able to avoid the area during periods of disturbance' (point 13.128) is, in my opinion, too generalised. Whilst I agree that fishes are mobile species, and most will exhibit behavioural avoidance reactions if disturbed or threatened, the ability of fish to move away from an impact e.g. noise, is dependent on a variety of physiological factors including motility, size and swimming speed. Slow swimming fish cannot move quickly away from the affected area. Small fish and fish in their larval stages may be less mobile and/or slower and may not be able to move away quickly from an impacted area. Additionally, biological impulses such as seasonal spawning and migration activities may override avoidance reactions so that a fish may be compelled to attempt to pass through an area of impact.	This comment has been noted. It is agreed that different species may vary in relation to how mobile they are. The intention was to indicate that due to adult fish being mobile they would have the ability to move away from the source of disturbance, albeit some species would move more slowly than others and larval fish may be less mobile (unlike sessile organisms which would be unable to move away from any source of disturbance). For individuals being compelled to move through the area of impact they would rapidly pass through any area of disturbance due to the extremely localised potential effects on fish in terms of potential mortality/injury with only behavioural/masking effects likely to be evident hundreds of metres from the source (with effects expected to be reduced with increased distance from the source as noise levels attenuate rapidly with increased distance from the source).
Cefas – Fisheries Advice Letter dated 7th June 2019	29. I recommend that the applicant endeavours to complete vibro-extraction of piles as quickly as possible, ideally by mid-October to avoid prolonged overlap with the cod fishing season which could impact on the local commercial and charter fishing businesses who rely on this catch.	The dismantling of the Jetty is anticipated to take place over a period of 24 weeks by simply pulling and extracting the existing timber piles using a crane mounted on a floating barge. Only if some of the piles prove to be difficult to extract would vibrio–extraction techniques be used. The vibrio-extraction of the piles will only be used as last resort and any pile that is difficult to be extracted will be cut off at the riverbed which will minimise any disturbance to marine life.
Cefas – Fisheries Advice Letter dated 7th June 2019	30. I recommend that good communication channels are maintained between the applicant and both charter and commercial fisherman throughout the period of construction and site development.	Consultation with fishing interests is on-going and will continue during the construction phase to promote co-existence and minimise disturbance to fishing operations. In addition, in the interest of promoting co-existence and cooperation with fisheries stakeholders and minimising disturbance to fishing operations, it is anticipated that a Fisheries Liaison Officer (FLO) would be appointed for the duration of the underwater works, subject to further discussion and agreement with the MMO. The FLO would help maintain open channels for dialogue and communication between commercial fishermen and charter boat skippers and the Developer.
Cefas – Fisheries Advice Letter dated 7th June 2019	31. I recommend that these hours be conditioned on the marine licence in respect of vibro-piling and drilling.	Rotary drilling and socketing will be used for pile installation and no vibro–piling methods will be used for installation of piles in order to minimise underwater noise. In addition, no piling or drilling works would be undertaken between the hours of 19:00 and 07:00.
Cefas – Fisheries Advice Letter dated 7th June 2019	32. For any form of piling used I recommend that a minimum of 20 minutes soft-start procedure is undertaken to allow any potentially affected species in the area time to flee before the higher energies are used. Cefas fisheries advisors recommend a 20-minute soft-start in accordance with Joint Nature Conservation Committee (JNCC) protocol for minimising the risk of injury to marine mammals and other fauna from piling noise (JNCC 2010). Should piling cease for a period greater than 10 minutes, then the soft-start procedure must be repeated.	Soft start procedures will be implemented for any form of piling.
Cefas – Fisheries Advice Letter dated 7th June 2019	33. I note the applicant's proposal to undertake noise monitoring during removal / installation of piles which I support. I recommend that the reporting of this is included to Cefas Fisheries and Noise and Bioacoustics advisors.	Noise monitoring will be undertaken during pile removal and installation activities.
Cefas – Fisheries Advice Letter dated 7th June 2019	35. The applicant has recognised that there is also potential for visual disturbance due to the artificial lighting that will be used during the demolition and construction works. I recommend that, where possible and safe to do so, lighting is directed away from the water, in order to avoid disturbance to fish undertaking	This is agreed.

	nocturnal migrations.	
Cefas – Underwater noise advice Letter dated 11th June 2019	8.iv - Rotary auger drilling of new steel piles: A source level of 163.3 dB re 1 µPa72 has been assumed (para 13.157 in ES addendum). Note, the metric here has not been clarified in the report, and it doesn't appear to have been derived from peer-reviewed sources, but I could not find a copy of the referenced report to confirm this.	Please note that the units should be indicated as 163.3 dB re 1 µPa (RMS). This value is taken from 'Hobbs Associates (2018) Noise and vibration impact assessment of piling work at the new Liverpool Cruise Terminal' produced for the LCT project which can be provided on request.
Cefas – Underwater noise advice Letter dated 11th June 2019	9. It is not clear how the report conclusions have been derived; the source levels for vessels and rotary drilling, and the noise exposure criteria, are based on different metrics.	The assessment of potential effects of continuous noise on fish (e.g. for vessels, drilling, vibro-extraction) does not directly rely on the source levels for vessels and rotary drilling as the noise exposure criteria are not quantitative. Instead, these source levels are used in combination with project details such as the likely duration of exposure, and professional judgement to determine the value and sensitivity of the receptors and magnitude of the impact to determine the overall effect significance.
Cefas – Underwater noise advice Letter dated 11th June 2019	17 and 22. I recommend a condition on the marine licence which stipulates that no piling (rotary drilling works) will be undertaken at night (from 1900 to 0700). I defer comments to Cefas fisheries advisors and the Environment Agency for migratory species in particular.	No piling or drilling works would be undertaken between the hours of 19:00 and 07:00.
Cefas – Underwater noise advice Letter dated 11th June 2019	28. I'm unsure as to how these conclusions have been derived. As stated above, the source level metrics used in the assessment are not consistent with the noise exposure criteria. Permanent Threshed Shift (PTS) and TTS marine mammal noise exposure criteria for continuous sources, as per NOAA (NMFS, 2018), are based on the weighted cumulative Sound Exposure Level (SELcum). NMFS intends for the weighted SELcum metric to account for the accumulated exposure (i.e., weighted SELcum cumulative exposure over the duration of the activity within a 24-h period).	The noise levels used for the assessment for marine mammals were based on the following text in Chapter 13, which was not explicit in the text *Recordings made of a 209 kW Wirth B5 rotary drilling rig (of lower power than those proposed for this Development) recorded underwater noise levels at just over 50m away from source of 127 to 133dB re 1µPa RMS (Root Mean Squared (RMS) sound pressure was averaged over 1 second) and the mean RMS during this period was equivalent to a one second Sound Exposure Level (SEL) of 130dB re 1µPa^{2}s.* The above sound level was used instead of the 163.3 dB re 1 µPa (RMS) considered for the fish so that the units considered were consistent with the marine mammal noise exposure criteria. The SEL for rotary auger drilling of 130dB re 1µPa2s was compared against the criteria for non-impulsive sounds for marine mammals in the NMFS criteria table and was lower than all criteria. For vibro-extraction based on the worst case scenario of vibro-piling (of a 0.30 m diameter steel pipe pile in less than 5 m of water), noise levels for pile extraction of 155 dB re 1 µPa2s (SEL) were compared against the NMFS criteria above. Based on these values, it was determined that there was potential for some TTS effects on high frequency hearing cetaceans in the immediate vicinity of the piling extraction works (i.e. within a few metres). However, this noise level will rapidly attenuate away from the noise source. In addition, it is unlikely that harbour porpoise (the only high frequency hearing cetacean potentially present) will be close to the site during construction and individuals could readily move away from the source of the noise if required.
Cefas – Underwater noise advice Letter dated 11th June 2019	29. As an additional precautionary measure, it would be beneficial to have a marine mammal observer in place for the piling works, as this would likely help minimise the risk of potential impact.	This can be agreed, subject to further discussion with and guidance from the MMO.

Appendix 13.12a: Fishing Activity Technical Note

LIVERPOOL CRUISE TERMINAL

Fishing Activity Technical Note

July 2019

Brown & May Marine Ltd.

LIVERPOOL CRUISE TERMINAL

Fishing Activity Technical Note

Undertaken by

Brown & May Marine Limited

Ref	Rev.	Author	Date	Checked	Sign off
WTRMN_CFB_01RC	Draft 1.0	PD	13/03/2019	SX	SJA
WTRMN_CFB_01RC	Final 1.0	PD	02/04/2019	SX	SJA
WTRMN_CFB_01RC	Final Rev.	SX	22/07/2019	SX	SJA

Cover photo: Brown & May Marine Ltd.

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Glossary

Term	Definition / Description
AIS	Automated Identification System
ICES	International Council for the Exploration of the Sea
NW-IFCA	North-western Inshore Fisheries and Conservation Authority
MMO	Marine Management Organisation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest

1.0 Introduction

This report provides a baseline characterisation of fishing activity in the River Mersey, with a particular focus on areas relevant to the redevelopment of the Liverpool Cruise Terminal (the Development). This has been primarily based on the information gathered by Brown and May Marine (BMM) during consultation with local fisheries stakeholders.

In addition, taking account of the fisheries information gathered and of the outcomes of Chapter 13 of the 2019 Environmental Statement (ES) Addendum, this report considers the potential for works associated with the Development to result in impacts on fishing activities.

For the purposes of this report only fishing activities undertaken by commercial fishermen (defined as fishermen that capture finfish and shellfish from a licensed fishing vessel to be sold for profit) and those carried out by charter boat operators are considered. Both activities are of socio-economic importance in the Mersey.

1.1 Project Background

The existing cruise terminal was opened as a "stop-off" only terminal in 2007, before being licensed for "turnaround" cruises with the addition of temporary facilities in (BBC, 2012). To cater for anticipated growth in the cruise sector (both in vessel size and passenger numbers), the temporary terminal is to be redeveloped with permanence in mind.

The following construction and maintenance activities are anticipated in relation to the Development:

- the demolition of the existing timber and concrete decked jetties (known as Princes Jetty);
- the construction of a reinforced concrete suspended deck together with the creation of a new terminal building, with a gross floor area of approximately 10,000m², for use as a baggage hall, passenger lounge(s) and other associated facilities;
- the construction of a vehicular and pedestrian linkspan bridge approximately 85 metres in length connecting the new terminal building with the existing landing stage;
- the construction of a new floating pontoon approximately 20 metres in length connecting the new linkspan bridge with the existing landing stage;
- modifications to the existing landing stage, including the removal and relocation of the existing pilot boat launch facility, works to the existing walkway cover, the existing lower terminal buildings and the existing linkspan bridge; and
- the removal of existing and the construction of new steel mono pile mooring dolphins.

1.2 Study Area

The Mersey is predominantly a sandy estuary, with fine sediment occurring in places along its inner margins (Ridgway *et al.*, 2012). The Mersey estuary is designated as a Special Protection Areas (SPA), Ramsar Site and a Site of Special Scientific Interest (SSSI). The banks of the Mersey estuary are subject to major industrial centres (e.g., Liverpool, Birkenhead, Bromborough, Ellesmere Port, Runcorn), whilst further inland the river drains highly urbanised catchment areas such as Manchester and Stockport (amongst others).

The Development is located on the east bank of the Mersey, centrally in Liverpool's UNESCO (World Heritage Buffer Zone Site) accredited waterfront. Figure 1 provides a view of the Development site (Figure 4 in Appendix 7.1 provides an alternative view). At this locality the river is approximately 970m wide (Aecom, 2017) and is considered to represent the narrowest part of the estuary.

Figure 1: Development area (image courtesy of Peel Land and Property (Ports) Ltd – provided by Liverpool City Council)

1.3 Data and Information Sources

The baseline characterisation of fishing activity presented in this report has been primarily derived from information gathered during consultation with local fisheries stakeholders. Consultation meetings were undertaken with a range of fisheries stakeholders in November 2018 to obtain information on preferred fishing areas and operating patterns and to discuss potential concerns relating to the Development. A list of consultees, along with dates of meetings is provided in Table 1.

Table 1: Consultation undertaken with fisheries and relevant stakeholders

Consultee	Role, Organisation	Date / Method
Charter Boat 1	Charter Boat Skipper	22/11/2018; Meeting in Rhyl
Charter Boat 2	Charter Boat Skipper	22/11/2018 Meeting in Rhyl
Charter Boat 3	Charter Boat Skipper	23/11/2018 Meeting in Liverpool
Charter Boat 4	Charter Boat Skipper	23/11/2018 Meeting in Liverpool
Charter Boat 5	Charter Boat Skipper	23/11/2018 Meeting in Liverpool
Fisherman 6	Commercial Fisherman	23/11/2018 Meeting in Liverpool
Fisherman 7	Commercial Fisherman	23/11/2018 Meeting in Liverpool
Fisherman 8	Former Commercial Fisherman / entering charter boat business	23/11/2018 Meeting in Liverpool
MMO	Marine Enforcement Officer	23/11/2018 Meeting in Liverpool
NW IFCA	Marine Officer	19/11/2018 Telephone conversation
Peel Ports	-	Contacted by both email and phone. No response received.
Liverpool Pilot Services	-	As above

Whilst there are a number of fisheries datasets of relevance to the Mersey Estuary and coastal areas in its proximity (i.e. landings data, surveillance sightings, AIS data, etc) these are subject to various limitations and do not allow for characterisation, to the required level of detail, of fishing activity in discrete, small inshore areas such as that where the Development is to be located. Available fisheries datasets have been reviewed to provide context, for completeness, and are provided in Appendix 7.2, including a description of their limitations.

2.0 Fisheries Baseline

2.1 Overview

Whilst the Mersey saw a decline in commercial fishing activity in the mid-1900s (Jones, 2006; Porter, 1973) due to pollution from industrial activity in surrounding cities (Potts & Swaby, 1993); significant improvements in water quality since the 1970/80s (NRA, 1995) have resulted in the recovery of fish populations which currently support commercial fishing and charter boat operations.

From consultation with fisheries stakeholders (Section 1.3) it is understood that up to ten charter boats are active in the area at varying degrees. Of these, six operate on a full-time basis. In addition, two commercial fishermen are known to operate in the Mersey.

The commercial fishermen primarily target cod, bass and flatfish (flounder, plaice, sole, dab, brill and turbot) within the bounds of the Mersey whilst some potting for shellfish occurs beyond the river mouth. In addition to the aforementioned species, charter boats frequently catch species such as ling, conger eels, pollack, gurnard, rays, tope, whiting, bull huss, lesser spotted dogfish, smooth hound, mackerel, and pouting.

2.2 Vessels and Operating Practices

2.2.1 Commercial Fishermen

The two commercial fishermen identified during consultation as active in the Mersey operate a range of fishing gears from small vessels (multipurpose vessels, 5 to 6 m in length). A summary of the specifications of the vessels used by these two commercial fishermen is given in Table 2.

Gear deployed within the Mersey includes hook and line, long line and gill nets; with pots/creels being deployed beyond the river mouth (see Appendix 7.3 for further information on these techniques).

Commercial fishermen reported that they had recorded 32 different fish species in the Mersey, whilst the majority of their earnings (from fish within the Mersey) come from cod, bass and flatfish. Flounder in particular constitute a significant proportion of their catch at present, with approximately 30 tonnes reported to have been caught in the river within the last year by one of the fishermen consulted.

Table 2: Vessel specifications and summary of fishing activity reported by commercial fishermen during consultation

Vessel Specifications		
Length (m)	5	6
Beam (m)	2	2.4
Engine (HP)	28	80
Range (miles)	6	15
Crew	2	2
Fishing Activity		
Days spent fishing per year	c.200	c.130
Days fishing the Mersey per year	c.200	c.130
Days at sea allocation	212	130
Typical trip duration	4-12 hours	4-12 hours
Principal fishing methods	Drift/Static nets, rod & line	Nets, rod & line, pots

2.2.2 Charter Boats

From consultation with charter boat operators it is understood that there are six full-time charter boats operating in the area.

Of these, two operate from Liverpool all year round, whilst three only operate from Liverpool between November to March being based out of ports in North Wales for the rest of the year. The sixth boat has been operating from Plymouth and other UK locations in summer months in recent years, however the intention to operate all year round from Liverpool in future years was noted during consultation.

In addition to the full-time vessels noted above, up to 3-4 charter vessels are thought to operate out of Liverpool on a part-time basis. In addition, the intention for a new vessel to enter the charter boat market was noted during consultation.

Charter boat activity within the Mersey is constrained by tidal influences. Firstly, the tidal lock at Liverpool Marina dictates sailing times, whilst their ability to fish is limited to conditions below 29ft tides due to the strength of tidal flow. As a result, trips usually run 9-10 days straight followed by a couple of days off. A stricter "week on: week off" schedule to work around the spring tides was reported by some of the skippers consulted.

Whilst from consultation it is understood that fishing occurs within the Mersey year-round, the level of dependency on the river estuary would be expected to be higher over the winter. As outlined on the websites of various of the charter boats active in the Mersey, during the summer, trips are offered for wreck and reef fishing and therefore outside of the Mersey. It is understood, however, that charter vessels based in Liverpool may stop off within the Mersey on the way out to/back in from offshore grounds.

The year-round activity of charter vessels in the Mersey was also noted by the MMO during consultation, as well as the fact that activity during the summer generally extends to Liverpool Bay, including areas near the wind farms and beyond.

Vessel details and operating practices reported by charter boat skippers during consultation are summarised in Table 3.

Table 3: Vessel specifications and summary of fishing operations reported by charter boat skippers during consultation (information was provided by 5 skippers)

Vessel Specifications					
Length (m)	10	13.5	10.5	10	8
Beam (m)	5	4.87	4.1	3.6	4
Engine (HP)	500	615	320	450	400
Range (miles)	/	60 mile-Cat2	60 mile-Cat2	/	/
Crew / Passenger Capacity	/	12 + 2 crew	12	12	12
Charter Operations					
Days spent fishing per year	c.150	c.180	c.85	c.180	c.180
Days fishing the Mersey per year	c.150	c.85	c.85	c.45	c.45
Typical trip duration	10 – 12 hrs	9 – 12 hrs	8 – 10 hrs	9 hrs	5 – 12 hrs
Principal fishing methods	Rod & Line	Rod & Line	Rod & Line	Rod & Line	Rod & Line

2.3 Principal Fishing Grounds / Fishing Locations

2.3.1 Commercial Fishermen

Fishing grounds in the vicinity of the Development, as derived from consultation with local commercial fishermen known to be active in the Mersey, are shown in Figure 2.

One of the commercial fishermen consulted reported that he fishes the entire geographical expanse of the Mersey Estuary – from Runcorn up to the river mouth. Potting is also reported to be undertaken beyond the river mouth.

The distribution of species making up the principal catches (bass, cod, and flatfish) were reported to be fairly even across the identified grounds, although flounder in particular is understood to be caught in greater numbers within the inner reaches of the estuary.

From consultation with the MMO, it is understood that fishing activity by these vessels, given their small size and associated operational range, is highly weather dependent and confined for the most part to inshore areas close to shore (i.e. within the 6nm limit and generally within the Mersey).

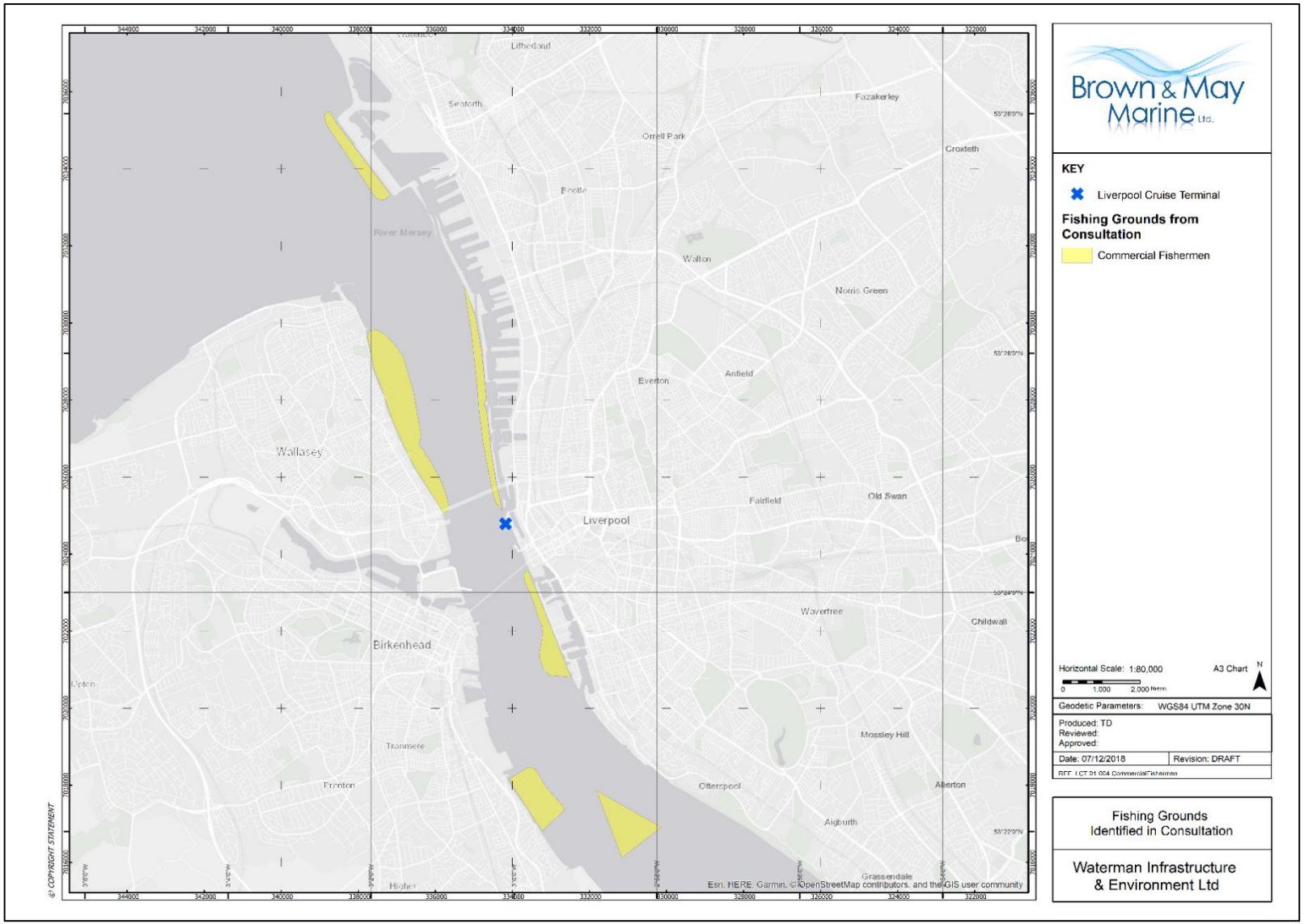

Figure 2: Main fishing grounds in the vicinity of the Development as identified by commercial fishermen during consultation

2.3.2 Charter Boats

Fishing locations in the vicinity of the Development, as derived from consultation with local charter boat operators, are shown in Figure 3. Weather permitting, summer trips (April – September) will typically go beyond the bounds of the Mersey, stopping off within the Mersey on route to or from these grounds. Trips may also operate within the Mersey during the summer, if requested by clients (it was noted that these are cheaper trips due to reduced fuel expenditure).

Charter boat skippers consulted noted that besides the increased availability of cod in the Mersey during the winter months (October – March), fishing within the Mersey at this time of year benefits from the 'weather sanctuary' provided by the geography of the estuary, which is also occasionally called on during the summer season.

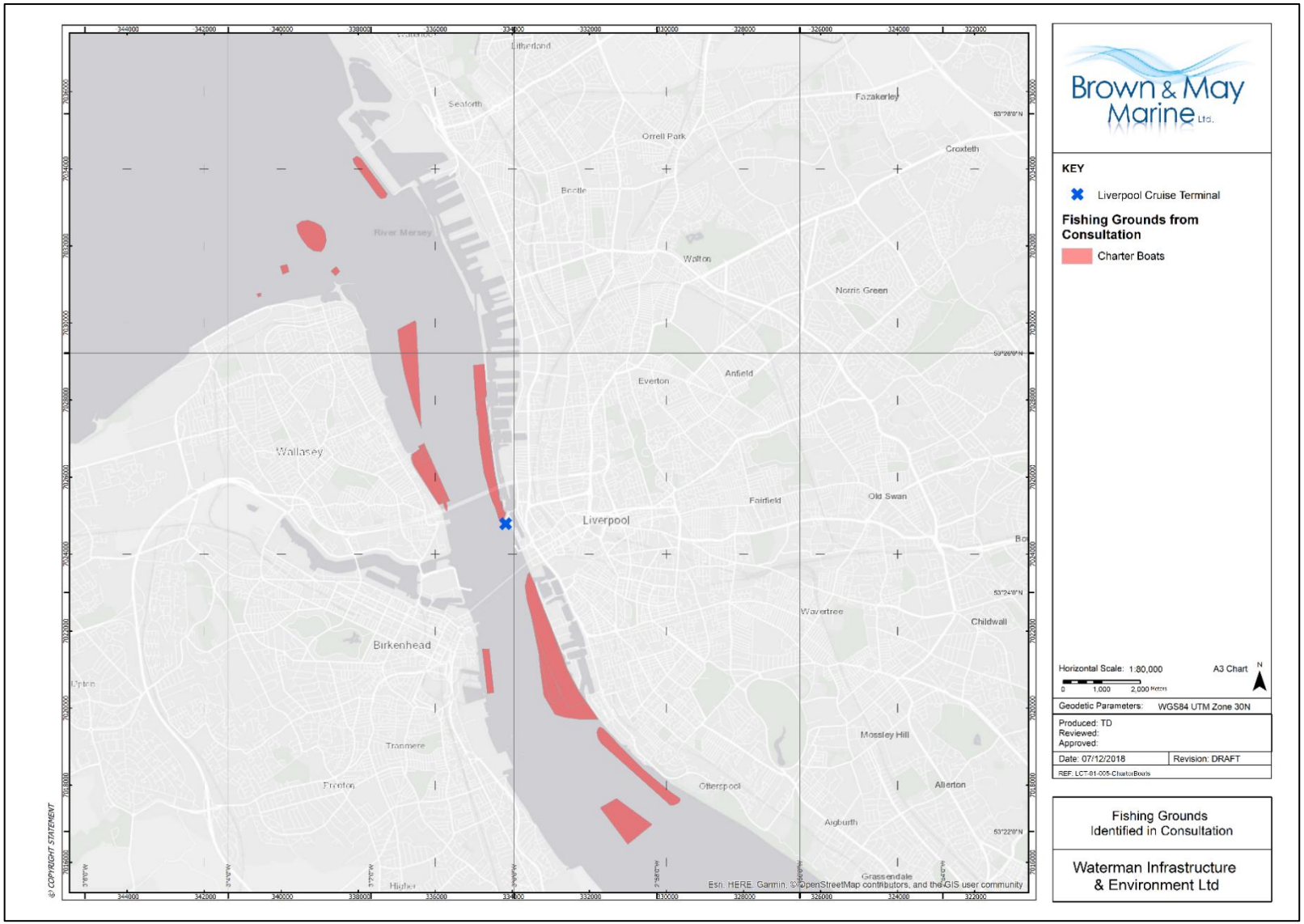

Figure 3: Main fishing grounds in the vicinity of the Development as identified by charter boat operators during consultation

2.4 Seasonality by Species

Commercial fishermen reported the following seasonality for their catches within the Mersey:

- Bass: March – November;
- Cod: October – May;
- Flatfish: March – January.

