Northumbria Flood Risk Management Plan

Habitats Regulations Assessment

December 2022

We are the Environment Agency. We protect and improve the environment.

We help people and wildlife adapt to climate change and reduce its impacts, including flooding, drought, sea level rise and coastal erosion.

We improve the quality of our water, land and air by tackling pollution. We work with businesses to help them comply with environmental regulations. A healthy and diverse environment enhances people's lives and contributes to economic growth.

We can't do this alone. We work as part of the Defra group (Department for Environment, Food & Rural Affairs), with the rest of government, local councils, businesses, civil society groups and local communities to create a better place for people and wildlife.

Published by:

Environment Agency
Horizon House, Deanery Road,
Bristol BS1 5AH

www.gov.uk/environment-agency

Further copies of this report are available from our publications catalogue: www.gov.uk/government/publications or our National Customer Contact Centre: 03708 506 506

Email: enquiries@environment-agency.gov.uk

Table of Contents

1. Non-Technical Summary

Introduction

1.1 This is the Habitats Regulations Assessment (HRA) of the Northumbria River Basin District (RBD) Flood Risk Management Plan (FRMP). The HRA has been undertaken in accordance with The Conservation of Habitats and Species Regulations (The Habitat Regulations) 2017 (as amended) and considers the potential implications of the FRMP on designated European conservation sites. These sites contain species and habitats that are important at a European scale.

1.2 The FRMP, covering the years between 2021 and 2027, seeks to manage significant flood-related issues in the Northumbria RBD, including one specifically identified Flood Risk Area (Newcastle-upon-Tyne). It covers an area of over 9,000km^2 in Northumberland, County Durham and Tyne and Wear as well as parts of Cumbria and North Yorkshire. The Northumbria FRMP seeks to reduce a range of flooding threats, including from rivers, the sea, surface water, groundwater and sewers / canals / reservoirs.

1.3 The need for protecting human receptors should be viewed in the context of the environmental challenges present in the Northumbria RBD. Many geographic areas in the RBD are experiencing growth and need to mitigate climate change. Therefore, many freshwater and coastal habitats in the RBD, important in sustaining wintering wildfowl, fish populations and terrestrial species (e.g. otters), are subject to a wide range of human impacts, such as recreational pressure, reduced water flow / level, declining water quality and coastal squeeze. This HRA assesses the potential for the Northumbria FRMP to result in Likely Significant Effects (LSEs) and, where applicable, adverse effects on the integrity of European sites (i.e. the ability of those sites to achieve their conservation objectives).

Methodology

1.4 The Habitats Regulations 2017 (as amended) set out the specific assessment steps required for the HRA process.

1.5 The first step in the sequence of tests, often referred to as HRA screening, establishes whether a more detailed analysis known as Appropriate Assessment is required. The purpose of HRA screening is to determine, in view of the best available scientific knowledge, whether a plan or project, either alone or in-combination with other plans or projects, could result in LSEs on European sites in view of their Conservation Objectives. If the Competent Authority determines that no LSEs are present (both alone and in-combination), then no further assessment is necessary.

Test of Likely Significant Effects

1.6 All measures included in the Northumbria RBD were assessed for LSEs on the European sites across and within 10km of the RBD. None of the measures were identified to result in LSEs on any European site for a range of reasons, including that they are too non-specific to assess meaningfully, already being implemented (thus having undergone HRA previously), being subjected to a separate consenting process (as applies to Local Flood Risk Management Plans, Shoreline Management

Plans (SMPs) and Coastal Strategies), desk-based and involving no physical activity on the ground, remote from vulnerable sites or worded such they are about 'investigating', 'reviewing' and 'identifying opportunities'.

1.7 One group of measures was found to commit to physical work on the ground by 'delivering' or 'implementing' flood management interventions, such as coastal defence structures or natural flood management approaches. The broad location of some measures, is known, enabling a broad assessment of their proximity to European sites and potential linking impact pathways. However, detailed HRA (including Appropriate Assessment) was deferred to either lower-tier plans or the planning application stage when details on the nature of proposals are available. This approach was adopted to account for the strategic (and thereby necessarily non-specific) nature of the FRMP, while also identifying the measures with the highest impact potential on European sites.

1.8 This document also identified that a range of measures in the Northumbria FRMP have the potential to improve the hydrological condition of European sites across the RBD. Overall, it was shown that the FRMP represents a positive framework that will help achieve the Conservation Objectives of the freshwater bog habitat European sites, such as by collaborating with Environmental Partners and major landowners to increase peatland and wetland restoration in North East of England to reduce flood risk, improve water quality, restore natural habitats, promote carbon storage or allow for carbon sequestration to counter the impacts of climate change in the Northumbria RBD. As well as by delivering nature based solutions to flood management across the RBD which may also improve the natural habitats of the region.