As previously mentioned, charter boat winter fishing (October – March) is primarily focused on cod within the bounds of the Mersey Estuary. Other common winter catches include whiting, dabs and thornback rays.

Charter boat summer species can include: ling, conger eels, pollack, gurnard, rays, tope, whiting, bull huss, dogfish, smooth hound, dabs, plaice, turbot, bass, mackerel, pouting, coley, and flounder. It should be noted that this seasonality is not clear-cut and species may be caught outside of their primary season.

3.0 Key Concerns Raised by Stakeholders

From consultation with commercial fisheries stakeholders, it is understood that the key issue of concern is piling noise, particularly that associated with impact piling which is perceived to have adversely affected fisheries in the wider area following other developments, particularly offshore wind farm developments such as Gwynt-Y-Mor and Burbo Bank and the L2 Seaforth Container Terminal.

A summary of the rationale for stakeholders' concerns is provided in Table 4.

Table 4: Concerns raised by stakeholders during consultation

Impacts of Concern
Underwater noise could create a "barrier" across the extent of the Mersey that could stop fish penetrating further upstream.
Concern that piling noise can scare fish kilometres away – in line with studies on the effects of noise from impact piling, such as that associated with offshore wind farm construction activities.
Some of the best cod grounds are located in the immediate vicinity of areas where piling may take place. At the Development site, the seabed is made up of mussel beds, hard ground and sandstone which support spawning cod in an area considered to be one of the best fishing spots for cod in winter and fishing for smooth hound, rays and conger in summer.
It is perceived that if catches in charter boats are reduced as a result of underwater noise, word would get out (an effect amplified by social media) that fish are not being caught resulting in an impact on bookings and/or client satisfaction.

4.0 Potential Impact of the Development on Fishing Activity

As noted above (Section 3.0), of key concern to fisheries stakeholders is the potential for underwater noise associated with the installation of the piles at the Development. Concern regarding piling noise has resulted in a number of fisheries stakeholders taking objection to the Development.

In this context it is important to note that since the publication of the Development's Environmental Statement (ES), and taking account of the concerns raised by fisheries stakeholders, the project construction design has been revised and impact piling is no longer considered an option in relation to the installation of the piles. Lower noise generating methods have been proposed instead and their impact on fish has been assessed in Chapter 13 of the 2019 ES Addendum. In addition to noise associated with pile installation, the updated Addendum chapter considers noise resulting from the removal of the current piles and from increased vessel traffic during the works.

In respect of pile installation, the method currently considered and included for assessment in Chapter 13 of the 2019 ES Addendum is rotary pilling (drilling) of the steel tubular piles. It should be noted that this construction method is much quieter than either percussion (impact) piling or vibro-piling.

With regards to pile removal, for the purposes of the assessment presented in Chapter 13 of the 2019 ES Addendum, the assumption was made that piles may be removed using vibro-extraction. Pile removal using this method would generate noise levels lower than those resulting from pile installation, however, in the absence of available noise measurements for pile removal using this technique, and taking a conservative approach, the assessment in Chapter 13 was based on source noise levels for installation of piles by vibro-piling. Note that vibro-extraction of piles is only anticipated to be used for 50% of the piles or less. In addition, pile extraction would be expected to occur within a window from 1st May to 18th October 2019 (24 weeks) and therefore for the most part would avoid the main cod fishing season.

Considering the noise levels associated with the activities identified above (vessel noise, vibro-piling and rotary drilling) the assessment presented in the updated Chapter 13 concluded that the impact of underwater noise on fish would be of negligible significance. This took account of the localised areas where behavioural impacts are likely to occur as a result of noise from the proposed activities (i.e. the relative risk of behavioural effects would be highest within tens of metres from the noise source, with lesser risk of impact beyond this distance). In addition, it considered the intermittent and temporary nature of pile installation and removal activities, noting that there would be extensive windows each day where no vibro-extraction or drilling activity would be undertaken.

From the information provided above it is apparent that there would be little potential for noise associated with construction works to result in a significant impact on the commercial and charter boat fisheries active in the Mersey.

It is recognised that behavioural impacts on fish could result in changes in the distribution of target species and that this could in turn affect fishing operations. However, as described in Chapter 13 of the 2019 ES Addendum, the areas where it would be likely that the noise levels reached could trigger behavioural responses, would be very small. Furthermore, considering the localised area of impact

and the width of the estuary in the area of the Development (approx. 970m) underwater noise would not be expected to result in a barrier to fish movement in and out of the estuary.

Taking the above into account together with the extent of areas that the charter and commercial fishermen target in the Mersey (Figure 2 and Figure 3) it is not anticipated that commercial or charter boat fishing activities would be significantly affected by the proposed works.

5.0 Mitigation and Monitoring

As discussed in Chapter 13 of the 2019 ES Addendum, rotary drilling has been implemented as an inherent mitigation measure to minimise the levels of noise and vibration during construction of the Development.

In addition, in the interest of promoting co-existence and cooperation with fisheries stakeholders and minimising disturbance to fishing operations, it is anticipated that a Fisheries Liaison Officer (FLO) would be appointed for the duration of the underwater works, subject to further discussion and agreement with the MMO. The FLO would help maintain open channels for dialogue and communication between commercial fishermen and charter boat skippers and the Developer.

Considering this, together with the information provided in Section 4.0 and in Chapter 13 of the 2019 ES Addendum, further mitigation measures in respect of potential impacts on fish species in the Mersey and on the fisheries that target them, are not deemed necessary.

With regards to monitoring the following is proposed:

- Conduct underwater noise monitoring during demolition/construction phases, as appropriate.

6.0 References

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7.0 Appendices

7.1 Alternative View of Development Area

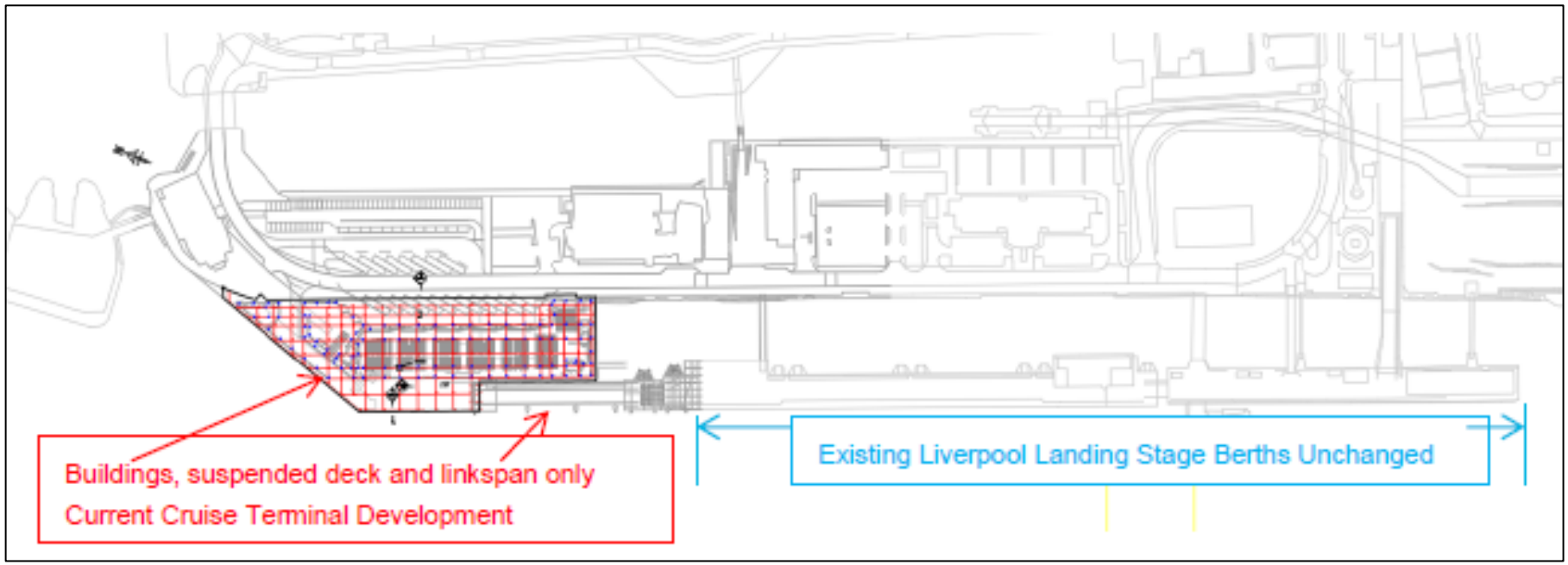

Figure 4: Development Area (image from Navigational Risk Assessment (Ref: LCT-ACM-XX-GE-RP-MT-00002)

7.2 Existing Fisheries Data

7.2.1 AIS Data

An indication of the spatial patterns of operation of four of the charter boats known to be active in the Mersey are given in**Error! Reference source not found.** Figure 5[1] and**Error! Reference source not found.** Figure 6 based on AIS tracks for November 2017 – November 2018.

AIS data was sourced from Big Ocean Data by BMM.

It should be noted that there is no requirement for small vessels to carry AIS transponders and as transmissions may be turned off, the data may only provide partial coverage of a vessel's positions.

In correlation with the information gathered during consultation, however, the AIS data analysed suggest a heavier reliance on / use of the Mersey Estuary over the winter months (October to March); particularly in the case of the two of the vessels shown in Figure 6 which operate from Rhyl during the summer.

[1] The AIS for one of the vessels can be seen to go off chart (Figure 5**Error! Reference source not found.**) which coincides with information imparted by the vessel's skipper in consultation (operates elsewhere in the UK for periods of the year), whilst the blue line to the south-east relates to an AIS return 'pinged' from near Rostock in the Netherlands which is understood to be an error.

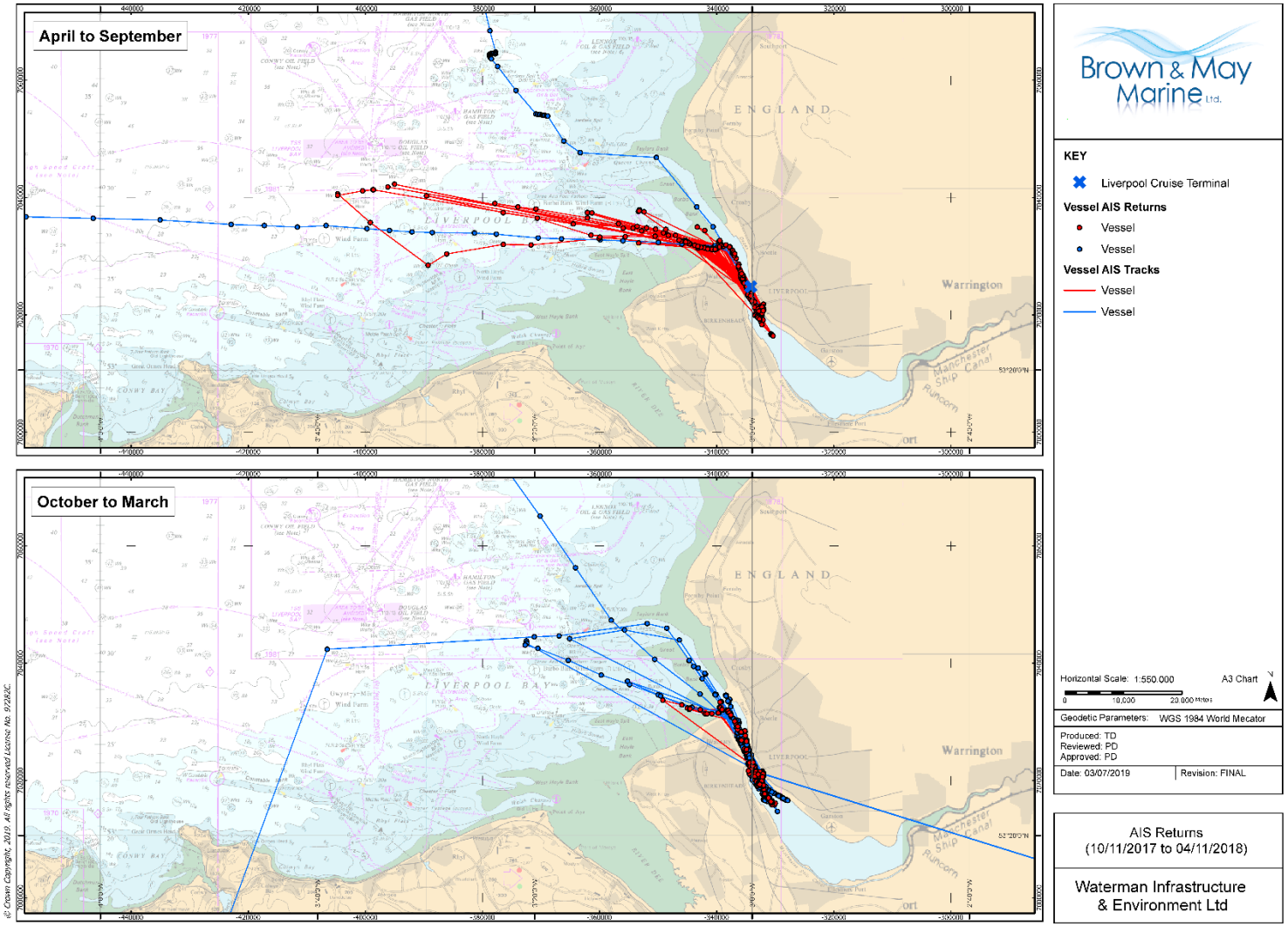

Figure 5: AIS returns showing operations of two charter boats over the past year (Nov 17 – Nov 18)

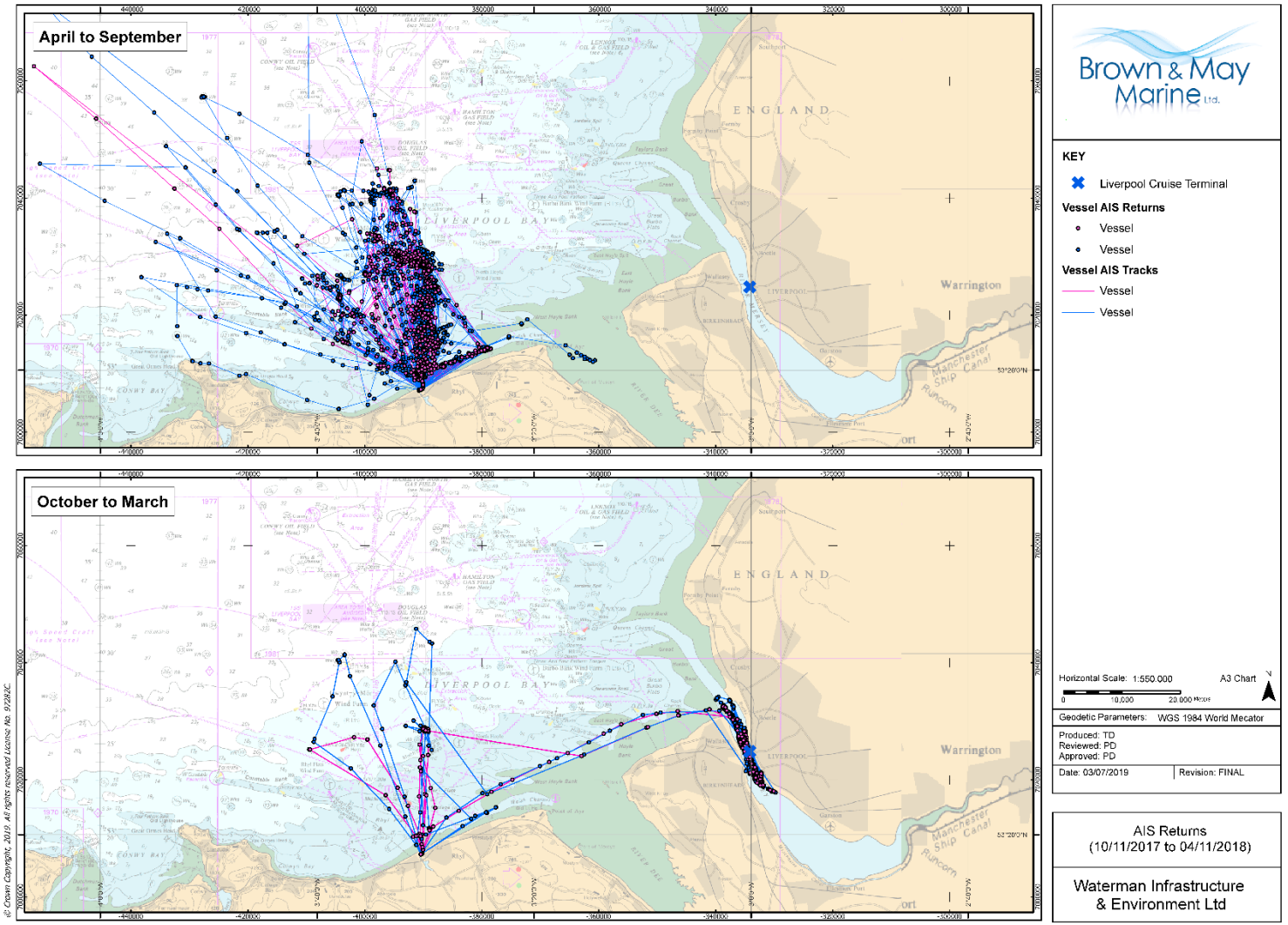

Figure 6:AIS returns showing operations of two charter boats over the past year (Nov 17 – Nov 18)

7.2.2 MMO Landings Data (2012 – 2016)

The MMO records landings data at the International Council for the Exploration of the Sea (ICES) rectangle scale. Given the large geographical scale at which the data are collected and the comparatively small and localised area of the Development, this dataset does not provide a representative indication of fishing activity in the area of the Development.

The dataset is however useful to identify the principal species which are landed in the wider area surrounding the Development and the seasonality of the landings.

MMO landings data for the ICES rectangles where the Development is located (Figure 7**Error! Reference source not found.**; 35E6, 35E7[2]) and adjacent rectangles (36E6, 36E7) have therefore been analysed to provide an indication of the general seasonality of some of the key species targeted in the Mersey (Figure 8).

[2] Note that no landings of fish species have been recorded in the MMO statistics in rectangle 35E7 in the period under consideration and therefore data for this rectangle has not been included in Figure 7.

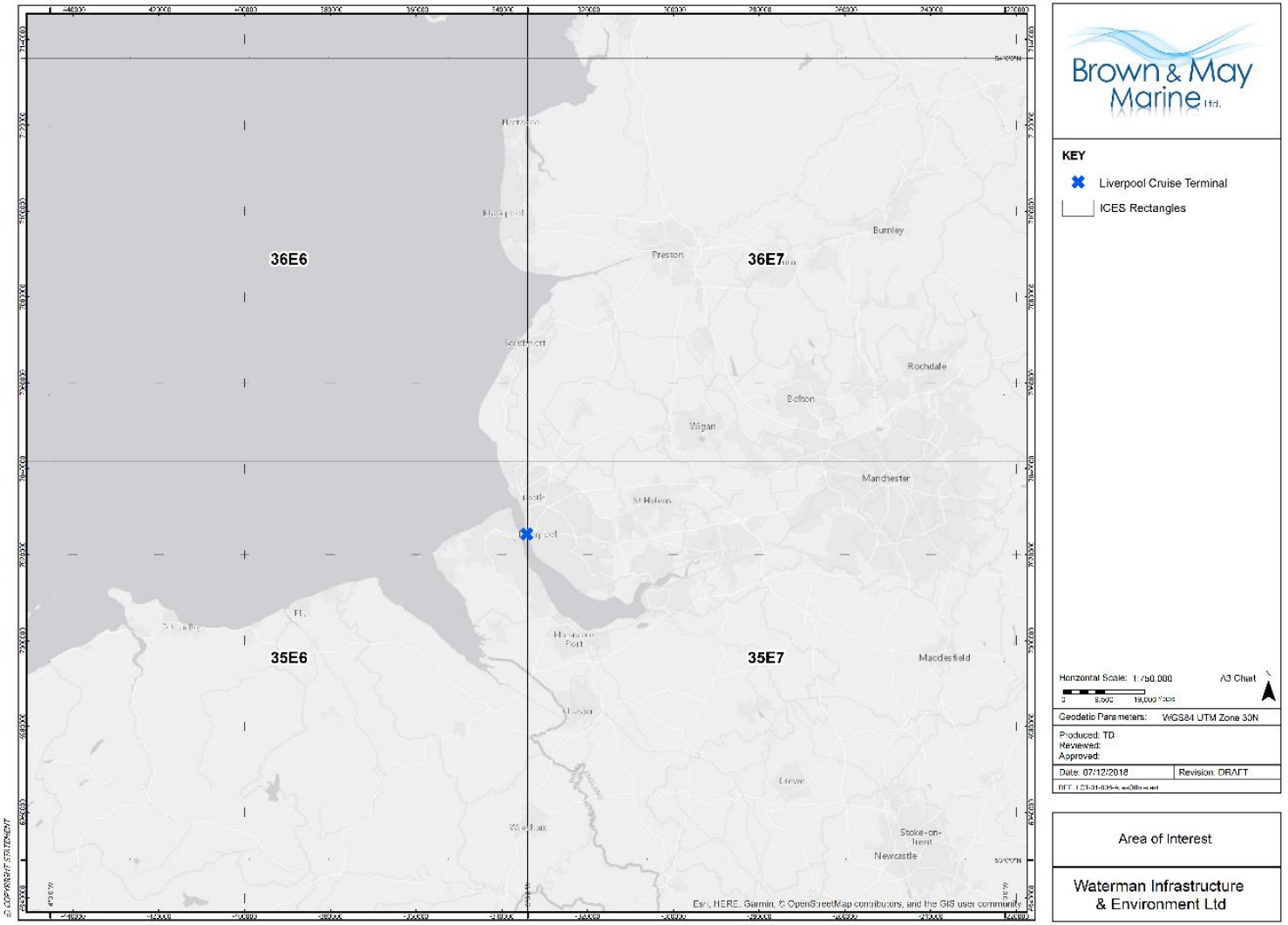

Figure 7: Location of ICES rectangles in the proximity of the Development

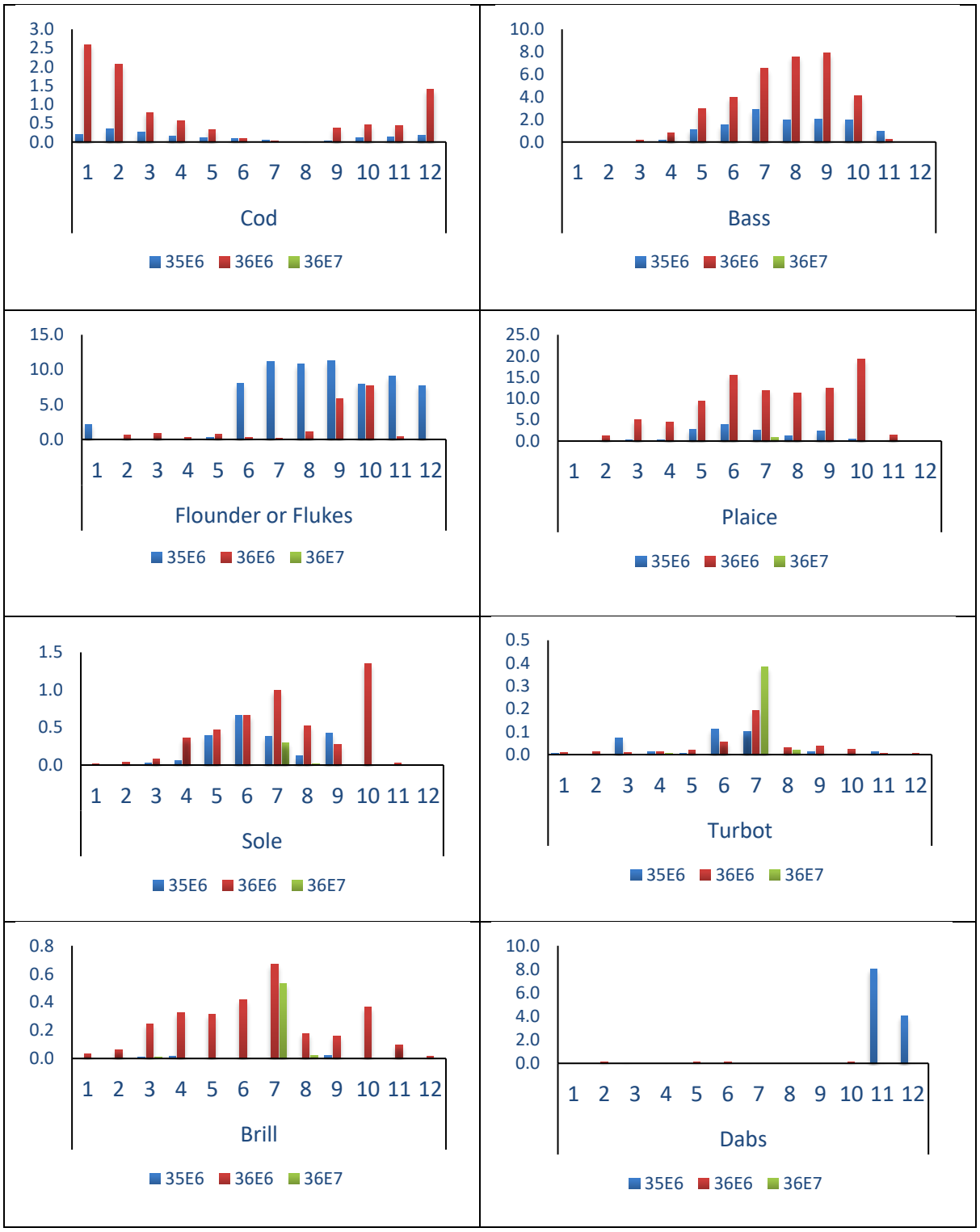

Figure 8: MMO monthly landings (tonnes) by ICES rectangle (average 2012-2016)

7.2.3 MMO Surveillance Sightings (2001 -2015)

This dataset provides sightings of commercial fishing vessels recorded by MMO surveillance patrols. Whilst the dataset does not provide quantitative information on the level of fishing activity, it provides an indication of the overall distribution of fishing activity by fishing method. Analysis of MMO surveillance sightings for the period 2001 to 2015 (Figure 9) suggest that the area where the Development is located is not generally surveyed, therefore does not provide useful information to characterise the baseline in the localised area of the Development.

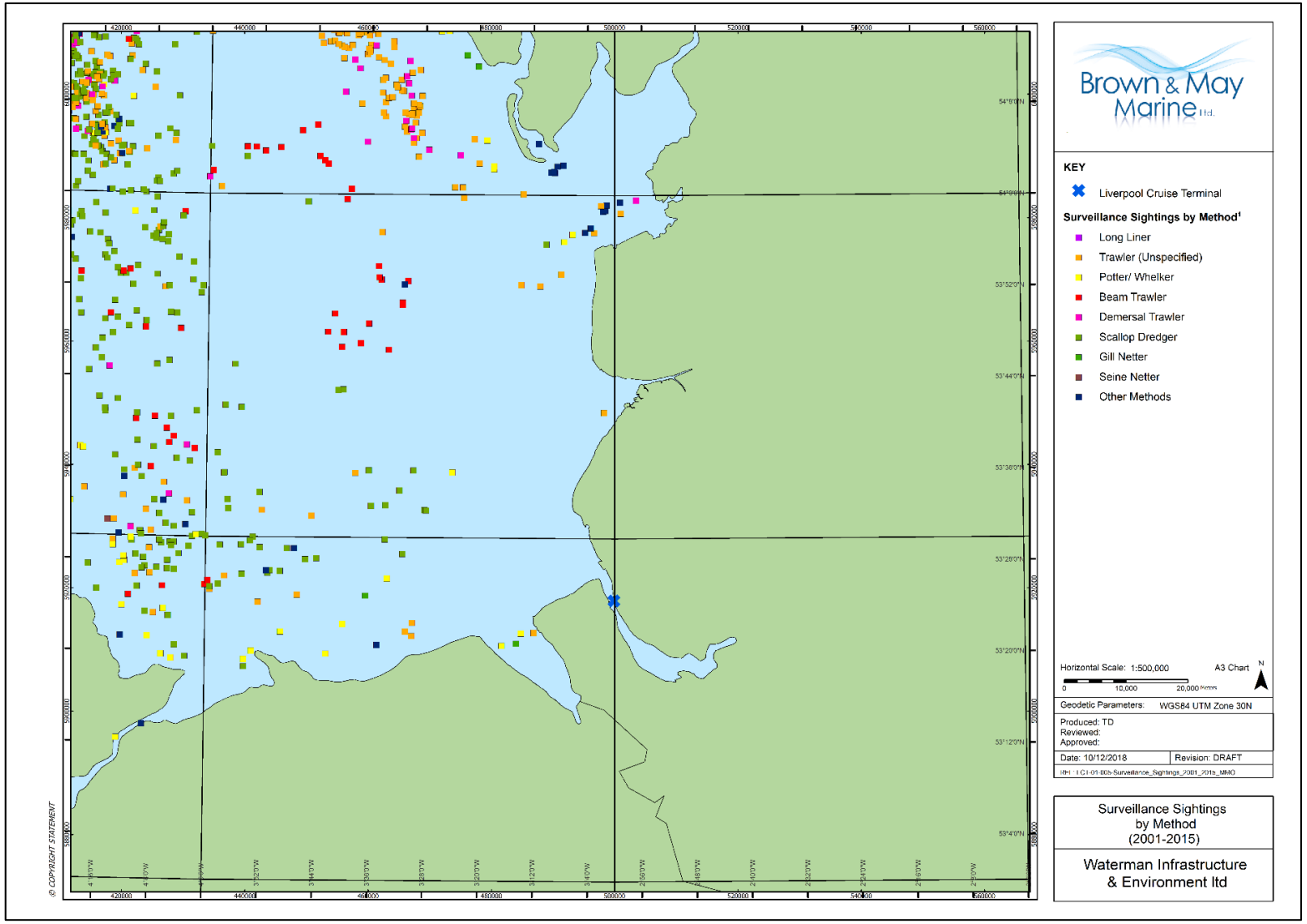

Figure 9: MMO Surveillance Sightings 2001 - 2015

7.2.4 NW-IFCA Observation Data

The data shows sightings of charter and commercial vessels recorded by NW-IFCA Conservation Officers on the Mersey. It should be noted that this data does not provide a comprehensive overview of the level of activity as sightings are limited to times when officers are present in the area.

This data does however support that both charter vessel skippers and commercial fishing vessels are active within the Mersey.

Table 5: Sightings of vessels in the Mersey for the period May 2014 – July 2018 (NW-IFCA, 2018)

Date	Number of vessels	Vessel type	No. of vessels fishing/steaming	No. moored	No. of the moored boats that are in Liverpool Marina	Estimated no. of anglers on board each vessels fishing
13/05/2014	5	Charter	0	5	3	N/A
17/06/2014	2	Charter	0	2		N/A
17/06/2014	1	Commercial	0	1		N/A
07/07/2014	3	Charter	1	2		Unknown
31/07/2014	5	Charter	0	5	2	N/A
04/08/2014	5	Charter	0	5	2	N/A
08/08/2014	1	Charter	1	0	1 (leaving Liverpool Marina)	8
10/10/2014	0	N/A	0	0		N/A
13/10/2014	0	N/A	0	0		N/A
27/10/2014	6	Charter	0	6	6	N/A
03/11/2014	6	Charter	0	6	6	N/A
10/11/2014	2	Charter	0	2		N/A
18/11/2014	3	Charter	3	0		Unknown
24/11/2014	6	Charter	0	6	6	N/A
28/11/2014	5	Charter	1	4	4	6
23/12/2014	5	Charter	0	5	6	N/A
20/01/2015	5	Charter	0	5	6	N/A
27/02/2015	4	Charter	0	4	4	N/A
08/04/2015	1	Charter	0	1		N/A
08/05/2015	1	Charter	0	1		N/A
13/05/2015	1	Commercial	1	0		N/A
14/05/2015	1	Charter	1	0		6
11/06/2015	2	Charter	2	0		Unknown
15/06/2015	1	Charter	1	0		7
29/06/2015	1	Charter	0	1		N/A
01/07/2015	1	Charter	1	0		8
11/08/2015	5	Charter	2	3	2	8-9
21/09/2015	6	Charter	0	6	5	N/A
21/09/2015	1	Commercial	0	1		N/A
03/10/2015	1	Charter	1	0		10

Date	Number of vessels	Vessel type	No. of vessels fishing/steaming	No. moored	No. of the moored boats that are in Liverpool Marina	Estimated no. of anglers on board each vessels fishing
15/10/2015	3	Charter	3	0	1 (approaching Liverpool Marina)	Unknown
09/11/2015	1	Charter	1	0		6
26/11/2015	9	Charter	0	9	9	N/A
04/12/2015	1	Charter	1	0		6
08/12/2015	7	Charter	6	1	2	Unknown
14/12/2015	2	Charter	2	0		11
06/01/2016	3	Charter	2	1	1 (leaving Liverpool Marina)	8-9
16/01/2016	4	Charter	4	0		9-11
17/05/2016	1	Charter	1	0		2
24/05/2016	4	Charter	0	4	4	N/A
04/06/2016	1	Charter	1	0		Unknown
09/06/2016	1	Charter	1	0		Unknown
14/08/2016	2	Charter	2	0	2 (leaving Liverpool Marina)	19
16/08/2016	1	Charter	1	0		Unknown
18/08/2016	6	Charter	0	6	6	N/A
27/08/2016	1	Charter	1	0		7
28/08/2016	2	Charter	2	0		2-8
13/09/2016	1	Charter	1	0		8
25/09/2016	6	Charter	0	6	6	N/A
06/10/2016	6	Charter	0	6	6	N/A
20/10/2016	6	Charter	0	6	6	N/A
23/10/2016	7	Charter	2	5	5	8-9
03/11/2016	8	Charter	0	8	8	N/A
06/11/2016	2	Charter	2	0		Unknown
11/11/2016	2	Charter	2	0		6-8
22/11/2016	4	Charter	4	0		6-8
24/11/2016	3	Charter	3	0		Unknown
28/11/2016	7	Charter	0	7	7	N/A
06/12/2016	2	Charter	2	0		6-8
07/12/2016	3	Charter	3	0		6-8
08/12/2016	3	Charter	3	0		6-8
12/03/2017	4	Charter	0	4	4	N/A
25/05/2017	1	Charter	0	1		N/A
05/08/2017	1	Charter	1	0		Unknown
27/08/2017	3	Charter	1	2		10
25/09/2017	3	Charter	0	3	3	N/A

Date	Number of vessels	Vessel type	No. of vessels fishing/steaming	No. moored	No. of the moored boats that are in Liverpool Marina	Estimated no. of anglers on board each vessels fishing
25/10/2017	2	Charter	1	1		Unknown
13/11/2017	3	Charter	0	3	3	N/A
15/11/2017	3	Charter	3	0		10
17/11/2017	2	Charter	1	1		5
19/11/2017	2	Charter	2	0		5
28/11/2017	5	Charter	5	0		8
30/11/2017	4	Charter	4	0		10
12/12/2017	3	Charter	3	0		10
12/01/2018	6	Charter	6	0		Unknown
13/01/2018	4	Charter	4	0		Unknown
14/01/2018	6	Charter	6	0		8-9
25/01/2018	1	Charter	1	0		5-8
26/01/2018	2	Charter	2	0		10-15
12/04/2018	3	Charter	3	0		Unknown
05/05/2018	2	Charter	1	1		3
15/05/2018	1	Commercial	0	1		N/A
15/05/2018	3	Charter	0	3	3	N/A
18/05/2018	1	Charter	0	1		N/A
02/06/2018	1	Charter	0	1		4
10/06/2018	2	Charter	2	0		7-10
14/07/2018	1	Charter	1	0		Unknown

7.3 Gear Types and Operating Practices

7.3.1 Hook & line

This is fishing in its most basic form and most popular for angling (charter boat) use. A single baited (or imitation lure) hook is attached to a weighted monofilament line that is released or cast from a spool on a rod. Boat rods are typically shorter and stouter rods geared to the rigours (the fight) of course/game fishing whilst longer rods (beachcasters or pier rods) may be used for greater leverage when casting. Long range casting is not normally carried out from charter boats for safety reasons whilst the ability of the vessel to anchor / remain in the desired located reduces the need for long range casting.

7.3.2 Gillnets

Gillnets (Figure 10) which can be either fixed or drifting, are a series of monofilament nets joined together to form fleets which can be up to 1500 m in length. Fishermen in the Mersey reported that upto four nets are deployed per fleet which are soaked for 5-24 hours. Leaded lines are used attached to anchors at each end that are marked with floats/flags. These may be deployed at different heights within the water column.

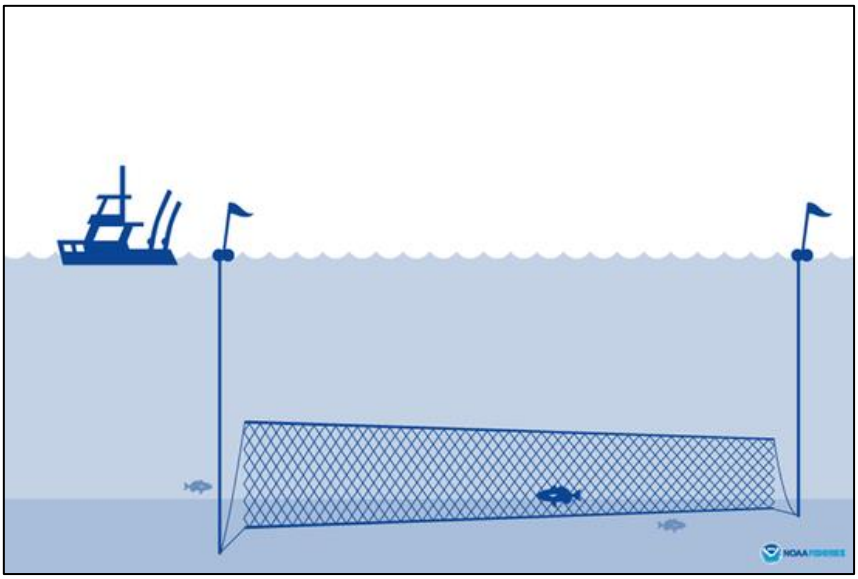

Figure 10: Gillnet (Source: NOAA Fisheries)

7.3.3 Longlining

Longlining involves a main line onto which a series of baited hooks are attached via snoods at set intervals (Figure 11). Longlines can be anchored or drifting and used to target demersal or pelagic species.

From consultation with Commercial Fishermen it is understood that 30 m main lines with c.10 m branch lines are deployed with the tide. These are baited with sandeels or razer fish and left to soak for 3-5 hours.

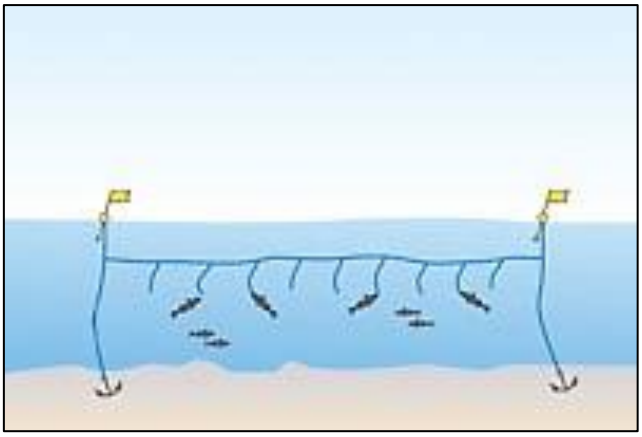

Figure 11: Longlining (Source: Sustain 2018)

7.3.4 Potting / Creeling

Potting and trapping for crab, lobster and whelks is understood from consultation to occur outside the mouth of the Mersey Estuary. Although the design of pots may vary depending on region and target species. In general, all pots have one or more “funnel” shaped entrances for the shellfish to enter.

Whilst multiple pots may be deployed on single lines (referred to as fleets), due to the small nature of the inshore vessels operating in the Mersey area, single weighted pots (measuring 1.2m by 0.5m) with floats tend to be deployed. From consultation it is understood that pots are typically deployed (soaked) for 3-4 days.

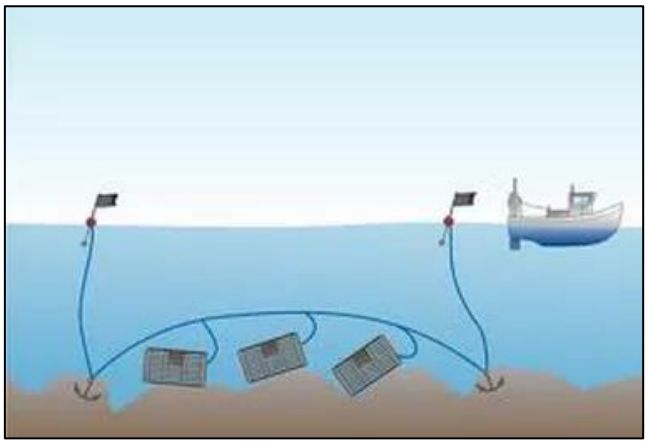

Figure 12: Creeling / potting (Source: Orkney Fisheries Association)

Appendix 14.1a: Hydrodynamic and Coastal Process Studies

HR Wallingford
Working with water

Liverpool cruise terminal

Hydrodynamic and coastal process studies

DER5821-RT001-R02-00 November 2018

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26 Nov 2018	02-00	WJF	JVB	TJM	
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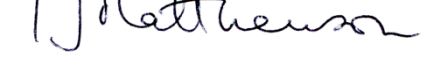

Summary

HR Wallingford is supporting Waterman Infrastructure & Environment Limited through the Environmental Impact Assessment (EIA) of a new cruise terminal in Liverpool. The project will include the removal of the existing Princes Jetty structure and the construction of a new berth based on a piled deck.

The effects of the cruise terminal on waves, tidal flows, sedimentation and morphology have been studied using a mix of modelling and desk assessment. In summary the effects of the completed cruise terminal structure are relatively localised and small. No overall effects on the tidal propagation or sedimentation regime are predicted.

The predicted effects are summarised as:

- The new structure will dissipate less wave energy and therefore more wave energy will be reflected back from the existing sea wall. Under northerly and north-westerly wind conditions, this is likely to result in a small localised increase in wave activity at the north end of the landing stage and at the northern end of ships on berth.
- Currents in the area around the site and extending north in the approaches to the Princes Half Tide Dock will be increased by the demolition of the existing Prince's Jetty, but then will broadly return to something close to the existing situation once the proposed piled structure for the cruise terminal is built.
- The footprint of effect of the developed cruise terminal on tidal currents extends approximately 0.6 km seawards during the ebb tide and 0.2 km landwards during the flood tide. The effects are confined to the eastern bank line of the Mersey Estuary; no effects mid channel are shown.
- No effect on high or low water levels was predicted. At other tidal states predicted water levels with the completed development included were negligibly different, within 2mm, to the baseline case.
- The pattern of sedimentation with the cruise terminal in place is similar to the existing situation. Some sediment accumulation under the proposed piled structure is predicted. No effects on sedimentation in the areas around the pontoons to the south of the site are shown.
- Removal of the existing jetty will result in some limited erosion of the bed, mostly from underneath the present structure. However, the rate of sediment release resulting from this erosion is anticipated to be insignificant compared to the ambient sediment flux in the Mersey Estuary (up to 7,000 kg/s).
- During the demolition some sediment disturbance is unavoidable. By analogy with a reasonable worst case assumption of sediment release during backhoe or grab dredging the rate of sediment release is anticipated to be insignificant compared to the ambient sediment flux in the Mersey Estuary (up to 7,000 kg/s).
- The predicted effects of the completed development on water level, tidal currents and sediment transport have been shown to be insensitive to increased mean sea level associated with climate change for the lifetime of the development.

Suggested citation

HR Wallingford (2017). *Hydrodynamic and coastal process studies, Liverpool cruise terminal, RT001 R02-00*. Report produced for Waterman Infrastructure and Environment Ltd.

Contents

Tables

1. Introduction

HR Wallingford is supporting Waterman Infrastructure & Environment Limited through the Environmental Impact Assessment (EIA) of a new cruise terminal in Liverpool. The project will include the removal of the existing Prince's Jetty structure and piled platform and the construction of a new berth based on a piled deck.

This report describes the studies undertaken to support the EIA in regards to coastal processes although some of the outputs are also of relevance for water and sediment quality, navigation and ecology. The report comprises a further four sections. Section 2 describes the desk assessment of wave conditions at the site and the potential of the development to alter them. The application of tidal flow modelling to the development is described in Section 3 with the consequences of the change to the currents on fine sediment transport described in Section 4. A desk assessment of the potential for fine sediment to be released as part of the demolition stage of the project is provided in Section 5.

2. Waves

2.1. Objective

Change to the form of an estuary by dredging or by changing the structures within the estuary, or the structures that form boundaries to the estuary, can alter the wave conditions at the site. This can have potential consequences, for example, for ecology, sedimentation, coastal processes and flood risk. Based on an assessment of the proposed works, which in effect replace one piled structure for another, the effect of the proposed development on waves is anticipated to be small and therefore a desk assessment of these effects has been undertaken to support the assessment of effects on sediment transport and estuarine morphology.

Whilst the assessment is appropriate for the EIA study in showing the potential for wave conditions to be altered by the works; if wave conditions are required for detailed design, it would be anticipated that a dedicated modelling study be carried out.

2.2. Wave conditions at Prince's Jetty

The site is located at the narrowest point of the Mersey river mouth, approximately 4.5 km south of the entrance. The narrow entrance and the shallow banks outside the Mersey mouth shelter the site from most of the wave energy entering from the Irish Sea. The tide has a strong effect – at low tide the water depths over the banks outside the Mersey entrance, Great Burbo Bank and Brazil Bank, are very shallow and dry in some areas and so will block waves from the Irish Sea. In addition, the strong tidal currents are likely to significantly affect waves – the ebb tide is also likely to block waves entering the estuary from the Irish Sea. It is likely to be only at high tide and with a wind from the northwest that some wave energy from the Irish Sea may reach the site.

For the majority of the time, wave conditions at the site will be due to waves generated within the estuary by local wind. The locally generated wave conditions are largest when the wind is blowing along the estuary, either from the north and northwest or from the south and southeast.

HR Wallingford has carried out a number of wave studies in the Mersey Estuary. HR Wallingford (2011) studied waves at a site on the Birkenhead shore using the numerical wave model, SWAN. This wave model has been restored and wave conditions extracted at the site of the Prince's Jetty. Note that the model was created for a different site and has not been revised for this study so the wave conditions are indicative only and hence not suitable for detailed design of the structure.

Indicative extreme wave conditions for 4 wind directions and return periods of 1 year, 10 years and 50 years at the proposed cruise terminal are presented in Table 2.1. The model was run with water levels of 9.3 mCD, equivalent to MHWS, and 1.1 mCD, equivalent to MLWS.

The largest waves occur under winds from 300°N, where waves generated within the estuary combine with some wave energy from the Irish Sea. The next largest waves in the sample are caused by waves from 180°N.

Water level has a strong effect on wave conditions. The largest predicted wave height at MLWS, 1.1 m, is just more than half that at MHWS, 2.0 m. MHWS and MLWS occur at slack tide, the effect of tidal currents was not included in the modelling.

Table 2.1: Indicative wave conditions at site of proposed cruise terminal. Not to be used for design

Return period (years)	Wind direction (°N)	MHWS			MLWS		
		Hs (m)	Tp (s)	Dir (°N)	Hs (m)	Tp (s)	Dir (°N)
1	150	1.1	3.9	148	0.7	3.0	162
	180	1.2	3.9	153	0.8	3.1	169
	300	1.5	4.9	322	0.8	3.2	317
	330	1.2	4.4	326	0.6	3.2	327
10	150	1.3	4.1	149	0.8	3.3	164
	180	1.5	4.3	154	0.9	3.4	171
	300	1.8	5.2	321	1.0	3.6	314
	330	1.4	4.8	326	0.7	3.5	325
50	150	1.4	4.3	149	0.8	3.4	165
	180	1.7	4.4	154	1.0	3.6	172
	300	2.0	5.4	321	1.1	3.7	312
	330	1.6	5.0	326	0.8	3.6	324

Source: HR Wallingford (2011)

2.3. Existing Prince's Jetty

The existing Prince's Jetty consists of a complex open structure including vertical and horizontal timber and concrete beams and other components such as decks and staircases. The interaction and effect on waves is likely to be highly complex.

As the structure is relatively open, the majority of wave energy is likely to pass through the structure. Some scattering and dissipation is likely to occur and will depend on the water level and the height and wavelength of the waves.

2.4. Proposed cruise terminal

The cruise terminal is proposed to be suspended on piles. The preliminary sketch in 'Suspended deck pile layout.pdf' shows piles at spacings of between about 5 m and 15 m. This is more open than the existing structure and therefore will transmit more wave energy and dissipate and disperse less wave energy than the existing structure. Most of the wave energy will pass under the deck of the proposed terminal and impact on the sea wall. The sea wall is vertical and will reflect most of the wave energy incident upon it. Under northerly and north-westerly wind conditions, this is likely to result in a small localised increase in wave activity at the north end of the landing stage and at the northern end of ships on berth.

In the context of the whole estuary, it should be noted that the combination of new terminal structure and the existing sea wall will reflect no more wave energy than the vertical sea walls that make up the majority of the shoreline. It is therefore not expected that removal of the Prince's Jetty structure and installation of the new structure will have a significant effect on the wave climate in the estuary and hence no impact is expected from changes to wave conditions on navigation, coastal processes or morphology.

3. Tidal flow

3.1. Objectives

The piles included in the existing jetty structure provide an amount of drag force on the passing flow with implications for the distribution of current speed and direction. The removal of the structure and replacement with a new piled platform covering a different area and with different size and density of piles would be expected to alter the current distribution. For this study an existing numerical model was applied to simulate the effects of the development on tidal propagation and the distribution of tidal currents.

3.2. Tidal flow modelling

3.2.1. Choice of model

A 3D flow model has been used for the modelling because the known influence of a longitudinal salinity gradient tends to create variation in the current magnitude in the water column which would not be captured by a 2D, depth averaged model. Also for sediment transport modelling and predictions of infill it is usually important to have a 3D flow model as the highest sediment concentrations are typically near the bed and therefore accurate modelling of near bed currents is required.

The TELEMAC-3D flow model was used. It is based on a completely flexible grid made of triangles and runs on parallel high performance computers so provides high resolution results with a reasonable timeframe. HR Wallingford has 25 years' experience of using the TELEMAC suite of models, including at the Mersey.

The flexible triangular grid employed by TELEMAC-3D allows accurate representation of complex coastlines and seabed features such as the jetty, pontoons and other existing nearby features. The grid also provides complete control on the level of detail to be modelled such that particular features can be modelled in detail whilst using a larger grid to keep any imposed boundary conditions distant. This process focusses the computational effort where it is needed to maintain practicable run times and file sizes.

3.2.2. Model mesh

The applied TELEMAC-3D model covered the Mersey Estuary from approximately the tidal limit extending to the estuary mouth and out into Liverpool Bay. The full extent of the model mesh is shown in Figure 3.1. The horizontal extent of the mesh from the estuary mouth is around 45km in both the west and north directions, encompassing both the Dee and Ribble estuaries. The western flow boundary is at about the same longitude as Llandudno and the northern boundary is at Fleetwood (south of Heysham).

An advantage of the flexible grid system is that once established a model can be further refined in additional areas of interest whilst keeping the mesh the same elsewhere and hence maintaining the accuracy of the calibrated model. This method was particularly suitable for the needs of the study for the Liverpool Cruise Terminal as the calibrated model could be further refined at the study site.

The model mesh was refined to accurately include the form of the existing pontoons, the Prince's Jetty and the proposed piled platform for the cruise terminal. To enable to accurate representation of the structures the smallest model mesh size was in the range 2-5 m.

To provide a practical tool the individual piles were not modelled, rather the drag force of the combined piles was calculated based on the size, shape and number of piles.

TELEMAC-3D uses a sigma layer system to represent variation in currents in the vertical. Sigma layers divide the vertical into a user defined number of layers at each model node. For the present case, seven equally spaced vertical layers were used for the model simulations.

Figure 3.1 shows the extent of the model and shows the unstructured mode mesh.