Other Plans and Projects

1.9 The potential for the FRMP to result in LSEs on European sites in-combination with (i.e. considered alongside) other plans and projects was also assessed. Many such plans are proposed across the RBD, which are associated with their own impact potential. For example, local authorities are proposing a minimum delivery of c. 99,000+ dwellings to 2030 from districts fully within the Northumbria RBD as well as a further approx. 37,000 dwellings from districts partially within the RBD or adjacent to the RBD. Additionally, each district will also provide further employment land within the timescales of their current Local Plans and Core Strategies. There is also a potential for cumulative impacts with Drought Orders and Permits, Water Resource Management Plans, the Environment Agency National Drought Plan and SMPs.

1.10 Potential in-combination LSEs with Local Plan development were excluded due to most measures not being negatively linked to European sites, the fact that some measures are only included for completeness being driven by entirely separate plan processes, and the strategic nature of the FRMP, meaning that those measures with potential interactions with European sites depend upon considerable further development before the presence of any impact pathways can be clearly identified.

Conclusion

1.11 LSEs of the FRMP on all European sites, both alone and in-combination, were excluded for all measures and an Appropriate Assessment was not required. This was based on various factors, including some measures being carried over from the cycle 1 FRMP (which would have been subject to the statutory consenting process, including HRA), already implemented, not associated with impact pathways linking to

European sites or too non-specific (either in terms of specific location, their nature or both) to allow for a detailed, meaningful assessment.

1.12 Notably, seven measures were screened out at the strategic FRMP level but recommended for down-the-line HRA since the measures are sufficiently broadly expressed that they could be delivered without adverse effects but this will need to be reassessed as actual schemes are developed. As the details of potential schemes are developed towards the planning application stage, the HRA process will ensure that adequate mitigation measures, where relevant, are incorporated and the integrity of European sites will be protected.

2. Introduction and Approach to Assessment

Background and Description of the Northumbria River Basin District

2.1 The Northumbria river basin district (RBD) covers an area of 9,000 km^2, extending from the Scottish border in the north through Northumbria to Stockton-on-Tees in the south. It includes parts of Cumbria to the west and extends to North Sea to the east. The major urban centres within the district are: Newcastle, Gateshead, Sunderland and Middlesbrough and approximately 2.9 million people live in the region.

2.2 The landscape is highly varied, ranging from highly industrial urban areas in the east, across the moors, hills and valleys of Northumberland National Park, to the Heritage coast and the Pennine Area of Outstanding Natural Beauty. Generally, the west of the region is mostly rural with the main settlements to the east, along the coastal fringes. There are four main river catchments in the RBD: Northumberland Rivers, Tyne, Wear and Tees.

2.3 Around 67% of the river basin district is farmed or used for forestry, with a mixture of arable and livestock production including sheep, and on higher ground moorland, management for grouse and forestry. The main industries are chemical, petrochemicals, food, drink, transport equipment and metal sectors. Although agriculture only makes up a small part of the regional economy it is critical element of the rural economy.

2.4 The Environment Agency leads development of the Flood Risk Management Plans (FRMP) for RBDs in England and delivery of flood warning services. The draft second cycle FRMP is a plan to manage significant flood risks in designated flood risk areas (FRAs). The ambition is that the FRMP is a strategic, place-based plan which shows what is happening in flood risk management across the RBD. FRMPs focus on the more significant areas of flooding and describe the risk of flooding now and in the future. These plans will help:

- identify actions that will reduce the likelihood and consequences of flooding update plans to improve resilience whilst informing the delivery of existing flood programmes
- work in partnership to explore wider resilience measures, including nature-based solutions for flood and water
- set longer-term, adaptive approaches to help improve the nation's resilience

2.5 This document forms the Habitats Regulations Assessment (HRA) for the Northumbria FRMP. This document considers the potential effects of the draft FRMP on Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar sites, either alone or in combination with other plans or projects, and in view of best scientific knowledge.

Legislative context

2.6 The National Site Network of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) is protected via the Conservation of Habitats and Species

Regulations 2017 (as amended, most recently in 2019 to reflect Brexit). These regulations also set out the process for assessing potential adverse effects on such sites, known as HRA. Paragraph 181 of the National Planning Policy Framework[1] clarifies that, in England, the HRA process is also applied to another category of internationally important wildlife site called Ramsar sites.

2.7 The legislative basis for HRA is set in the Conservation of Habitats and Species Regulations 2017 (as amended). This states that 'A competent authority, before deciding to … give any consent for a plan or project which is likely to have a significant effect on a European site … shall make an appropriate assessment of the implications for the site in view of that sites conservation objectives… The authority shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the European site'.