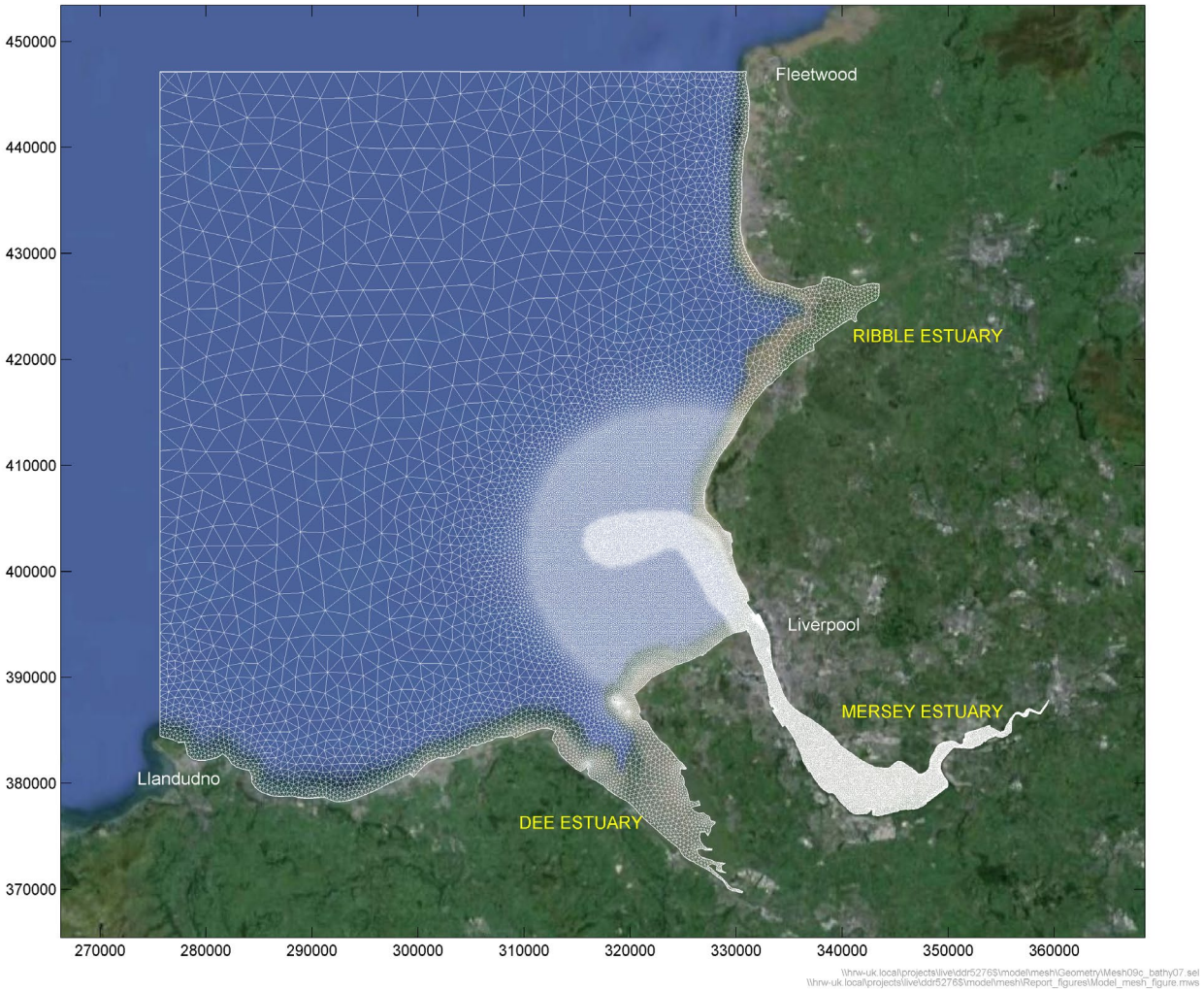

Figure 3.1: Model mesh, showing the full extent of the model

3.2.3. Model layout and bathymetry

Three layouts were modelled;

1. The existing layout with Prince's Jetty in place as well as the nearby pontoons and other structures (Figure 3.2);
2. The layout with Prince's Jetty removed;
3. The layout with the piled platform for the cruise terminal added (Figure 3.3).

Bathymetry data came from TruDepth grid data from the SeaZone Ltd. data sources, accessed in 2016. These data represented the most up-to-date survey information that was available at the time. The data was available on a 10 m grid. Due to the dynamic nature of the bed in the Mersey, there will unavoidably be some differences in detail between the present day bathymetry and the model due to movement of sand banks and the low water channel in the upper reaches of the estuary. Overall, however, the tidal volume and general circulation patterns in the area of interest are likely to be similar.

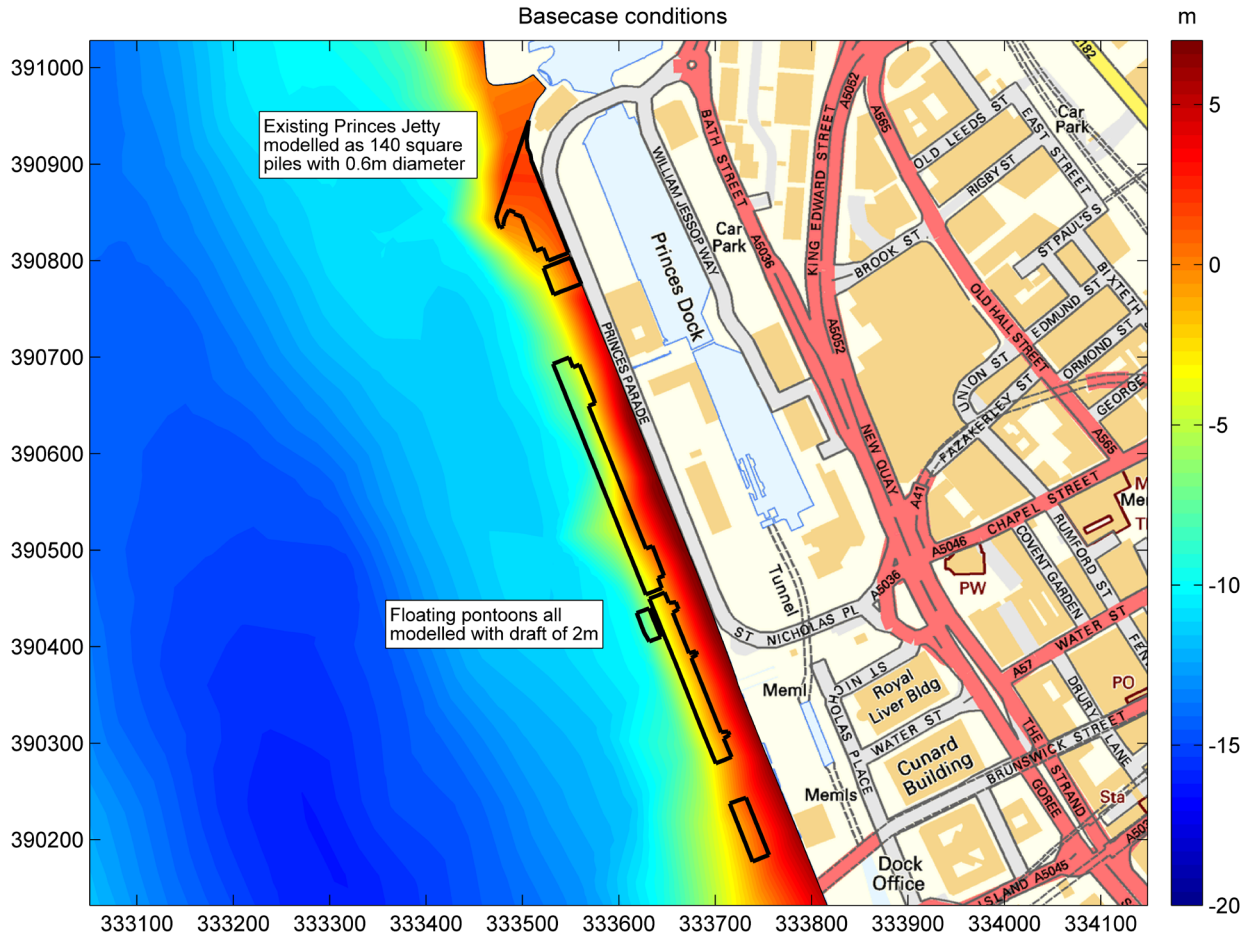

Figure 3.2: Existing site layout

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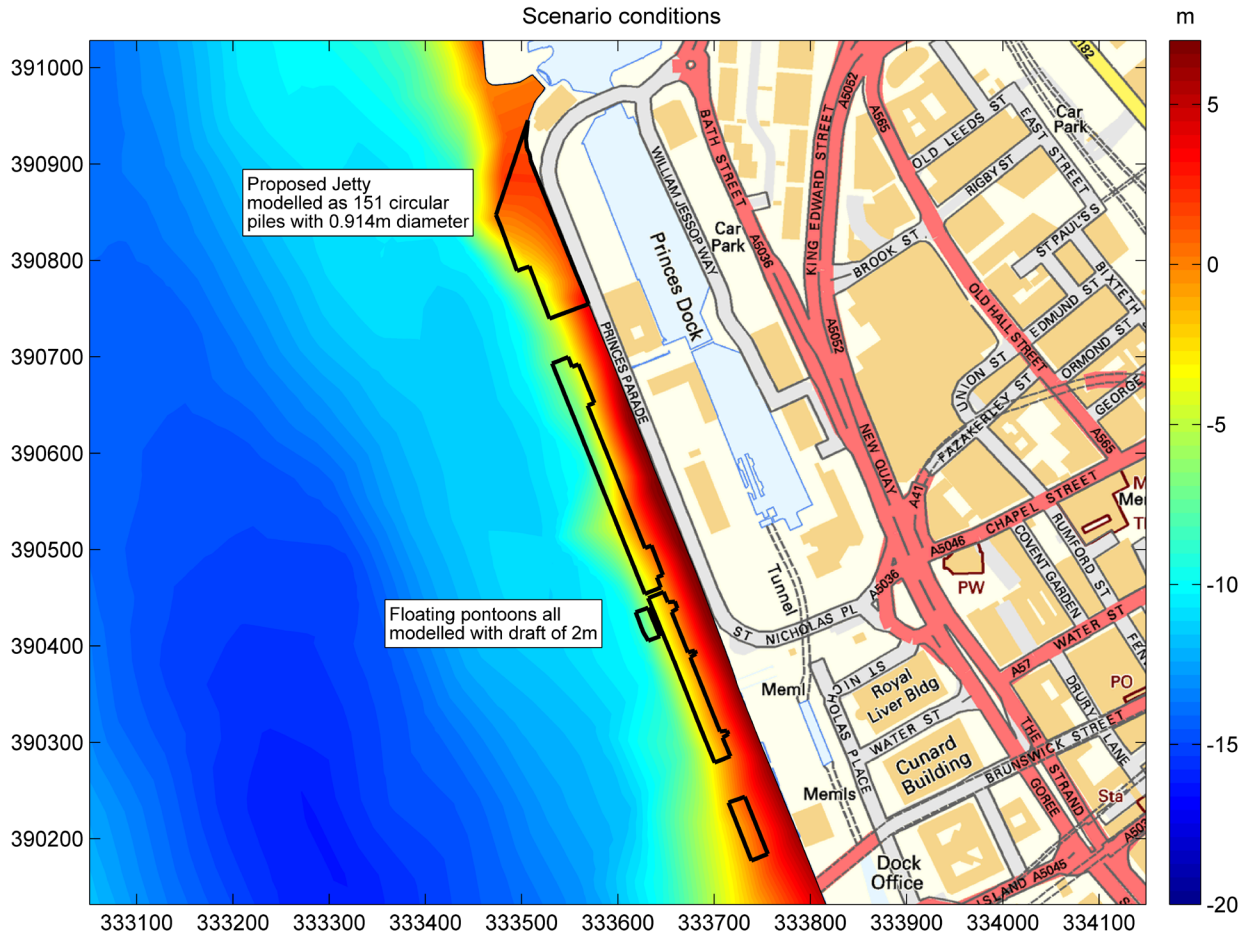

Figure 3.3: Proposed site layout

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3.2.4. Boundary conditions

The sea boundary data on the coast were taken from tidal predictions at Llandudno and Heysham. For the north tidal boundary, the Heysham predicted tidal levels were scaled by 5% since the model boundary was at Fleetwood. For the offshore, northwest corner of the model domain, data were extracted from the TOPEX/Poseidon Cross-Over Global Inverse Solution model (TPXO). The three tidal level series (Llandudno, Heysham and TPXO data) were all corrected to the same vertical datum as the model (Chart Datum at Liverpool). The tidal levels were then linearly interpolated to each model node along the tidal boundaries.

The model was run for a whole month including a period of approximately average range spring tides (April 2007). Freshwater runoff during this period was assumed to be constant with discharges of 11 and 19 m^3/s (equivalent to the mean daily gauged flow) applied at the Weaver and Mersey River boundaries respectively. No wind or wave forcing was included in the tidal flow model as the main driving factor for currents at the site were the tides.

3.2.5. Climate Change

The mean sea level is anticipated to rise in the Mersey Estuary over the lifetime of the development due to climate change effects. The sensitivity of the predicted effects on tidal currents and water levels to increased mean sea level was therefore tested in the model.

The increase in mean sea level for 2087, which is the end of the design life of the development, was calculated as 0.54 m based on the climate change allowances published by the Environment Agency (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances). The increase in mean sea level was applied to all the open boundaries of the model.

3.3. Model results

3.3.1. Model calibration

The existing model was previously calibrated using ADCP transect measurements made during a spring tide in October 1995 and validated for a neap tide during January 1996. For further details refer to HR Wallingford (2014) and Wither et al (1998). The accuracy of the model following its refinements at the study site was confirmed by comparison with the same data. Figure 3.4 shows the comparison of the total discharge though the Mersey Narrows as observed in 1995 and as simulated by the model.

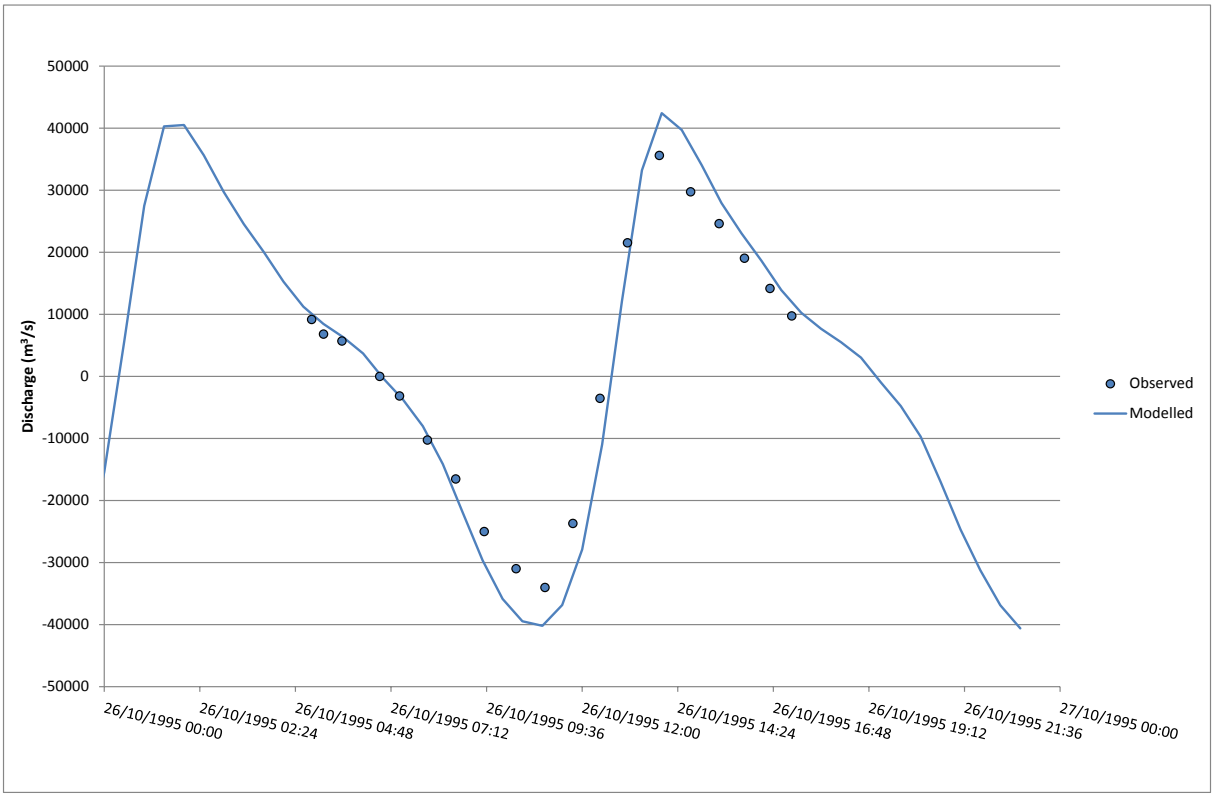

Figure 3.4: Comparison of simulated and observed total spring tide discharge through the Mersey Narrows

Mean Absolute Error was used an objective statistical measure of model accuracy being an overall measure of the 'goodness of fit' of the simulated tidal discharge when compared to the observations. The calculated

MAE was within 11% of the maximum tidal discharge for both spring and neap tide conditions and therefore considered sufficiently accurate for the present study.

3.3.2. Baseline conditions

Whilst the model was run in 3D to demonstrate the footprint of effect the depth averaged current are presented; Figure 3.5 and Figure 3.6 show the current magnitude overlaid by vectors indicating the current direction. The results at time of peak ebb tide are shown in Figure 3.5 and those at the time of peak flood tide are shown in Figure 3.6.

All results are shown for spring tide periods as the magnitude and footprint of any effect would be expected to be maximized for these higher current conditions.

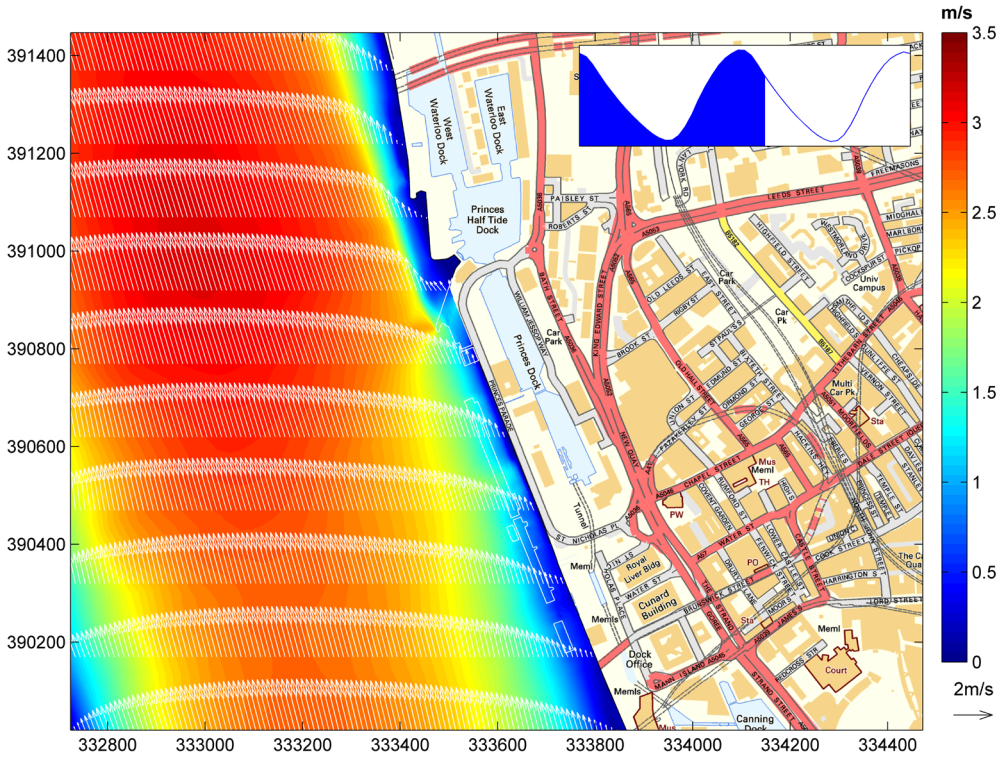

Figure 3.5: Current pattern at the time of peak ebb tide – baseline conditions

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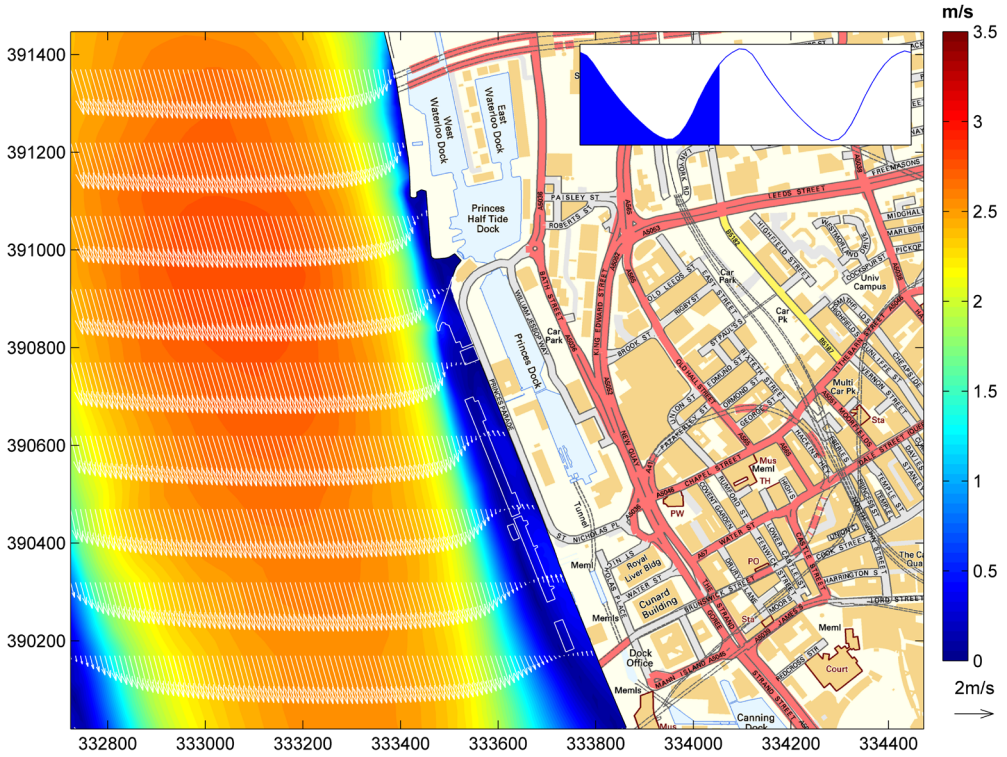

Figure 3.6: Current pattern at the time of peak flood tide – baseline conditions

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3.3.3. Effect of removing Prince's Jetty

The results for the intermediate case with the existing Prince's Jetty removed are shown in Figure 3.7 to Figure 3.10. The current speed magnitude and direction are plotted at times of peak ebb and flood tide followed by the difference in current magnitude resultant from the removal of the structure. In the speed difference plots yellow to red colours indicate speed magnitude increase with increasingly dark clue colours indicating speed magnitude decrease.

The most noticeable effect of removing Prince's Jetty is the speed increases show in Figure 3.8 and Figure 3.10 when the drag effect of the piled structure is removed. The largest effect is shown on the ebb tide where speed increases of more than 0.8 m/s are shown. The footprint of effect extends approximately 2 km seawards during the ebb tide and 1 km landwards during the flood tide. The effects are shown to be relatively confined to the eastern bank line of the Mersey Estuary; no effects mid channel are shown, indicating no effect on the general tidal propagation of the estuary or any overall effects on water levels.

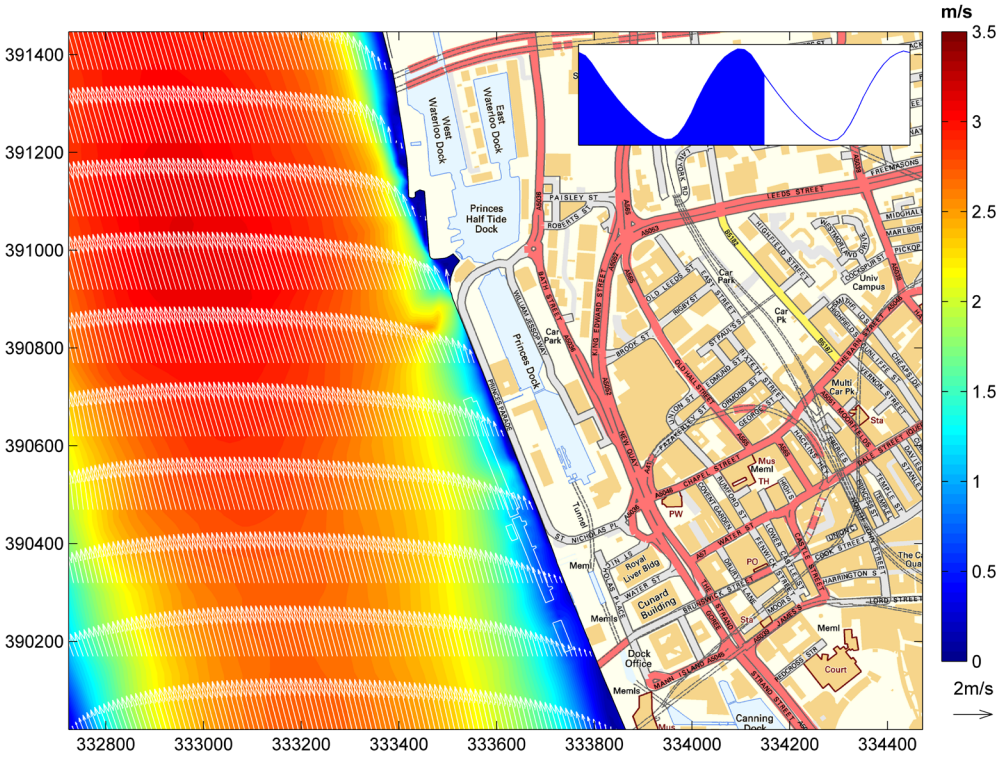

Figure 3.7: Current pattern at the time of peak ebb tide – Prince's Jetty removed

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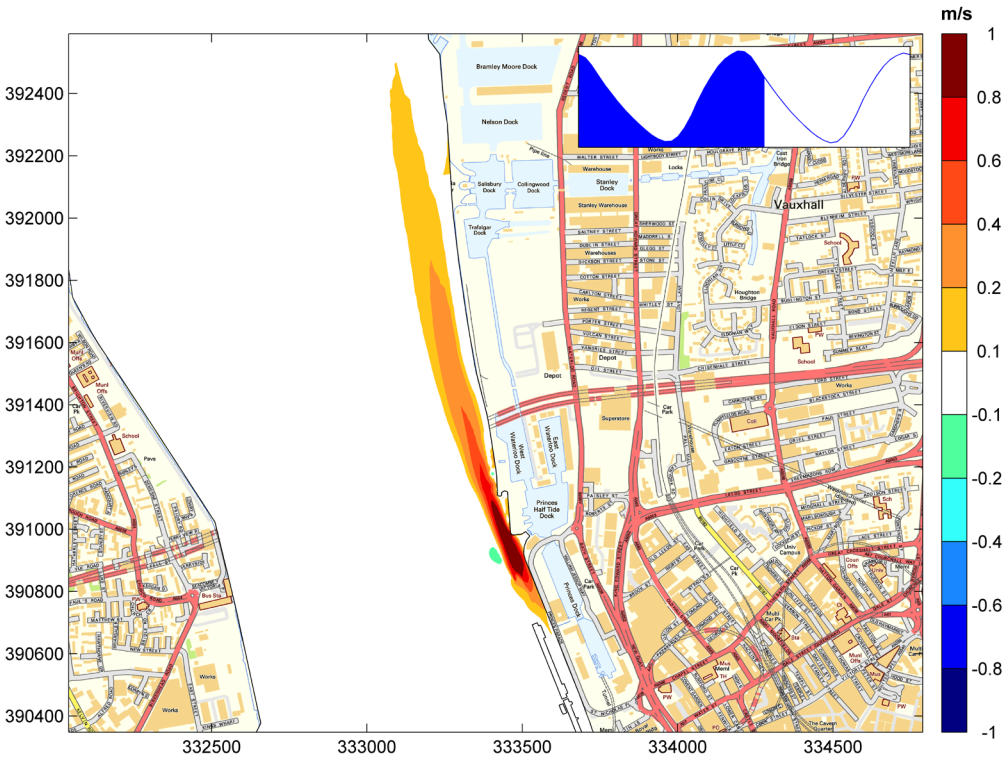

Figure 3.8: Effect of Prince's Jetty removal on current pattern at the time of peak ebb tide

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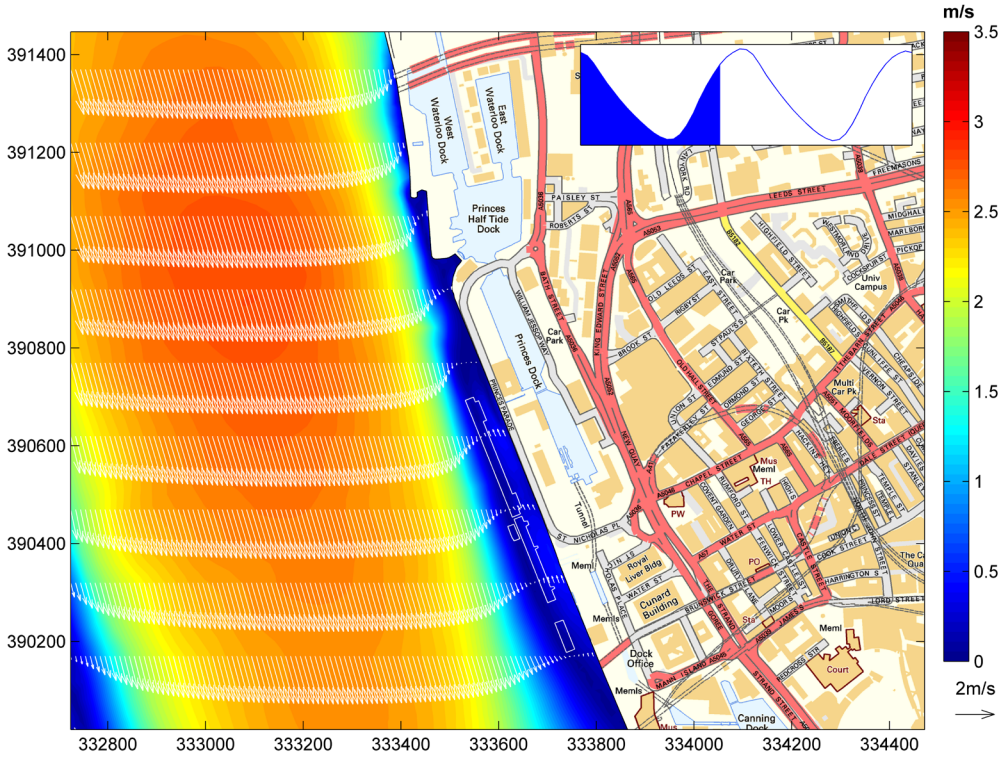

Figure 3.9: Current pattern at the time of peak flood tide – Prince's Jetty removed

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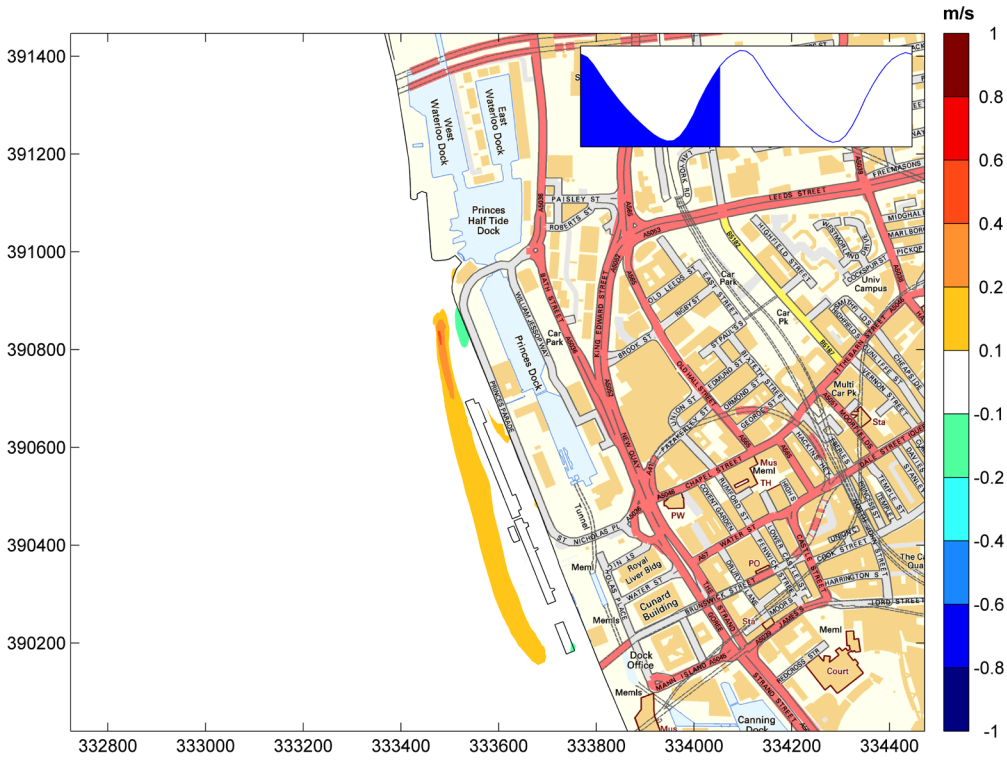

Figure 3.10: Effect of Prince's jetty removal on current pattern at the time of peak flood tide

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3.3.4. Effect of new cruise terminal platform

The results for the case with the platform supporting the new cruise terminal are shown in Figure 3.11 to Figure 3.14. As above the current speed magnitude and direction are plotted at times of peak ebb and flood tide followed by the difference in current magnitude resultant from the construction of the new structure. The speed difference plots (Figure 3.12 and Figure 3.14) compare the currents for the completed cruise terminal development with the baseline conditions as this is the long term effect of the permanent works which should be assessed for any effects on morphology or sedimentation at nearby berths etc.

As the cruise terminal reintroduces a piled structure in the area of the existing Prince's Jetty the effects shown above of the jetty removal are, to some extent, countered. The effects of the completed works compared to baseline (existing) conditions are much less in magnitude and footprint than the effects of removing the existing jetty.

The effect shown at the time of peak ebb tide is speed increases of 0.2-0.4 m/s. The footprint of effect extends approximately 0.6 km seawards during the ebb tide and 0.2 km landwards during the flood tide. As for the removal of the present jetty the effects are shown to be confined to the eastern bank line of the Mersey Estuary, no effects mid channel are shown, indicating no effect on the general tidal propagation of the estuary or any overall effects on water levels. An analysis of the tide curve at Hale, landward of the development showed no effect on HW and LW levels and water levels within 2mm of the baseline case at other times.

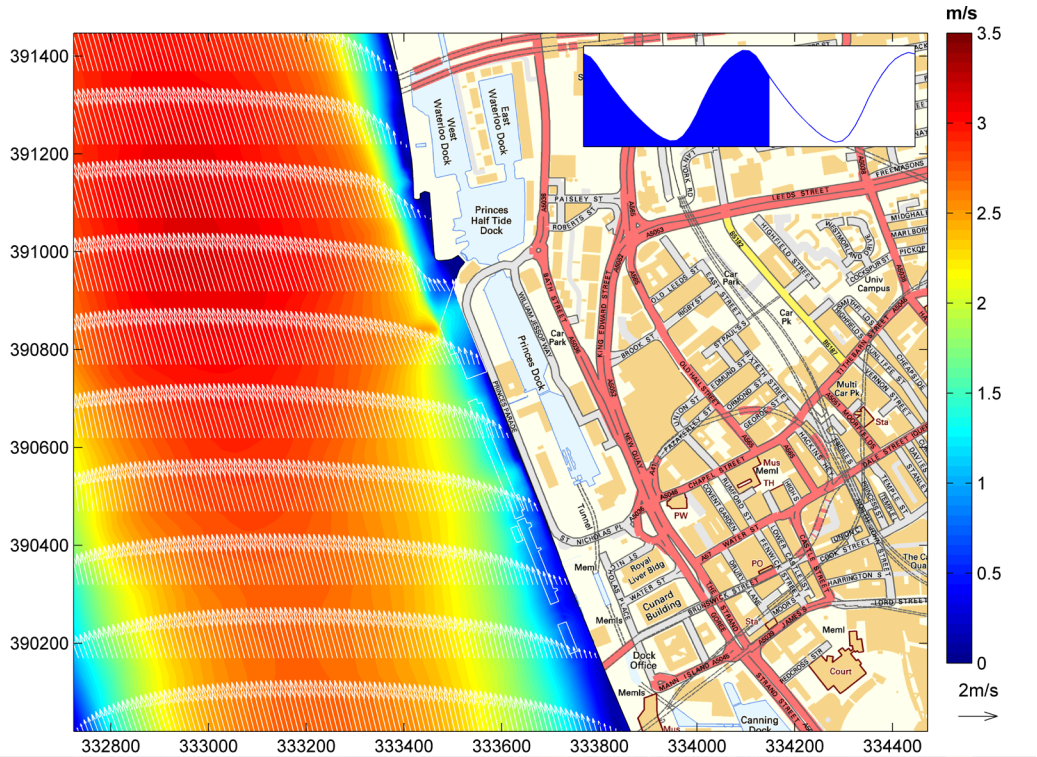

Figure 3.11: Current pattern at the time of peak ebb tide – Cruise Terminal completed

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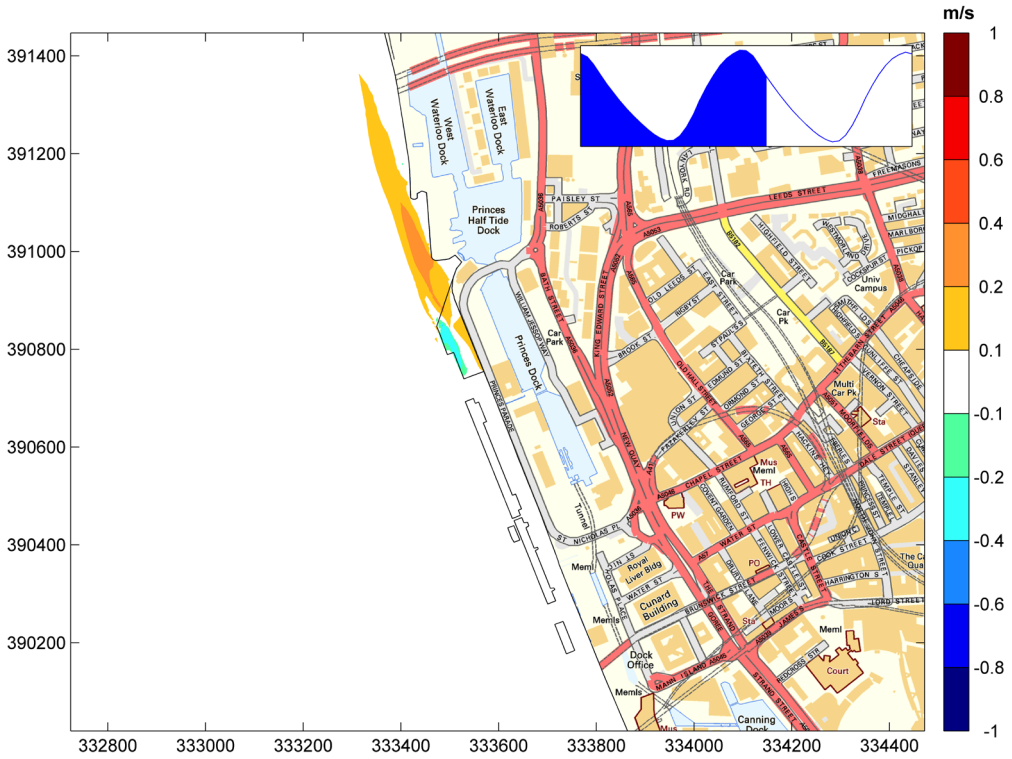

Figure 3.12: Effect of Cruise Terminal on current pattern at the time of peak ebb tide

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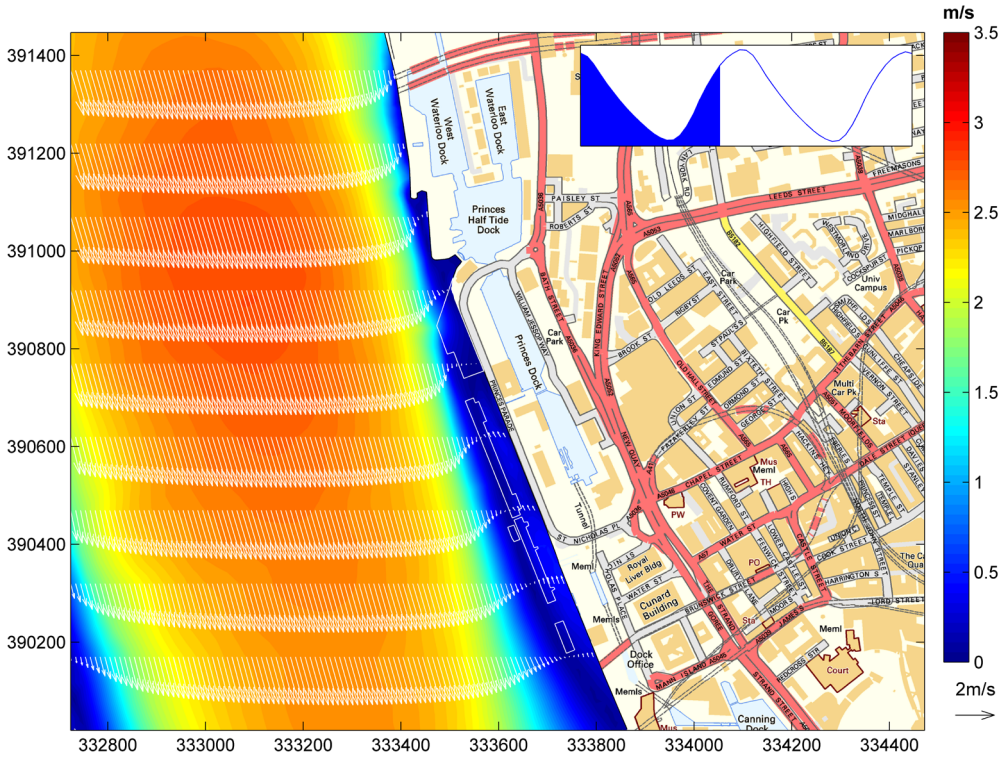

Figure 3.13: Current pattern at the time of peak flood tide – Cruise Terminal completed

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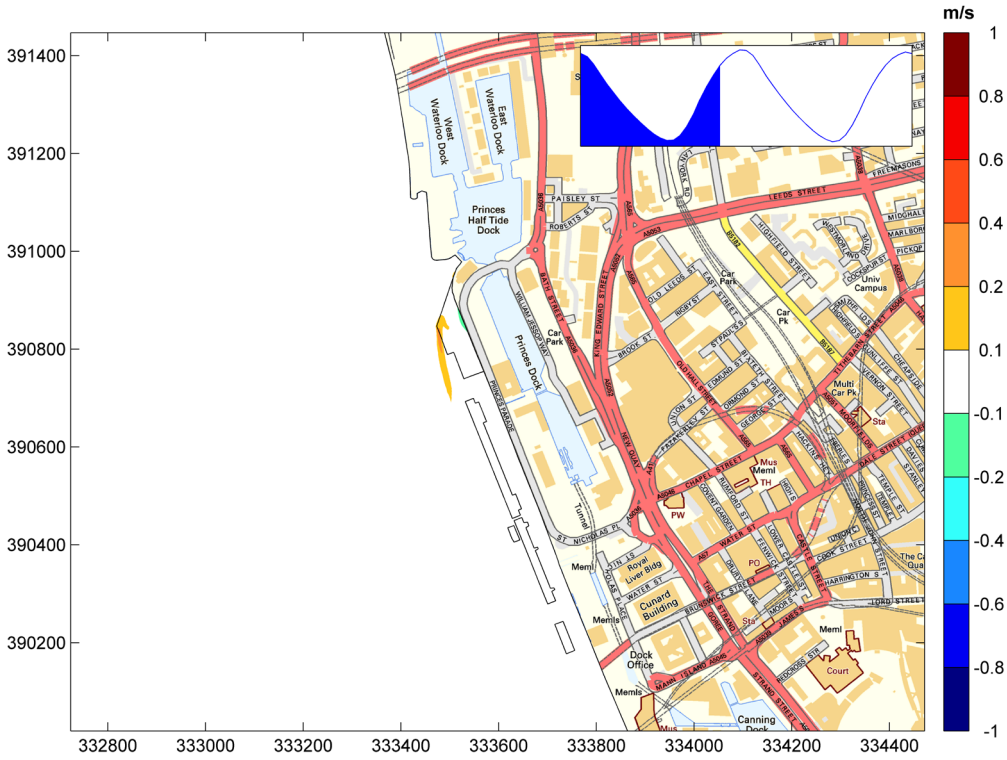

Figure 3.14: Effect of Cruise Terminal on current pattern at the time of peak flood tide

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3.3.5. Sensitivity to climate change

Figure 14.23 and Figure 14.24 show comparisons of the currents at times of peak ebb and flood tides for baseline and completed development cases with mean sea level increased by 0.54 m. A very slightly increased footprint of effect is shown due to the increased tidal volume in the inner estuary and consequential larger baseline currents. It should be noted that the morphology of the inner estuary is also expected to respond to mean sea level rise by accumulating sediment and hence reduce tidal volume. Therefore even the small enhancement to the effect of the development as presented is precautionary.

The insensitivity of the predicted effects on tidal currents also means the effect of the development on estuarine tidal propagation and water levels will remain negligible with increased mean sea level associated with climate change for the life time of the development. These results also imply that the predicted effect of the development on sediment transport and sedimentation presented in Section 4 will also be insensitive to increased mean sea level for the life time of the development.

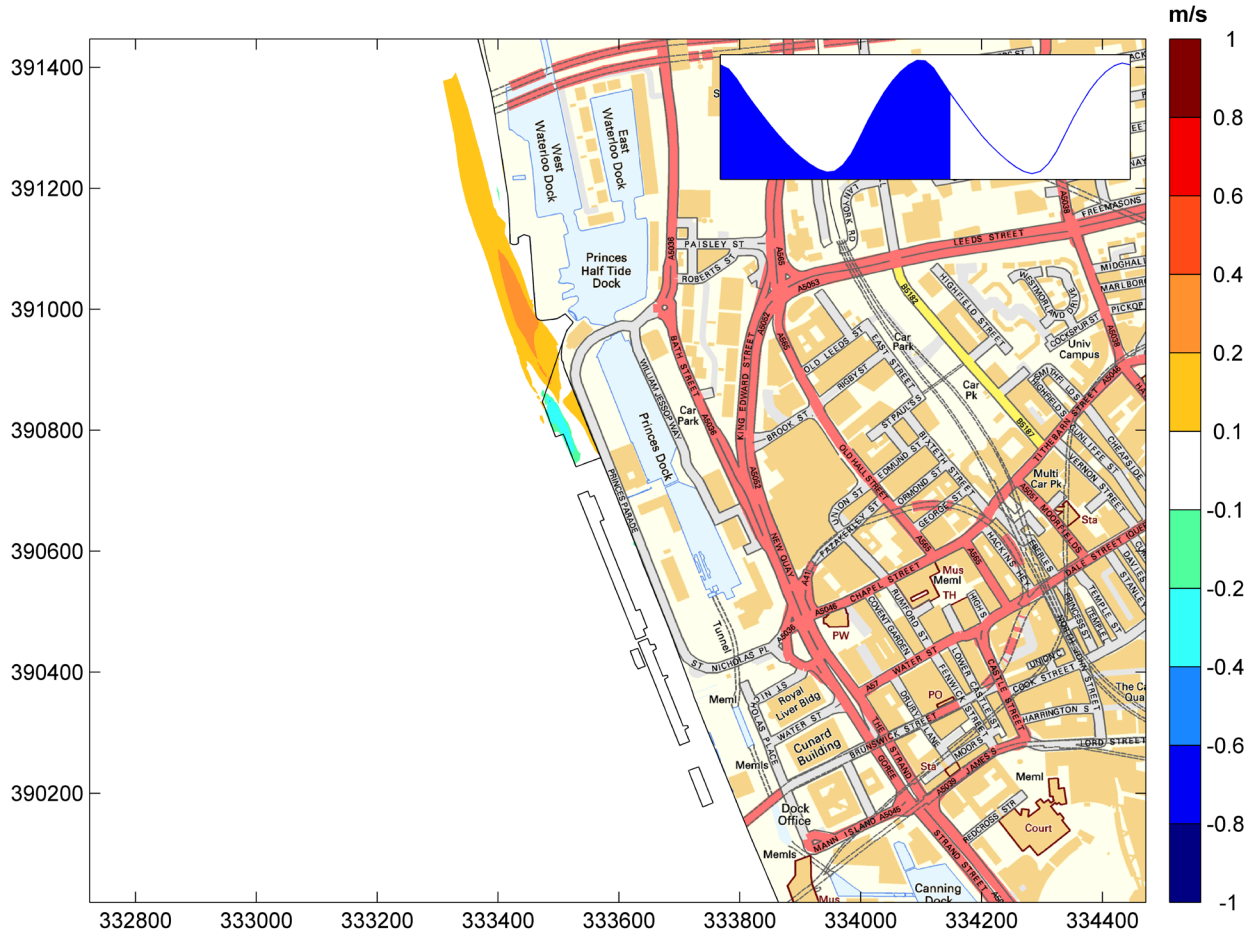

Figure 3.15: Effect of Cruise Terminal on current pattern at the time of peak ebb tide with 0.54 m MSL rise

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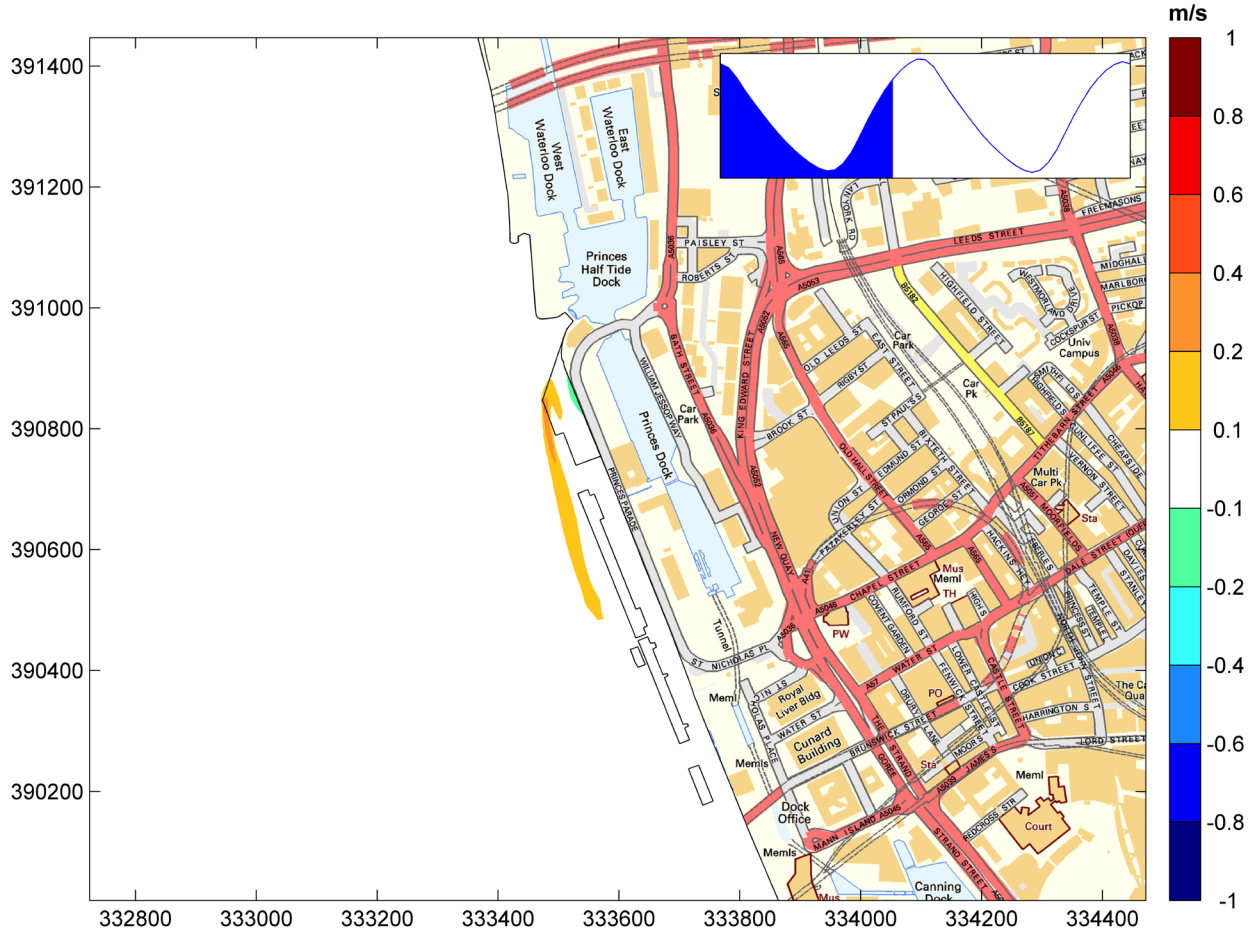

Figure 3.16: Effect of Cruise Terminal on current pattern at the time of peak flood tide with 0.54 m MSL rise

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4. Sedimentation

4.1. Objectives

Two issues require sediment modelling, firstly the effect of the Cruise Terminal development on estuarine sediment transport and patterns of erosion or sedimentation, and secondly the fate of sediment released as part of the Prince's Jetty demolition process. This chapter describes the studies undertaken to address the aspects related to estuarine sediment transport; the next chapter assesses the risk of sediment release during the demolition period.

4.2. Sediment transport modelling

4.2.1. Choice of model

For the estuarine sediment transport model the 3D mud transport module of TELEMAC-3D, namely SEDI-3D was applied. This model couples the sediment transport directly with the 3D flow modelling which allows the increased density caused by the sediment to be included in the hydrodynamic modelling. This effect is important in a highly turbid estuarine area such as the Mersey.

The mud transport model of the Mersey was first set up for the Liverpool2 container terminal studies (HR Wallingford, 2014) which describes the process of choosing the main parameter settings.

Settling of the suspended mud was parameterised using a constant settling velocity of 1 mm/s.

A two layer bed model was used for modelling the bed exchange processes in the model. Such an approach has been used previously by HR Wallingford for numerous studies of estuary mud transport and has been found to give robust results.

In the bed model, the uppermost sediment layer represents the mobile sediment that is picked up, advected and deposited each tide. Deposition is assumed to occur continuously into this top layer using the previously described settling velocity of 1 mm/s multiplied by the near bed suspended concentration. Net erosion occurs in the model if the erosion flux from the bed is greater than the deposition flux. For the top bed layer, a critical shear stress for erosion of 0.2 N/m^2 was set everywhere. When this threshold is exceeded by the flows, erosion is initiated and material erodes from the top bed layer at a rate predefined by the erosion rate constant (Partheniades, 1965). In this case the erosion rate constant was calibrated iteratively to a value of $5e^{-5}$ $kg/m^2/s$. This value is within the range used by other researchers generally found in the literature (Whitehouse et al., 2000).

The underlying bed layer represents the in situ sediment that has experienced previous consolidation and bed armouring. The critical shear stress for erosion for this layer was parameterised with spatially varied values. The values were calculated as the average of the shear stress experienced at each node during a set of mean spring tides. The minimum value was then limited to at least 0.4 N/m^2. The erosion rate constant for the lower bed layer was set to the same value as the top layer.

The dry density for both of the bed layers was assumed to be 500 kg/m^3.

The Mersey Estuary and Liverpool Bay rarely experience completely calm conditions and therefore waves were included in the sediment modelling. Although less important at the study location, waves can be important for increasing the bed shear stresses and thus mobilising settled sediment and preventing deposition. For completeness, a representative, though schematic, wave condition was applied throughout the model domain comprising a constant wave height of 0.5m with 4s period applied to the model everywhere in the offshore region, reducing through the Narrows over a distance of 5km to a value of 0.1 m within the estuary. The additional bed shear stress due to wave forces was combined with the bed shear stress from tidal currents using the Soulsby and Smallman method (1986).

4.2.2. Initial and boundary conditions

At the start of each model run, mud deposits were initialised everywhere except in shallow areas, where the bed level was higher than -1m CD in the offshore area. These regions were assumed to be predominantly sandy and therefore unlikely to be a source of much fine sediment. In the other areas, the upper and lower bed layer thicknesses were set to 0.01m and 0.2m respectively.

The suspended concentration in the model was initialised to zero everywhere. The time taken for the concentrations to “spin up” was observed to be of the order of two or three tidal cycles.

4.3. Model results

4.3.1. Model calibration

As for the flow model the best available data for sediment transport was from the October 1995 ADCP transect survey undertaken across the Mersey Narrows as described by Wither et al (1998). During the survey data from regular water sampling was used to convert the ADCP backscatter to suspended sediment concentration. Combination of the suspended sediment concentration with the water discharge taken from the ADCP data allowed calculation of the total sediment flux through the observed transect.

Figure 4.1 shows the comparison of the total sediment flux though the Mersey Narrows as observed in October 1995 and as simulated by the model. The comparison confirms that the model accurately represents the total amount of fine sediment passing the study site.

As for the tidal discharge Mean Absolute Error (MAE) was used an objective statistical measure of model accuracy Similar to the accuracy of the modelled tidal discharge, the calculated MAE of the total sediment flux was within 12% of the maximum observed sediment flux for both spring and neap tide conditions and therefore considered sufficiently accurate for the present study.

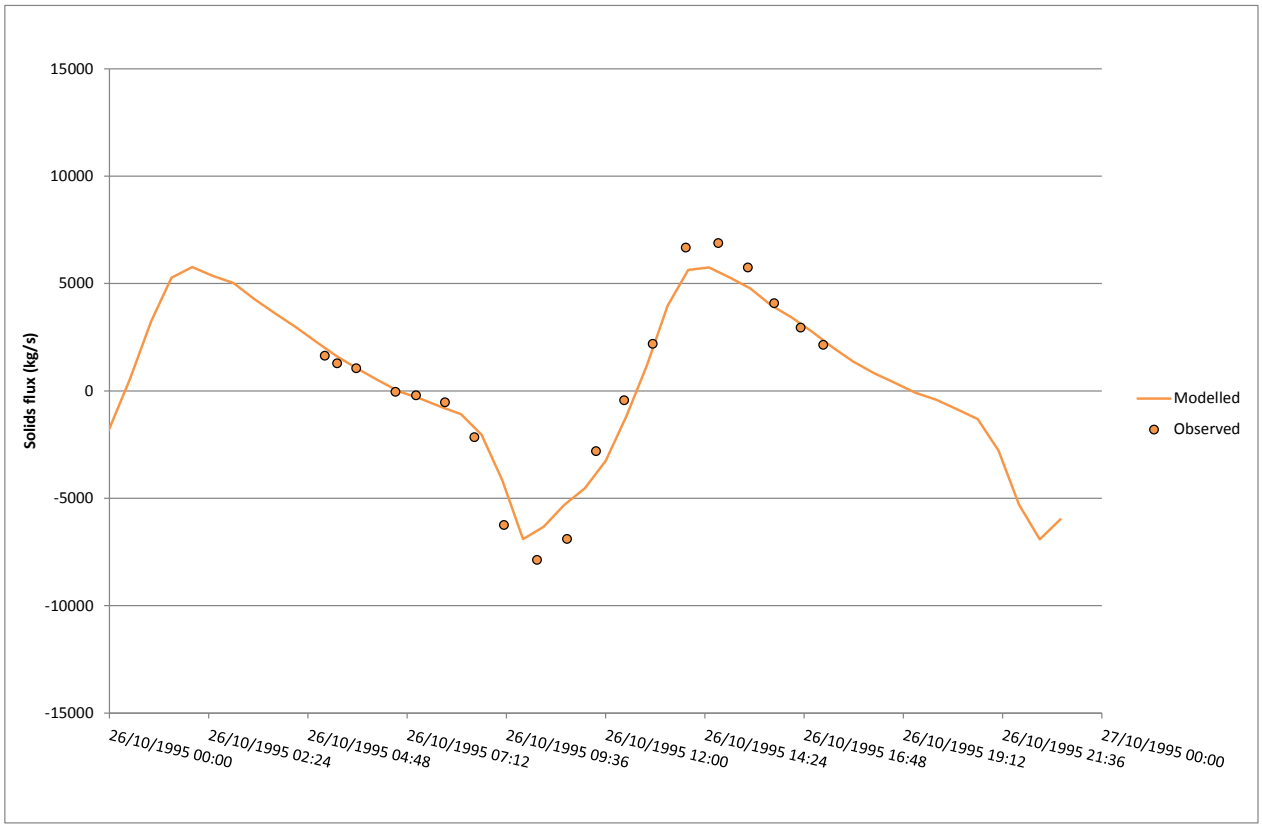

Figure 4.1: Comparison of simulated and observed total spring tide sediment flux through the Mersey Narrows

4.3.2. Baseline conditions

The baseline distribution of fine sediment deposition is shown in Figure 4.2. This figure shows an initial 30 days of potential sediment accretion. The features shown are no fine sediment accumulation in the channel due to the high currents. Some potential for sediment accumulation is shown to the north and south of the study site, particularly in the approaches to Princes Half Tide Dock.

The amount of sedimentation may appear large, however it should be noted that the prediction is of initial sediment accumulation which would not be expected to continue at the same rate over a whole year. For comparison the Maintenance Dredging Baseline Protocol document reports the average amount of sediment dredged and disposed at the licensed Mid-River site in the Mersey as 90,000 hopper Tons over the period 2002-2015 for dredging undertaken in the channel and riverside berths. Sediment is also disposed of at the licensed Site Z in Liverpool Bay. The average disposal mass at this site was approximately 1,000,000 hopper Tons, although it should be noted that this mass includes dredging of the Mersey approach channel. In addition an average total of approximately 500,000 hopper Tons of sediment taken from the Liverpool and Birkenhead Docks was disposed at the two sites.

The results indicate a risk of fine sediment accumulation in and around the existing Prince's Jetty which would be expected to be disturbed during the removal of the jetty structure.

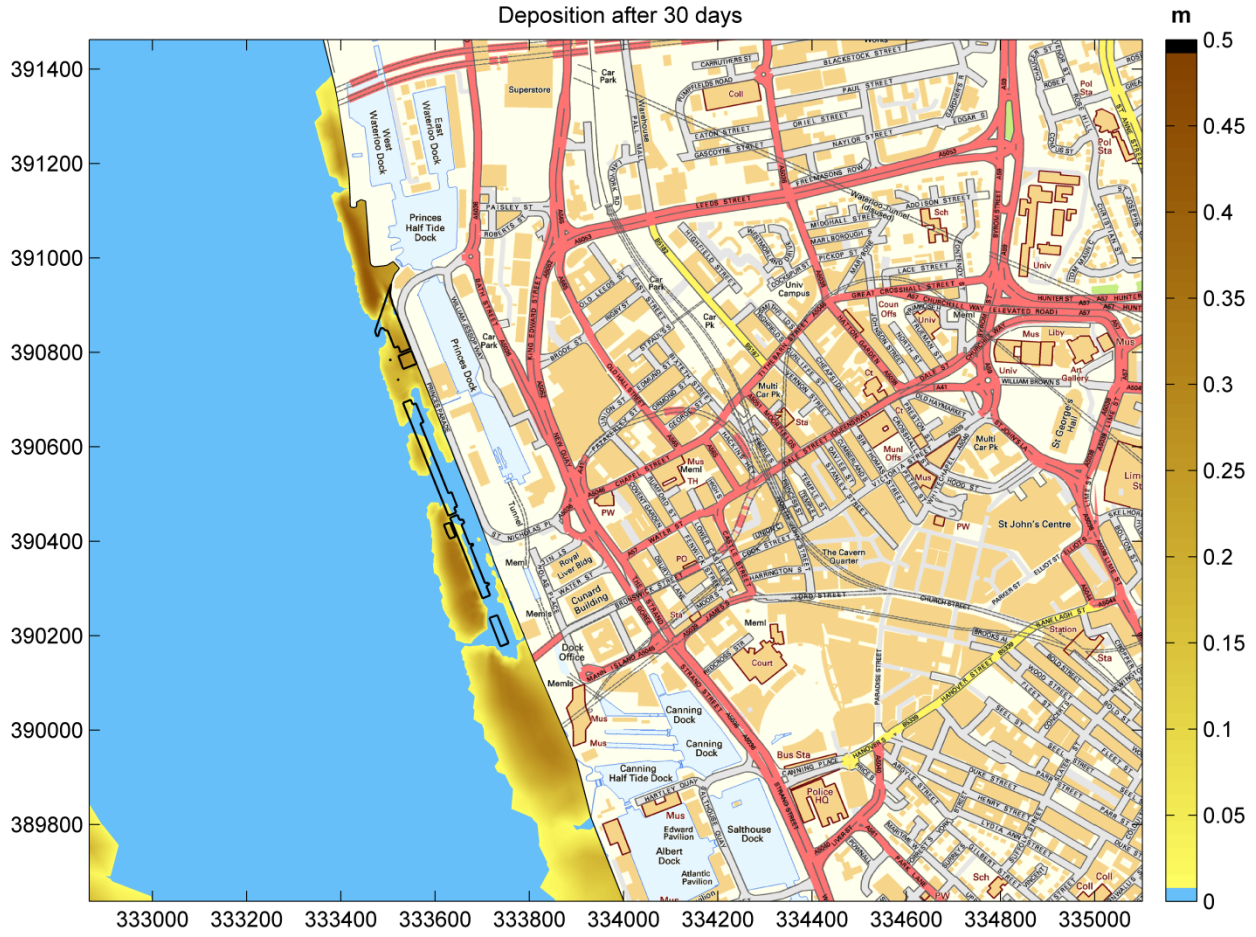

Figure 4.2: Predicted pattern of sediment accumulation, baseline conditions

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4.3.3. Effect of removing existing Prince's Jetty

The effect of removing the existing Prince's Jetty on the pattern of sedimentation is shown in Figure 4.3 and Figure 4.4. The pattern of sediment accumulation is shown by Figure 4.3 whereas the difference between this result and that predicted for the baseline case is shown by Figure 4.4.

The main effect of removing the existing jetty is in reducing the potential for fine sediment accretion particularly in the area north of the structure, around the Princes Half Tide Dock approaches. The reduction in accretion in these areas does result in some areas experiencing a small increase in the potential for fine sediment accumulation as material which would have settled further towards the channel is how able to settle nearer the bank line. There is some limited erosion of the underlying bed layer (up to 0.2 m), mainly at the location of the removed jetty, discussed further in Sections 4.4 and 4.5.

All the predicted effects are limited to approximately 1 km of the existing jetty.

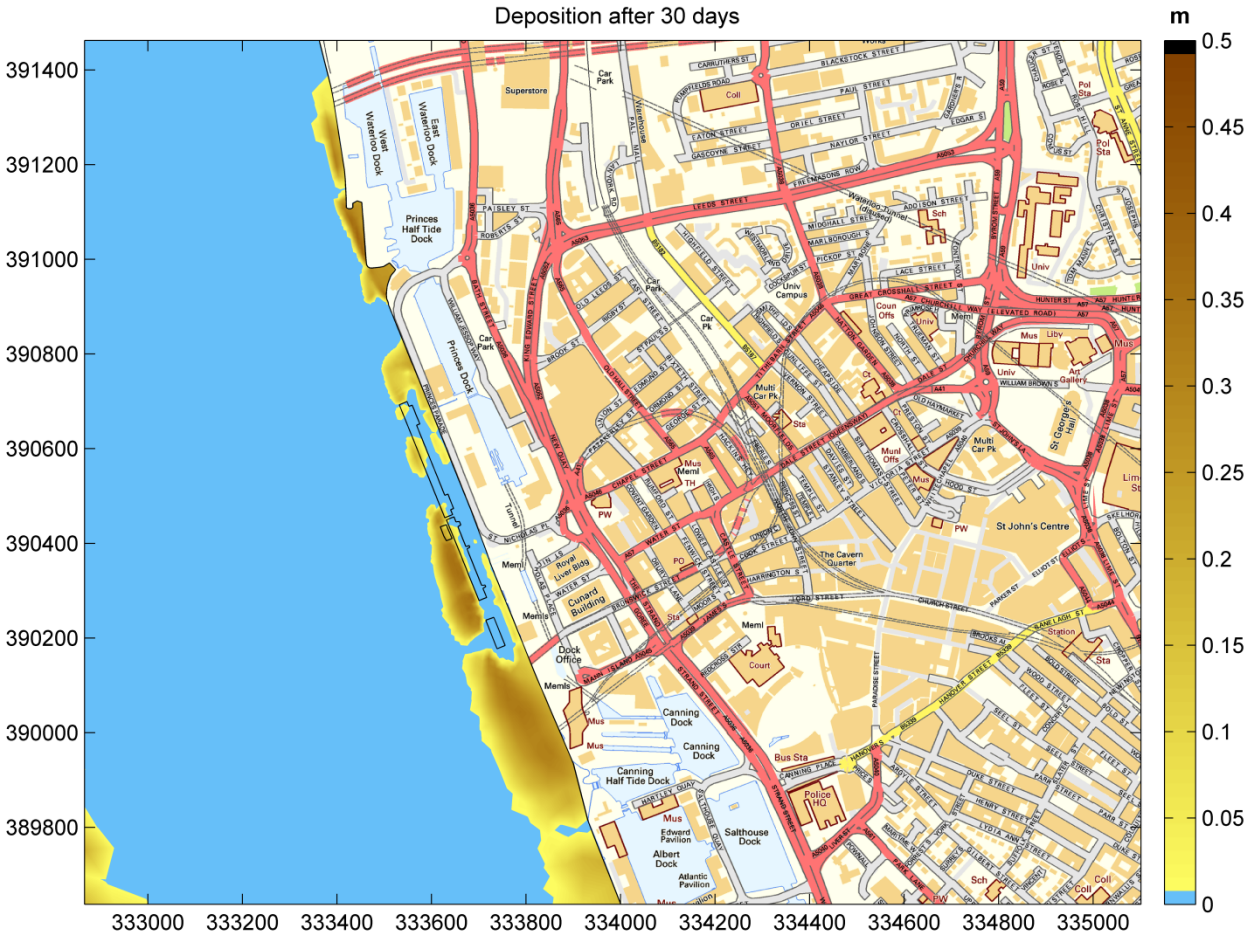

Figure 4.3: Predicted pattern of sediment accumulation, Prince's Jetty removed

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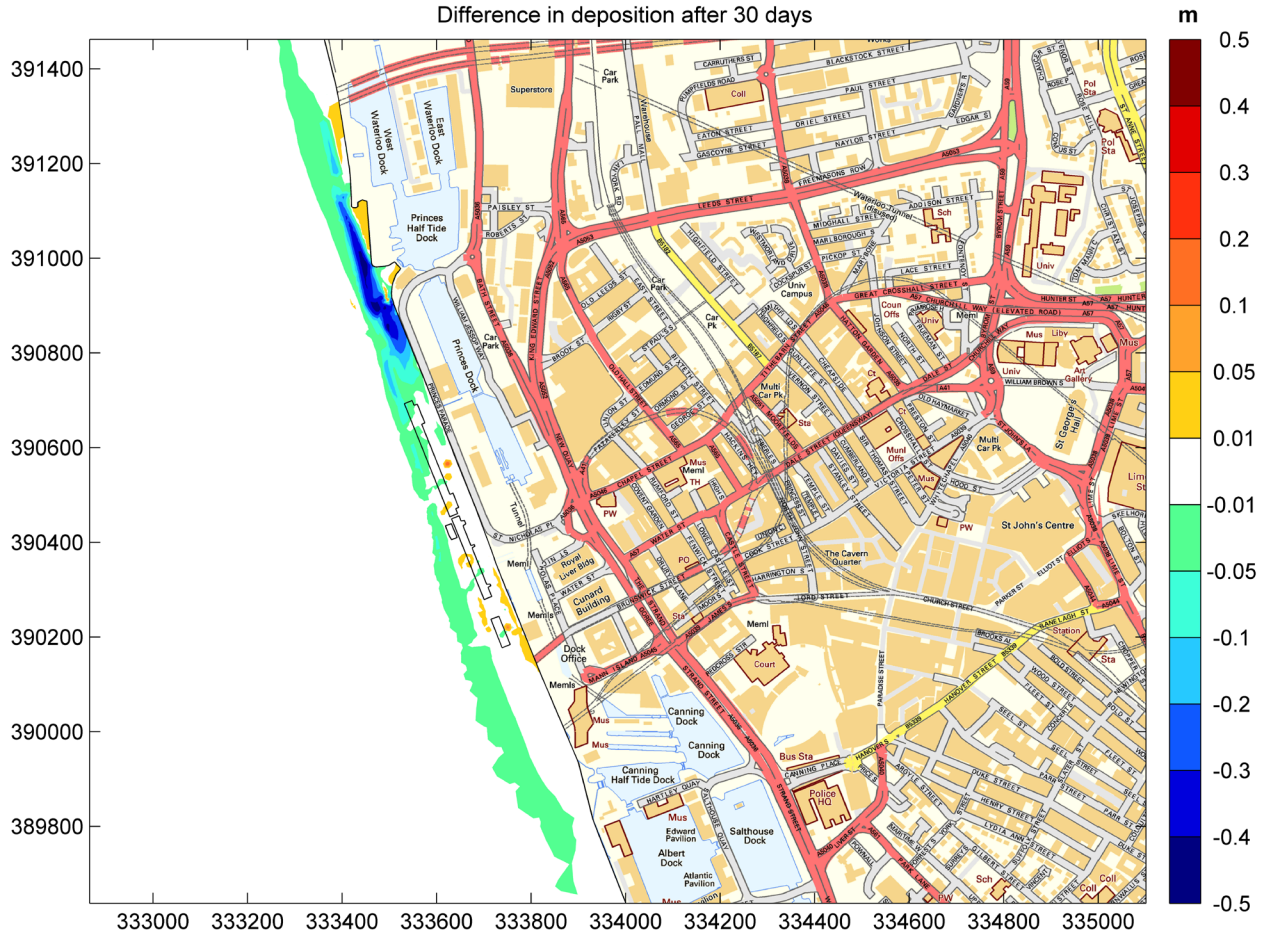

Figure 4.4: Effect of removal of Prince's Jetty on the pattern of sediment accumulation

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4.3.4. Effect of new cruise terminal platform

Figure 4.5 shows the potential for fine sediment accretion with the cruise terminal completed. Figure 4.6 shows the difference in potential accretion compared to baseline (existing) conditions. As indicated by the flow modelling the introduction of the piled structure associated with the cruise terminal counters some of the effect of removing the existing structure. The remaining effects are broadly small and localised. The change in the extent of the piled structure results in a small area with an increase in the potential for accretion underneath the proposed piled structure (Figure 4.6).

All the predicted effects are limited to within approximately 1 km of the existing jetty.

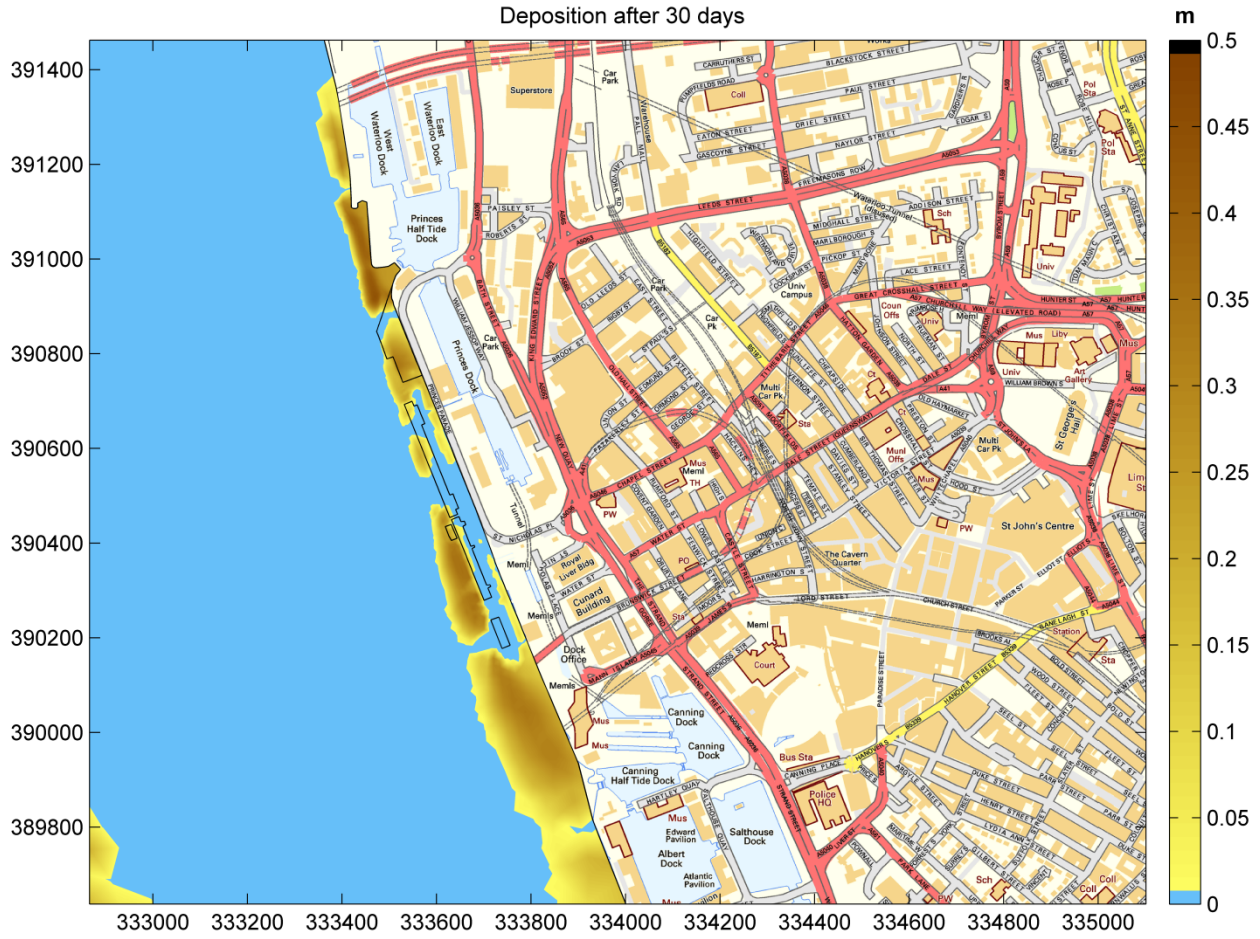

Figure 4.5: Predicted pattern of sediment accumulation, Cruise terminal completed

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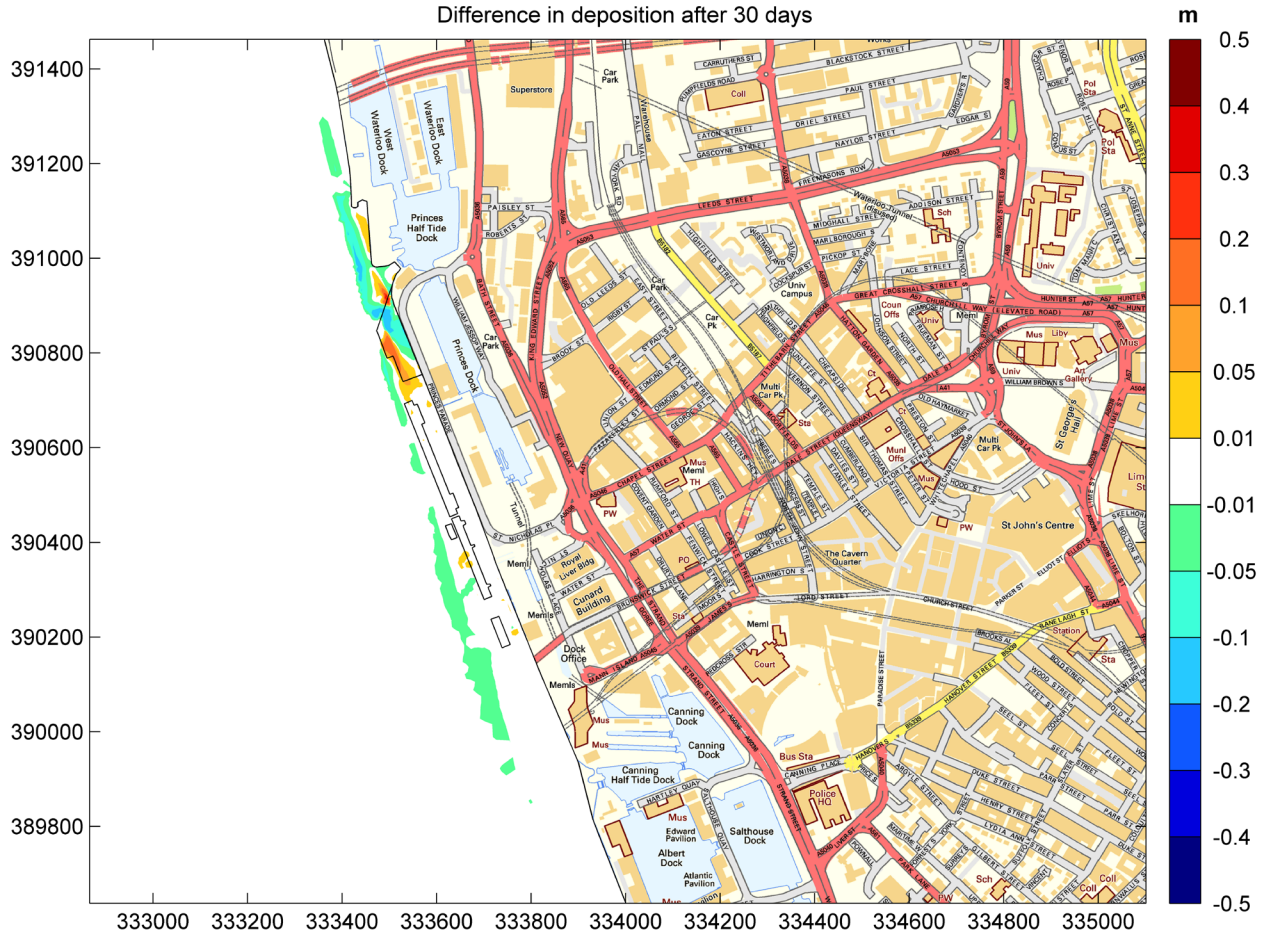

Figure 4.6: Effect of Cruise Terminal on the pattern of sediment accumulation

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4.4. Discussion

Further assessment of the predicted effects on potential fine sediment accretion has been undertaken by extracting time series of the predicted changes in bed level at a series of locations shown in Figure 4.7. The six locations, plotted in Figure 4.8 to Figure 4.13 cover a range of locations from the north of the cruise terminal site under the proposed piled structure and at locations around the existing pontoons to the south of the development site. In the time series figures “No Jetty” refers to the scenario with removal of the present Prince’s Jetty while “Scenario” refers to the scenario following construction of the new jetty.

At Points 1 and 3 (Figure 4.8 and Figure 4.10) the potential accretion is extremely close to that shown for the existing piled structure – the slight increase is not considered a significant additional risk of accretion. At the location under the present piled structure (Point 2 - Figure 4.9) the imposition of the new structure is predicted to result in minimal accretion compared to the existing case (due to the more sparse nature of the piles in the new structure), while the period between removal of the present structure and construction of the new one is predicted to result in erosion of up to 0.2 m over a 20 day period (see Section 4.5 for more details) . None of the locations to the south of the development site, around the existing pontoons (Points 4 to 6, shown in Figure 4.11 to Figure 4.13) show any effect of the development on fine sediment accretion.

The overall effect of the predicted changed pattern of accretion on the fine sediment regime is shown to be negligible as demonstrated by Figure 4.14 and Figure 4.15. These figures overlay the total sediment flux passing through transects located to either side of the cruise terminal site. The lines are indistinguishable indicating any effect of the changed layouts on accretion is only a local effect with no implications for changes to intertidal erosion or accretion in the Mersey estuary or sedimentation at marine facilities away from the development site.

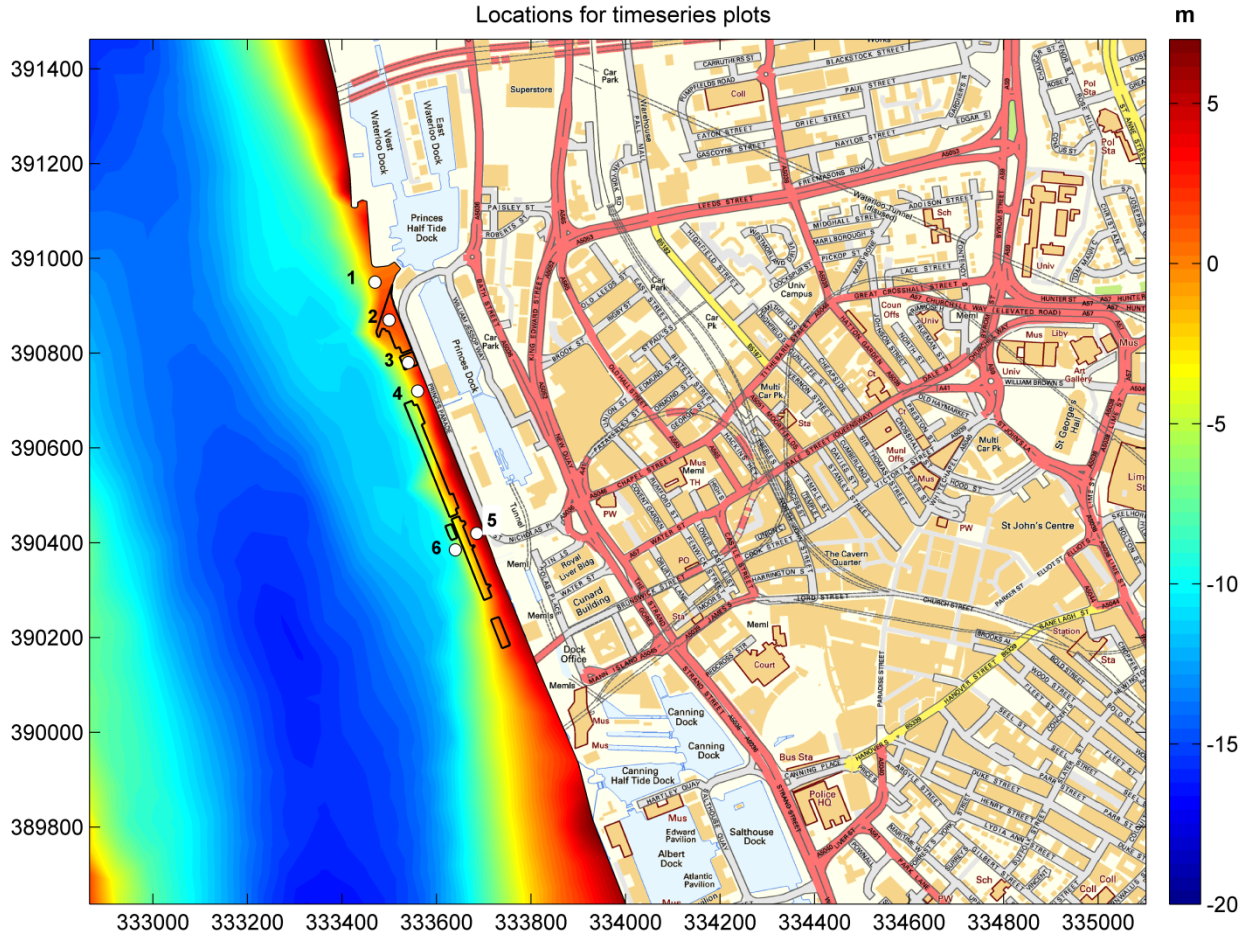

Figure 4.7: Locations of time series data points

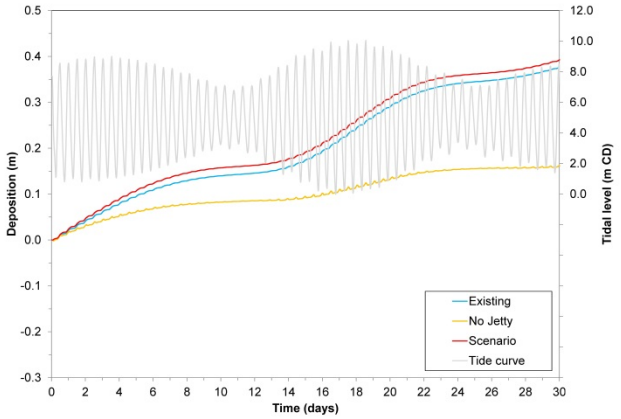

Figure 4.8: Time series of potential fine sediment accumulation at Point 1

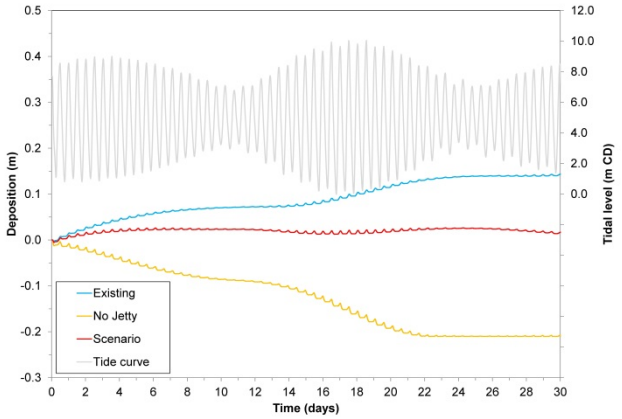

Figure 4.9: Time series of potential fine sediment accumulation at Point 2

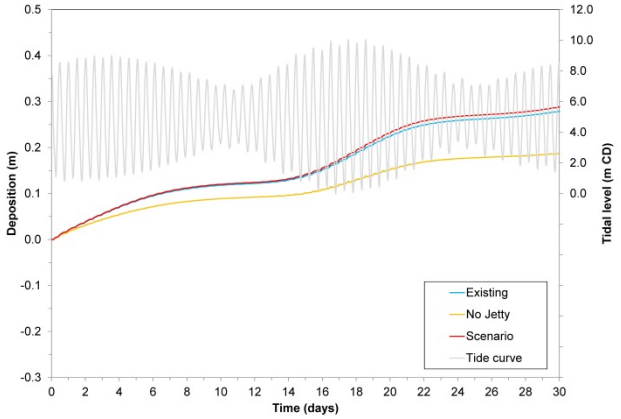

Figure 4.10: Time series of potential fine sediment accumulation at Point 3

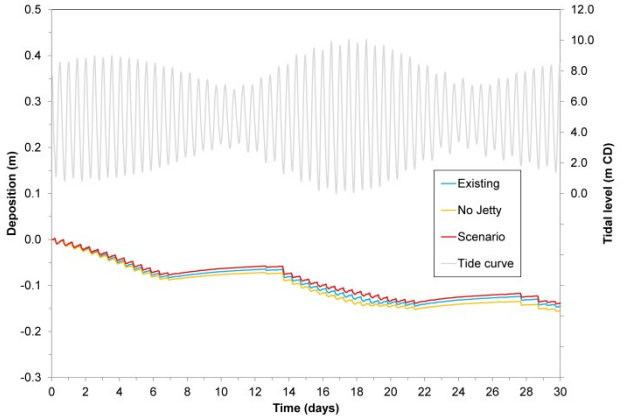

Figure 4.11: Time series of potential fine sediment accumulation at Point 4

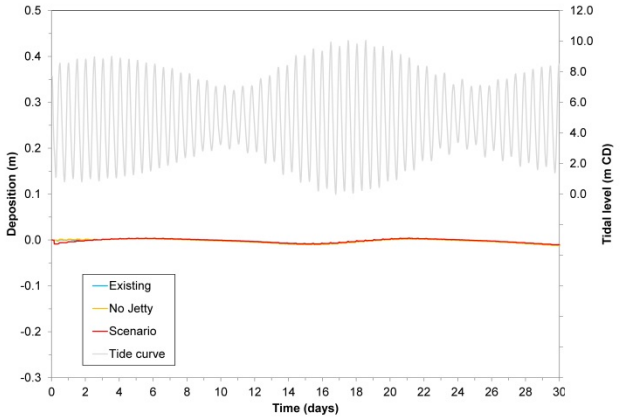

Figure 4.12: Time series of potential fine sediment accumulation at Point 5

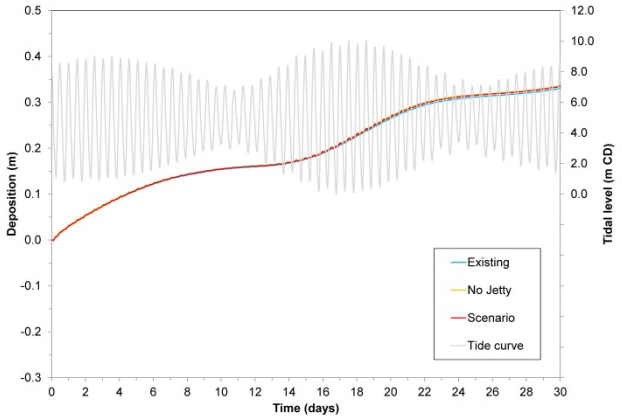

Figure 4.13: Time series of potential fine sediment accumulation at Point 6

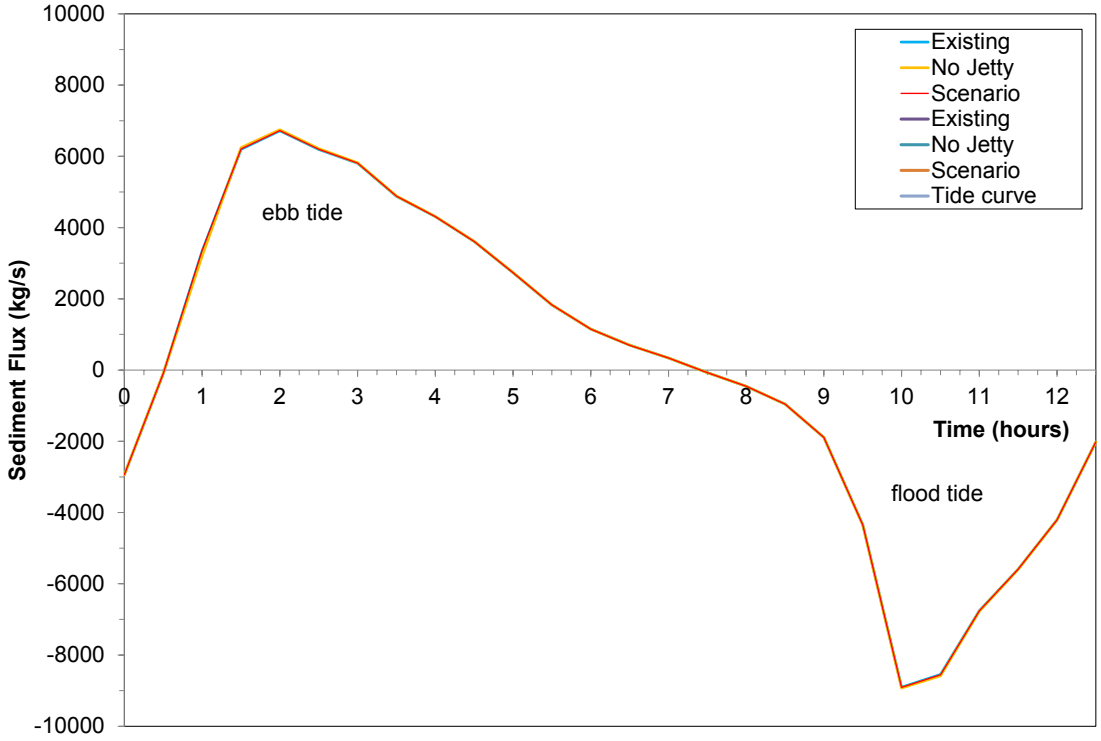

Figure 4.14: Total fine sediment flux seawards of the project site

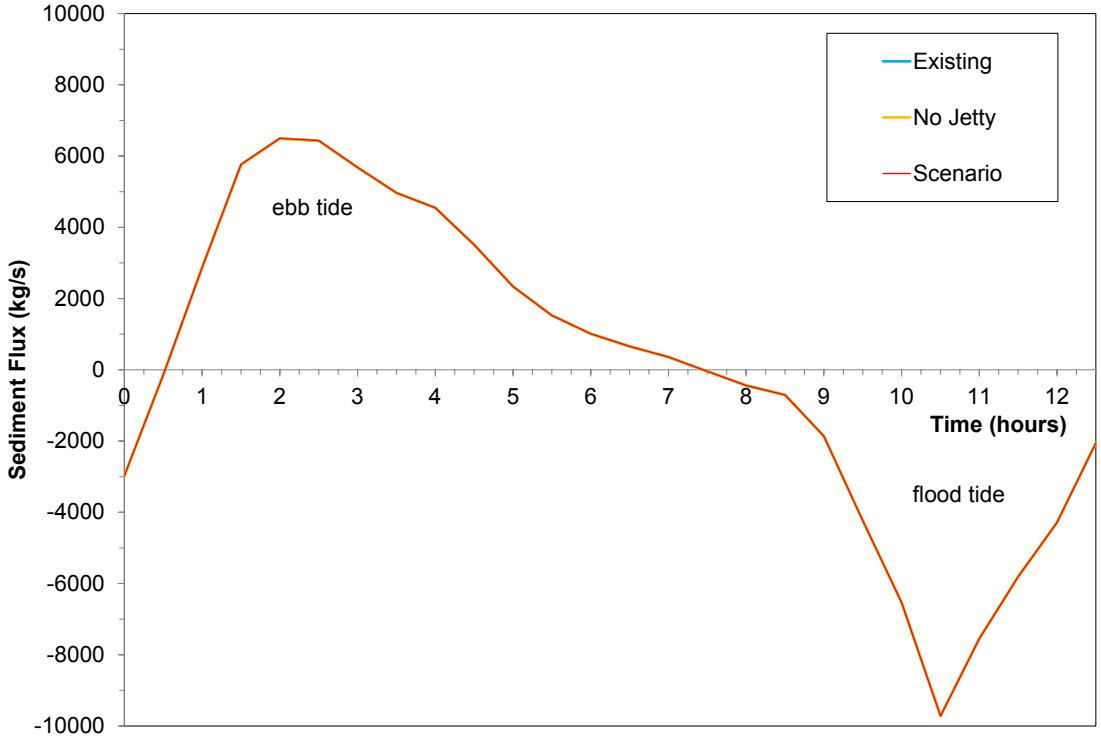

Figure 4.15: Total fine sediment flux landwards of the project site

4.5. Sediment release as a result of erosion of the bed

Figure 4.9 and Figure 4.16 indicate that there will be erosion of the bed in the vicinity of the present jetty owing to the increase in tidal current speed when the blockage to flows caused by the jetty is removed. The main area of erosion will be under the jetty itself (around 0.6 ha of up to 0.2 m depth) while much reduced levels of erosion are predicted up to 1 km away from the jetty (around 3.6 ha of a few centimetres depth). In total the volume of sediment predicted to erode is around 1,760 m^3. Figure 4.9 indicates that this erosion will occur over a 20 day period. Assuming a dry density of this underlying bed sediment of 500 kg/m^3, then on average over the period of 20 days, the rate of release of sediment material into the water column equates to 0.5 kg/s. By comparison with the observed fine sediment fluxes in the Mersey which are in the range 6,000-7,000 kg/s it can be seen the rate of additional fine sediment introduced by the removal of the present jetty structure is negligible.

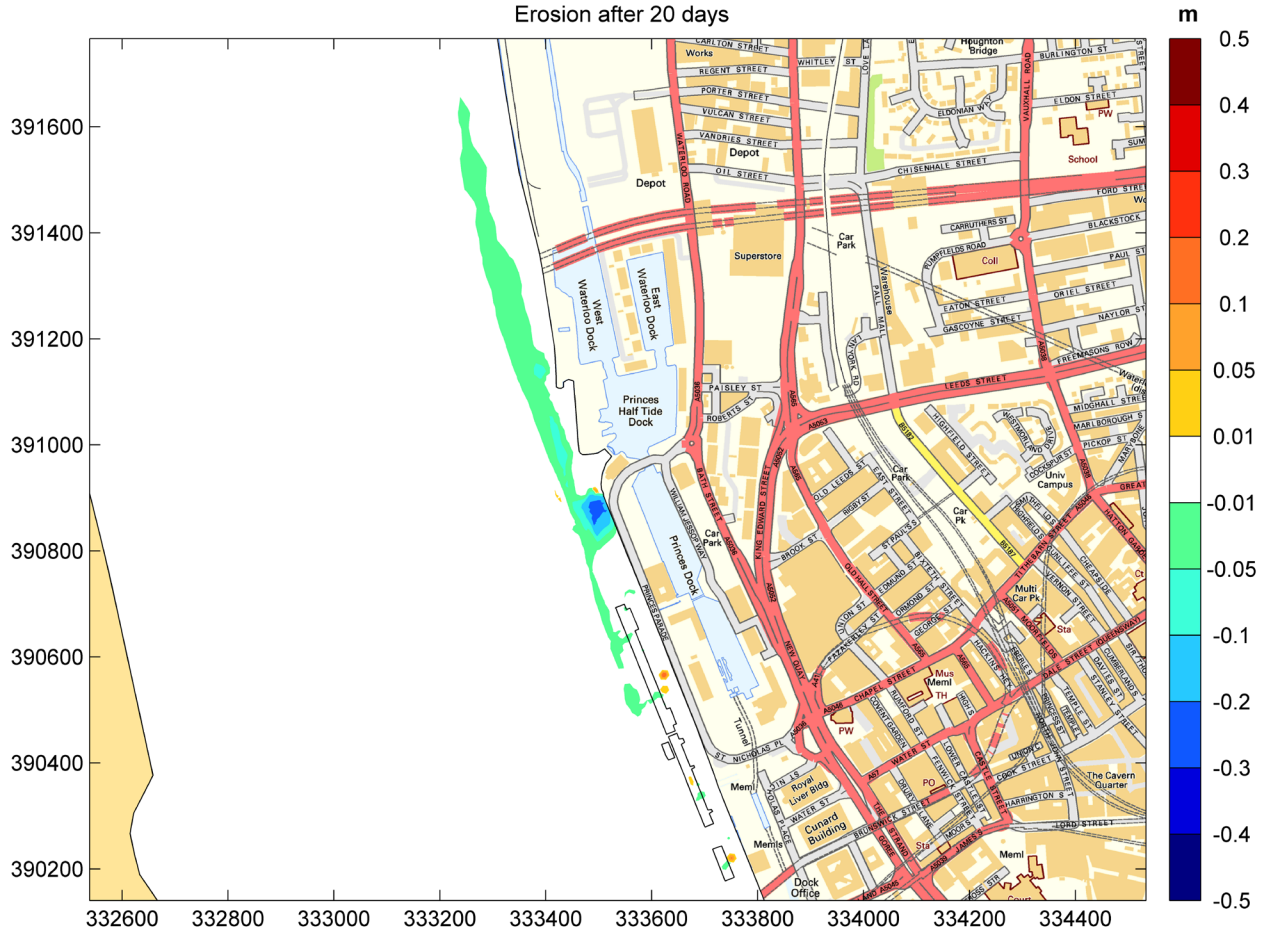

Figure 4.16: Predicted erosion of underlying bed layer as a result of removal of the present jetty structure

5. Sediment release during construction

Engineering activity in the marine environment has the unavoidable consequence of sediment disturbance. In the case of the present study and as shown by the modelling, sediment accumulation is likely to be present under the existing Prince's Jetty. This material will be disturbed during the demolition of the existing jetty and removal of the piles with the risk of increase to suspended sediment concentration or sediment deposition.

The removal of a pile from the water and associated release of fine sediment either attached to the pile or disturbed from the sea bed is considered to be broadly analogous to the release of sediment during back hoe or grab dredging. In the dredging case the bucket or grab closes around the bed material and lifts it out of the water column before placing it in a barge or on land. During the material lift and relocation a loss rate of sediment of the order of 1 kg/s is considered a reasonable worst case. By comparison with the observed fine sediment fluxes in the Mersey which are in the range 6,000-7,000 kg/s it can be seen the rate of additional fine sediment introduced by the demolition is negligible.

6. Conclusions

The effects of the cruise terminal on waves, tidal flows, sedimentation and morphology have been studied using a mix of modelling and desk assessment. In summary the effects of the completed cruise terminal structure are relatively localised and small. No overall effects on the tidal propagation or sedimentation regime are predicted.

The predicted effects are summarised as:

- The new structure will dissipate less wave energy and therefore more wave energy will be reflected back from the existing sea wall. Under northerly and north-westerly wind conditions, this is likely to result in a small localised increase in wave activity at the north end of the landing stage and at the northern end of ships on the berth.
- Currents in the area around the site and extending north in the approaches to the Princes Half Tide Dock will be increased by the demolition of the existing Prince's Jetty, but then will broadly return to something close to the existing situation once the proposed piled structure for the cruise terminal is built.
- The footprint of effect of the developed cruise terminal on tidal currents extends approximately 0.6 km seawards during the ebb tide and 0.2 km landwards during the flood tide. The effects are confined to the eastern bank line of the Mersey Estuary; no effects mid channel are shown.
- No effect on high or low water levels was predicted. At other tidal states predicted water levels with the completed development included were negligibly different, within 2mm, to the baseline case.
- The pattern of sedimentation with the cruise terminal in place is similar to the existing situation. Some sediment accumulation under the proposed piled structure is predicted. No effects on sedimentation in the areas around the pontoons to the south of the site are shown.
- Removal of the existing jetty will result in some limited erosion of the bed, mostly from underneath the present structure. However, the rate of sediment release resulting from this erosion is anticipated to be insignificant compared to the ambient sediment flux in the Mersey Estuary (up to 7,000 kg/s).
- During the demolition some sediment disturbance is unavoidable. By analogy with a reasonable worst case assumption of sediment release during backhoe or grab dredging the rate of sediment release is

anticipated to be insignificant compared to the ambient sediment flux in the Mersey Estuary (up to 7,000 kg/s).

- The predicted effects of the completed development on water level, tidal currents and sediment transport have been shown to be insensitive to increased mean sea level associated with climate change for the lifetime of the development.

7. References

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Appendix 14.2a: Hydrodynamic and Coastal Process Legislation and Guidance

Coastal Processes: Relevant Legislation and Guidance

14.1. The UK has a number consent regimes for different types of projects; these regimes are implemented into UK law through a number of statutory instruments. These include both national and local plans, policies and legislation.

Town and Country Planning (Environmental Impact Assessment) Regulations 2017

14.2. The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 transpose updates made to EU Directive 2011/92/EU ("the EIA Directive") as amended. These regulations apply the amended EU directive "on the assessment of the effects of certain public and private projects on the environment" (usually referred to as the 'Environmental Impact Assessment Directive') to the planning system in England.

14.3. The objective of the Directive is to provide a high level of protection of the environment and to help integrate environmental considerations into the preparation of proposals for development to reduce their impact on the environment.

14.4. The EIA Directive applies to public and private developments which are likely to have significant effects on the environment. These Regulations apply only to the environmental impact assessment ("EIA") of certain developments which are given consent for development under the town and country planning laws of England (the TCP Regulations) and through the nationally significant infrastructure planning regime (the IP Regulations).

14.5. The proposed development lies within Section 10 (g) of Schedule 2 of the regulations: *Construction of harbours and port installations including fishing harbours (unless included in Schedule 1)*, hence the requirement for the project to undergo an Environmental Impact Assessment process.

The Water Framework Directive (WFD) 2000/60/EC

14.6. The Water Framework Directive provides a framework in the form of a river basin planning system on a six year cycle, with the aim of protecting water dependent ecosystems, promoting sustainable water use, reducing releases of hazardous and non-hazardous substances, and contributing to mitigating effects of floods and droughts.

14.7. Any activities or developments that could cause detriment to a nearby water resource (e.g. the Mersey), or prevent the future ability of a water resource to reach its potential status, must be mitigated so as to reduce the potential for deterioration and allow the objectives of the Directive to be realised.

14.8. The proposed works will occur within the Mersey estuary and may potentially have an effect on the water resource.

EU Bathing Water Directive (2006/7/EC)

14.9. The Bathing Water Directive 2006/7/EC sets standards for monitoring water quality in places where large numbers of people are expected to bathe in surface waters. The Directive is intended to be integrated into other legislative instruments such as the Water Framework Directive to assist in protecting the quality of surface waters (e.g. rivers, lakes, groundwaters and coastal waters).

Directive 2009/147/EC on the conservation of wild birds

14.10. Special Protection Areas (SPAs) are strictly protected sites classified in accordance with Article 4 of the EC Birds Directive, which came into force in April 1979. They are classified for rare and vulnerable birds (as listed on Annex I of the Directive), and for regularly occurring migratory species

14.11. Conservation is aimed at the long-term protection and management of natural resources. The preservation, of a sufficient diversity and area of habitats is required under the directive.

Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora

14.12. Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (or Habitats Directive) allows member states to designate areas of conservational importance. Special Areas of Conservation (SACs) are protected areas designated under the EC Habitats Directive. SACs may be designated for various criteria, and the disturbance of these sites by development (or other) activities is generally prohibited unless in the case of overriding public interest.

Countryside and Rights of Way Act 2000

14.13. Sites of Special Scientific Interest (SSSI) have been developed since 1949. The most recent legislation, Countryside and Rights of Way Act 2000, includes additional provisions regarding the protection of the SSSI sites. SSSI sites are also used to underpin other national and international nature conservation designations. Although generally terrestrial, a SSSI site may extend into intertidal areas as is the case with the Mersey Narrows SSSI. Local authorities and regulators have a legal responsibility to consider how projects may affect SSSI sites.

National Planning Policy Framework (NPPF)

14.14. There are a number of policies relevant to this hydrology and coastal processes chapter within the National Planning Policy Framework (NPPF). The NPPF was published in March 2012. It sets out a new streamlined approach to the planning system that encourages growth and replaces the previous Planning Policy Statement. The relevant policies include those in Section 10 (paragraph 105) and in Section 11 (paragraphs 109, 110 and 118).

Guidelines and standards

14.15. Table 1 below lists the guidance taken into consideration during the assessment

Table 1: Industry guidance consulted during the EIA process

Guidance list
WFD Guidance: Clearing the Waters for All (2016)
CIRIA C744 - Coastal and marine environmental site guide. 2nd edition (2015)
CIRIA C741 - Environmental good practice on site guide. 4th edition (2015)
Canadian Council of Ministers of the Environment (CCME) Freshwater sediment quality guidelines (2001)
Marine Licensing: sediment analysis and sample plans (CEFAS Action Levels) (2016)
OSPAR Levels and trends in marine contaminants and their biological effects – CEMP Assessment report (2012)

Appendix 14.3a: Water Framework Directive Scoping Report

Liverpool Cruise Terminal

Water Framework Directive Scoping Assessment

October 2017

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Client Name:	Liverpool City Council
Document Reference:	WIE12464-R-9-1-2-WFD
Project Number:	WIE12464

Quality Assurance – Approval Status

This document has been prepared and checked in accordance with
Waterman Group's IMS (BS EN ISO 9001: 2015, BS EN ISO 14001: 2015 and BS OHSAS 18001:2007)

Issue	Date	Prepared by	Checked by	Approved by
First	October 2017	Pippa Kelly Associate Director	Gavin Spowage Associate Director	Gavin Spowage Associate Director

Comments

Comments

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This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at its own risk.

1. Introduction

The sea from the mean low water mark up to 1 nautical mile from shore is protected under the Water Framework Directive (WFD), 2000 as implemented by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. For licenced applications in this zone, the Marine Management Organisation (MMO) must make sure that the marine licence decision is compatible with the WFD and the North West River Basin Management Plan (RBMP)[1].

Every water body has a status and the aim of the WFD is for all water bodies to be at 'Good' status by a certain date; in the case of the River Mersey, by 2027. It's based on the condition of different quality elements in the water body, for example hydromorphology, water quality and biology. The current status is set out in the RBMP where the overall ecological status of the River Mersey is classed as 'Moderate' (i.e. does not meet 'Good' – the maximum status for a Heavily Modified Water Body). This is on account of not meeting a 'Good' status for biological (phytoplankton), physico-chemical (dissolved inorganic nitrogen), and specific pollutant (zinc) elements. In addition, the chemical status 'Fails' regarding lead and its compounds[2].

The WFD assessment must show if the activity will:

- cause or contribute to deterioration of status; and
- jeopardise the water body achieving 'Good' status.

New guidance, named Clearing the Waters for All[3], has been produced for activities in estuarine (transitional) and coastal waters. It defines the level of assessment required for a development and states that an assessment can have up to three stages: screening, scoping and impact assessment. The development of the Liverpool Cruise Terminal involves alteration / extension to a jetty and therefore the second 'scoping' stage of assessment is required. The initial 'screening' stage would only be undertaken if the activity is low risk, e.g. maintenance of structures or removal of blockages. A standard template[4], produced by the Environment Agency, has been adapted to record the findings of the scoping stage of the WFD assessment. Only one water body would be affected and therefore only one template has been completed.

A site location plan is provided in **Figure 1**, the demolition plan in **Figure 2** and proposals in **Figure 3**.

1 DEFRA and Environment Agency, North West River Basin Management Plan, February 2016
2 http://environment.data.gov.uk/catchment-planning/WaterBody/GB531206908100
3 Environment Agency, Clearing the Waters for All, June 2017
4 https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters#contents

Activity	Description, notes or more information
Applicant name	*Liverpool City Council*
Application reference number (where applicable)	*No reference available at present*
Name of activity	*Alteration to a jetty*
Brief description of activity	*The proposals are for the demolition of the existing, derelict, Princes Jetty in the north of the site to enable a new Cruise Terminal to be constructed on a suspended deck structure within the River Mersey. The deck structure would be supported on steel tubular piles cast into the sub-tidal sediments (land reclamation).* *A series of four floating pontoons are to be retained in the south-west of the Site, forming the current Liverpool Landing Stage. The landing stage facilitates the berthing and servicing of cruise ships.* *The existing 'lower' cruise terminal in the south of the site would be retained as a storage area with no change to the structures on or adjacent to the river bed. It is currently used as a reception building for cruise ship passengers.*
Location of activity (central point XY coordinates or national grid reference)	*SJ 335 905*
Footprint of activity (ha)	*It has been assumed that the existing jetty has in the region of 140 wooden posts, each 0.6m in diameter, giving an overall footprint on the estuary bed of 39.6m^2. The overall design for the new suspended deck structure has not been finalised. However, for the purposes of assessment it is considered that there would be 155 piles (which includes 15 piles for an abeyance region), each 914mm in diameter, giving an overall footprint on the estuary bed for the new jetty of approximately 102m^2.* *Both the tidal currents and the pattern of sedimentation will have a similar footprint to the existing situation following completion of the piled structure for the Cruise Terminal:* • *The footprint of effect of the developed Cruise Terminal on tidal currents extends approximately 0.6 km seawards during the ebb tide and 0.2 km landwards during the flood tide[5].* • *The pattern of sedimentation with the Cruise Terminal in place will have a similar footprint to the existing situation (i.e. with the existing or proposed development in place, the sedimentation footprint will be approximately 4.7 hectares[6]). In detail, there will be a reduction in fine sediment accumulation in the area that was covered by the existing structure, due to the reduced piling density. However, the area under the new structure that was not within the existing piling predicts an increase in sedimentation.* *The footprint of sediment disturbance relating to the future passage of cruise liners has not been accounted for as the effect would be difficult to quantify. This is on account of existing sediment movement from natural processes (tide, current and wave action) and from passage of existing craft arriving or departing from adjacent jetties.*

5 HR Wallingford (2017). Hydrodynamic and coastal process studies, Liverpool cruise terminal, RT001 R0100. Report produced for Waterman Infrastructure and Environment Ltd
6 HR Wallingford (pers. comm), 19 October 2017

Activity	Description, notes or more information
Timings of activity (including start and finish dates of construction)	*It has been assumed that the works would commence in Quarter 2 of 2018 and would be undertaken in a phased manner over approximately 24 months. Completion is therefore estimated to be in the second quarter of 2020.*
Extent of activity (for example size, scale frequency, expected volumes of output or discharge)	*The existing Liverpool Cruise Terminal has been estimated to have been used by 62 cruise liners during the 2017 summer season (comprising 42 transit and 20 turnaround vessels). This is considered likely to equate to 12 or 13 cruise ships in the busiest months.* *The estimated vessel usage for future years is indicated in Table 1. It is predicted that for the opening year there would be a 'worst case' of 14 cruise ships in the busiest month which is just two more cruise ships than currently use the existing terminal. In 2027, there is predicted to be a slight increase to 16 cruise ships in the busiest month. It should be noted that the new Cruise Terminal would replace the existing temporary Cruise Terminal, which would close when the new facility becomes operational.* *It is anticipated that the Cruise Terminal will be used from March through to November and peak-season would be July and August.*

Table 1: Estimated Cruise Visits 2020-2027[7]

Year	Estimated Transit Vessels*	Estimated Turnaround Vessels**			Estimated Total Passengers
		Medium	Large	Extra-Large	
2020	37	10	19	1	84,000
2021	38	8	19	4	86,000
2022	39	8	20	4	110,000
2023	39	8	22	5	130,000
2024	40	8	24	6	140,000
2025	42	8	24	6	155,000
2026	42	8	24	6	160,000
2027	42	8	24	6	170,000

** Transit (or 'Port of Call') relates to cruises berthing at Liverpool Cruise Terminal to allow passengers to have a day trip ashore locally or beyond*

*** Turnaround: disembarkation and embarkation*

Surface water from the all areas will be discharged directly to the River Mersey. All surface water will be treated prior to discharge but the exact method will be determined at the detailed design stage.

[7] Waterman IE, Liverpool Cruise Terminal Environmental Statement, October 2017, Chapter 5: The Proposed Development

Activity	Description, notes or more information
Use or release of chemicals (state which ones)	*There will be no intentional release of chemicals to the waterbody.* *During demolition, some sediment disturbance is unavoidable and therefore mobilisation of potential chemicals within the sub-tidal soft sediments* *See further commentary within the Water Quality section.*

Water body[1]	Description, notes or more information
WFD water body name	*Mersey*
Water body ID	*GB531206908100*
River basin district name	*North West*
Water body type (estuarine or coastal)	*Estuarine*
Water body total area (ha)	*7,969.87*
Overall water body status (2015)	*Moderate*
Ecological status	*Moderate*
Chemical status	*Fail*
Target water body status and deadline	*Good by 2027*
Hydromorphology status of water body	*Supports Good*
Heavily modified water body and for what use	*Yes, modified for navigation, ports and harbours*
Higher sensitivity habitats present	*Not within footprint of activity*
Lower sensitivity habitats present	*Likely to be subtidal soft sediment (sand, mud & mixed) adjacent to footprint of activity (more than 380.54 ha recorded within waterbody, but a complete survey of sediments has not been undertaken[8]). The results from HR Wallingford's modelling indicate that there is an accumulation of fine sediment in and around the existing Prince's Jetty.*
Phytoplankton status	*Moderate*
History of harmful algae	*Not Monitored*
WFD protected areas within 2km	*The Mersey Narrows and North Wirral Foreshore Special Protection Area (SPA) is 800m west of site boundary. The site is within the proposed extension area to the SPA*

8 http://magic.defra.gov.uk/MagicMap.aspx

1: Water body information can be found in the Environment Agency's catchment data explorer and the water body summary table. Magic maps provide additional information on habitats and protected areas. Links to these information sources can be found in the WFD assessment guidance for estuarine and coastal waters.

Specific Risk Information

Consider the potential risks of your activity to each of these receptors: hydromorphology, biology (habitats and fish), water quality and protected areas. Also consider invasive non-native species (INNS).

Section 1: Hydromorphology

Consider if hydromorphology is at risk from your activity.

Use the water body summary table to find out the hydromorphology status of the water body, if it is classed as heavily modified and for what use.

Consider if your activity:	Yes	No	Hydromorphology risk issue(s)
Could impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status	Requires impact assessment	Impact assessment not required	***No.*** *The activity does not impact a water body at High status; the Mersey supports a Moderate ecological status.*
Could significantly impact the hydromorphology of any water body	Requires impact assessment	Impact assessment not required	***No.*** *Compared to the overall area of the waterbody (7,969ha), the footprint of effect of the developed Cruise Terminal on sedimentation (i.e. the approximate increase to the footprint on the river bed at 62.4m^2) is negligible.* *The effects will be confined to the eastern bank line of the Mersey Estuary where lower sensitivity habitats have been identified; no effects mid channel are shown on the HR Wallingford model, indicating no effect on the general tidal propagation of the estuary or any overall effects on water levels.*

Consider if your activity:	Yes	No	Hydromorphology risk issue(s)
Is in a water body that is heavily modified for the same use as your activity	Requires impact assessment	Impact assessment not required	***Yes.*** *The River Mersey is dredged in order that it can be used for navigation including use by cruise ships, ferries, naval vessels and wind farm maintenance vessels.* ***Further Impact Assessment*** *The River Mersey will still be dredged with or without the proposed Cruise Terminal; adjacent jetties and the existing floating pontoons within the site are currently used by cruise ships and will continue to be used by such vessels concurrently with those using the proposed Cruise Terminal.* *Separate WFD assessments have been submitted to the MMO relating to dredging activities. Peel Ports Group Ltd have an annual requirement to remove circa 2.15Mm^3 by use of water injection dredging[9].* ***Therefore, dredging activities are considered separately from this WFD Assessment and the proposals in isolation do not cause or contribute to deterioration of the ecological status.***

Record the findings for hydromorphology and go to section 2: biology.

9 Peel Ports Group Ltd, *pers comm*. September 2017

Section 2: Biology

Habitats

Consider if habitats are at risk from your activity.

Use the water body summary table and Magic maps, or other sources of information if available, to find the location and size of these habitats.

Higher sensitivity habitats[2]	Lower sensitivity habitats[3]
chalk reef	cobbles, gravel and shingle
clam, cockle and oyster beds	intertidal soft sediments like sand and mud
intertidal seagrass	rocky shore
maerl	subtidal boulder fields
mussel beds, including blue and horse mussel	subtidal rocky reef
polychaete reef	**subtidal soft sediments like sand and mud**
saltmarsh	
subtidal kelp beds	
subtidal seagrass	

2: Higher sensitivity habitats have a low resistance to, and recovery rate, from human pressures.

3: Lower sensitivity habitats have a medium to high resistance to, and recovery rate from, human pressures.

Consider if the footprint[4] of your activity is:	Yes	No	Biology habitats risk issue(s)
0.5km^2 or larger	Yes to one or more – requires impact assessment	**No to all – impact assessment not required**	***No**. The change to the footprint of activity is less than 0.5km^2; the sedimentation footprint as a result of the proposals is broadly similar to existing situation (4.7 ha).* *Under the piled structure, a reduced risk of fine sediment accretion is shown due to the sparser nature of the proposed piled structure compared to the existing Princes Jetty and more sedimentation in the area where there was no piling previously.* *There are no effects on sedimentation in the areas around the pontoons to the south of the site.*
1% or more of the water body's area			***No.** The activity is less than 1% of the water body's area (approximately 0.05% of the 7,969ha based on the existing and proposed sedimentation footprint);*
Within 500m of any higher sensitivity habitat			***No**. The activity is not within 500m of any higher sensitivity habitat.*
1% or more of any lower sensitivity habitat			***No**. The footprint of the activity is estimated to be less than 1% the subtidal soft sediment. 380.54 ha of this lower sensitivity habitat has been recorded within the River Mersey. From review of Magic maps and HR Wallingford's analysis, it is apparent that additional subtidal soft sediment would be present.*

4: *Note that a footprint may also be a temperature or sediment plume. For dredging activity, a footprint is 1.5 times the dredge area.*

Fish

Consider if fish are at risk from your activity, but only if your activity is in an estuary or could affect fish in or entering an estuary.

Consider if your activity:	Yes	No	Biology: fish risk issue(s)
Is in an estuary and could affect fish in the estuary, outside the estuary but could delay or prevent fish entering it or could affect fish migrating through the estuary	Continue with questions	**Go to next section**	***No.*** *Fish are highly mobile and any fish physically disturbed due to sediment movement/changes in habitat would be able to avoid the area and return to the area if required once any disturbance has ceased. The subtidal soft sediment potentially disturbed is widespread within the site and wider estuary, so fish would not have to move far to find similar habitat. Changes would be gradual and any effects would be local and temporary and the magnitude of the effect is considered to be negligible. The value and sensitivity of fish at the Development site is assessed to be very high for migratory fish, high for other protected fish species, and medium for other fish species, however, sensitivity to this effect is considered to be negligible. Overall, it is considered that any effects would be of negligible significance*[10]*.*
Could impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)	Requires impact assessment	Impact assessment not required	N/A
Could cause entrainment or impingement of fish	Requires impact assessment	Impact assessment not required	N/A

Record the findings for biology habitats and fish and go to section 3: water quality.

10 Waterman Infrastructure & Environment, Liverpool Cruise Terminal Environmental Statement, October 2017, Chapter 13: Ecology

Section 3: Water quality

Consider if water quality is at risk from your activity.

Use the water body summary table to find information on phytoplankton status and harmful algae.

Consider if your activity:	Yes	No	Water quality risk issue(s)
Could affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)	Requires impact assessment	Impact assessment not required	***No**. The river is already turbid on account of erosion / deposition cycles caused by the flow of the river, tides, wave action and additional sediment disturbance from river craft (the southern part of the Site is occupied by the Isle of Man ferry terminal and the existing Liverpool Cruise Terminal is located to the south of the site). Sediment modelling undertaken by HR Wallingford has predicted that the pattern of accretion on the fine sediment regime is shown to be negligible. Therefore water clarity would not be altered from operation of the cruise terminal.* *Similarly, construction of the proposed Cruise Terminal and passage of cruise ships would not affect other water quality indicators (temperature, salinity, oxygen levels, nutrients or microbial patterns).*
Is in a water body with a phytoplankton status of moderate, poor or bad	Requires impact assessment	Impact assessment not required	***Yes**. The activity is in a waterbody where the phytoplankton status is Moderate.* ***Further impact assessment*** *All sewage and foul water from the existing buildings on the jetty are discharged in tanks housed within the pontoons and emptied via road tankers 2/3 times a year. The proposed cruise terminal building would be connected to the foul sewage system and no additional foul waste water would be disposed of in the River Mersey.* *With regard to surface water drainage, water would be drained to the Mersey and treated to ensure that the water entering the river is unpolluted. Specific treatment will be determined at the detailed design stage.* *All treated sewage and foul water from the cruise ships is only discharged at sea and waste is not permitted to be discharged in port.*

Consider if your activity:	Yes	No	Water quality risk issue(s)
			Therefore the operation of the cruise terminal would not cause deterioration of the ecological status of phytoplankton because no additional nutrients would be added to the Mersey.
Is in a water body with a history of harmful algae	Requires impact assessment	Impact assessment not required	*N/A. This has not been monitored by the EA.*

Consider if water quality is at risk from your activity through the use, release or disturbance of chemicals.

If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if:	Yes	No	Water quality risk issue(s)
The chemicals are on the Environmental Quality Standards Directive (EQSD) list	Requires impact assessment	Impact assessment not required	***No.*** *The activities would not release chemicals on the EQSD list. The risk of chemical spillage during demolition and construction (e.g. fuel oils) would be managed by a Construction Environmental Management Plan.* *Strict protocols would be in place to minimise risks associated with oil spillages from the cruise ships utilising the new Cruise Terminal, as are currently in place for cruise ships currently using the area.*
It disturbs sediment with contaminants above Cefas Action Level 1	Requires impact assessment	Impact assessment not required	***No.*** *Cefas Action Level 1 is a framework to assess material from dredging. Although no dredging will occur, some sediment disturbance is unavoidable during demolition and installation of the piles. Therefore, there will be mobilisation of potential contaminants within the subtidal soft sediments. Pollutants have been measured by the Environment Agency in the River Mersey and all except Zinc and Lead are at usual levels ('Good' or 'High'). Zinc is classed as less than 'Good' in the Mersey (at Moderate) and it Fails for lead and its compounds.* *By analogy with a reasonable worst case assumption of sediment release during backhoe or grab dredging, the rate of sediment release is anticipated to be insignificant compared to the ambient sediment flux in the Mersey Estuary (up to 7,000 kg/s)[11]. It can be seen the rate of any change to usual movement of the sediments and therefore potential contaminants as a result of demolition would be negligible. There will be no change to the ecological and chemical status of the River Mersey.*

[11] HR Wallingford (2017). Hydrodynamic and coastal process studies, Liverpool cruise terminal, RT001 R0100. Report produced for Waterman Infrastructure and Environment Ltd

If your activity has a mixing zone (like a discharge pipeline or outfall) consider if:	Yes	No	Water quality risk issue(s)
The chemicals released are on the Environmental Quality Standards Directive (EQSD) list	Requires impact assessment[5]	Impact assessment not required	***No**. All surface water drainage from the car parking areas and highways will be treated. Proposed surface water drainage systems would be treated to ensure that the water entering the river is unpolluted. Specific treatment will be determined at the detailed design stage. No chemicals will be released.*

5: Carry out your impact assessment using the Environment Agency's surface water pollution risk assessment guidance, part of Environmental Permitting Regulations guidance.

Record the findings for water quality go on to section 4: WFD protected areas.

Section 4: WFD protected areas

Consider if WFD protected areas are at risk from your activity. These include:

- Special areas of conservation (SAC)
- Special protection areas (SPA)
- Shellfish waters
- Bathing waters
- Nutrient sensitive areas

Use Magic maps to find information on the location of protected areas in your water body (and adjacent water bodies) within 2km of your activity.

Consider if your activity is:	Yes	No	Protected areas risk issue(s)
Within 2km of any WFD protected area[6]	Requires impact assessment	Impact assessment not required	***Yes**. The activity is within 800m of the Mersey Narrows and North Wirral Foreshore Special Protection Area designated as an important site for non-breeding (wintering) birds, especially waders and wildfowl. It is also within the consultation area to widen the Liverpool Bay proposed SPA extension.* ***Further Impact Assessment*** *A full ornithology desk-based data review and screening exercise was undertaken to provide a desk based assessment of the potential effects on birds [12].* *The key finding from the desk study was that the land within close proximity to the Site and in the surrounding docks on the urbanised eastern side of the Mersey Estuary within the City of Liverpool supports very few of the waterbirds during any season across the calendar year. The Site was found to not be of importance for any particular bird species as a breeding location or as a non-breeding location used to nest, forage, loaf or roost. The site is largely void of waterbirds, though some relatively common species do reside within it on occasion.* ***Therefore, even though the site is within 2km of the SPA and pSPA, there would be no deterioration of the ecological status and the proposed development would not jeopardise the River Mersey from achieving a 'Good' ecological status in the future**.*

6: Note that a regulator can extend the 2km boundary if your activity has an especially high environmental risk.

12 APEM (2017) Ornithology Desk Study & EIA Screening for New Cruise Terminal – Princes Jetty Liverpool (Appendix 12.2 of Waterman Infrastructure & Environment's Environmental Statement, October 2017).

Record the findings for WFD protected areas and go to section 5: invasive non-native species.

Section 5: Invasive non-native species (INNS)

Consider if there is a risk your activity could introduce or spread INNS.

Risks of introducing or spreading INNS include:

- Materials or equipment that have come from, had use in or travelled through other water bodies
- Activities that help spread existing INNS, either within the immediate water body or other water bodies

Consider if your activity could:	Yes	No	INNS risk issue(s)

Introduce or spread INNS	Requires impact assessment	Impact assessment not required	***No**. The proposed development would not introduce or spread INNS.*
			The main non-native species recorded during the site-specific benthic survey were the invasive barnacle (A. modestus), the starlet sea anemone (N. vectensis) and the American piddock (P. pholadiformis).
			A project-specific Biosecurity Risk Assessment would be produced which outlines numerous inherent mitigation design measures which would be incorporated into construction methods to limit the risk of introduction and the spread of existing INNS.
			Best practice guidelines would be followed and a standard INNS protocol would be implemented by the contractor. Biosecurity assessments would be undertaken for all vessels and further measures taken would include consideration of the following:
			• *Management of vehicles and vessels during demolition and construction including:*
			  ○ *Biofouling*
			  ○ *Ballast water*
			  ○ *Movement of slow or stationary vehicles*
			  ○ *Use of small vessels*
			• *Ports and Harbour protocol:*
			  ○ *Adherence to legislative guidance for specific port and harbour authorities*
			• *Conforming to industry guidelines:*
			  ○ *Follow best practice guidance, apply Best Available Technology (BAT)*

- *Conforming to guidelines on marine biosecurity planning as advised by NE:*
  - *Follow best practice guidance as set out in the Natural England and Natural Resources Wales Biosecurity Planning guidance.*[13]

Record the findings for INNS and go to the summary section.

Summary

Summarise the results of scoping here.

Receptor	Potential risk to receptor?	Note the risk issue(s) for impact assessment
Hydromorphology	No	-
Biology: habitats	No	-
Biology: fish	No	-
Water quality	No	-
Protected areas	No	-
Invasive non-native species	No	-

If you haven't identified any receptors at risk during scoping, you don't need to continue to the impact assessment stage and your WFD assessment is complete.

If you've identified one or more receptors at risk during scoping, you should continue to the impact assessment stage.

Include your scoping results in the WFD assessment document you send to your activity's regulator as part of your application for permission to carry out the activity.

13 Cook, E.J., Macleod, A. Payne, R.D. & Brown, S. (2014) edited by Natural England and Natural Resources Wales (2015). Marine Biosecurity Planning – Guidance for producing site and operation-based plans for preventing the introduction and spread of non-native species in England and Wales.

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