2.8 The competent authority that carries out the HRA (in this case the Environment Agency) is required to apply the precautionary principle to European sites and can only adopt a plan once it has been ascertained that it will not adversely affect the integrity of the site concerned. However, even if significant adverse effects on the designated site are predicted, and in the absence of a suitable alternative solution, the plan can still be adopted in exceptional circumstances where there are deemed sufficient imperative reasons of over-riding public interest (IROPI). In such cases, however, compensatory measures must be implemented.

Overview of HRA process

2.9 The Habitats Regulations do not prescribe a particular methodology for carrying out an appraisal of plans or projects. However, it does set out the specific assessment steps involved. In February 2021 the government provided broad guidance on the HRA process[2]. The most detailed guidance on the HRA process in the UK has been produced by Scottish Natural Heritage (now NatureScot). They outline a series of thirteen steps. However, with cognisance of recent case law (refer to Table1) clarifying when mitigation can be taken into account in the HRA process, the process has been revised to constitute eleven stages (see Figure 1).

2.10 A four-stage methodology for HRA would therefore include:

- HRA Stage 1 – screening (including a 'likely significant effect' judgement)
- HRA Stage 2 – appropriate assessment
- HRA Stage 3 – assessment of alternative solutions
- HRA Stage 4 – assessment where no alternative solutions exist and where adverse effects remain (i.e. consideration of Imperative Reasons of Overriding Public Interest (IROPI) and identification of compensatory measures)

2.11 The first step in the sequence of tests is to establish whether an appropriate assessment is required. This is often referred to as HRA screening. The purpose of HRA screening is to determine, in view of best available scientific knowledge, whether a plan or project, either alone or in combination with other plans or projects, could have likely significant effects (LSE) on a European site, in view of that site's conservation objectives.

2.12 For this purpose and as a result of case law 'likely' means 'possible', while a 'significant' effect is one which could undermine the Conservation Objectives of a European site. To this end the HRA process applies the 'Precautionary Principle'[3] to

European sites. If the competent authority determines that there are no LSE (including 'in combination' effects from other plans or projects), then no further assessment is necessary and the plan or project can, subject to any other issues, be taken forward. If, however, the competent authority determines that there are LSE, or if there is reasonable scientific doubt, then the next step in the process must be initiated and a detailed appropriate assessment undertaken. While a judgment over likely significant effects must be precautionary, the court in R (Boggis) v Natural England [2009] EWCA Civ 1061 also noted that there must be a 'real', rather than a hypothetical, risk to European sites.

2.13 This is relevant to the assessment of the FRMP measures; while many measures commit to the production, update and/or delivery of other plans (such as Water Level Management Plans, WLMPs), or the assessment of options for, or a general commitment to, flood risk management assets in certain locations, the ability to identify 'real' rather than hypothetical impacts is constrained by the fact that considerable further work is needed at lower tiers to develop the plans or schemes in question before specific impact pathways can be identified with any confidence. For example, whether a given WLMP poses a likely significant effect on a given European site will depend entirely on the proposals it contains, which are not set by FRMP measures that commit to updating WLMPs. Similarly, the potential for likely significant effects to arise from 'implementing flood risk management improvements' will vary significantly depending on what is proposed and how it is to be delivered, which may not be determined at the FRMP level; a set-back flood embankment or a flood relief channel may have no implications for a given European site compared to sheet piling in the river.

2.14 The purpose of the appropriate assessment is to carry out sufficient scientific investigation to ascertain whether the plan or project, alone or in combination with other plans or projects, will not adversely affect the integrity of European sites, in view of their conservation objectives and considering any design modifications or mitigation (but <u>not</u> compensatory measures, which can only be considered in exceptional circumstances when requirements for the above HRA Stages 3 and 4 have been met).

2.15 Plans and projects can only be permitted having ascertained that there will be no adverse effect on the integrity of the European site(s) in question. Plans and projects with predicted adverse impacts on European sites may still be permitted if there are no alternatives to them and there are Imperative Reasons of Overriding Public Interest (IROPI) as to why they should go ahead. In such cases, compensation would be necessary to ensure the overall integrity of the site network. To ascertain whether or not site integrity will be affected, an Appropriate Assessment should be undertaken of the plan or project in question:

2.16 Over time the term HRA has come into wide currency to describe the overall process set out in the Regulations from screening through to IROPI. This has arisen in order to distinguish the process from the individual stage described in the law as an 'Appropriate Assessment'.

2.17 The HRA has been carried out being mindful of the implications of European case law in 2018, notably the Holohan ruling and the People over Wind ruling, both discussed below.

Figure 1. Stages of the HRA process (adapted from SNH (2015))

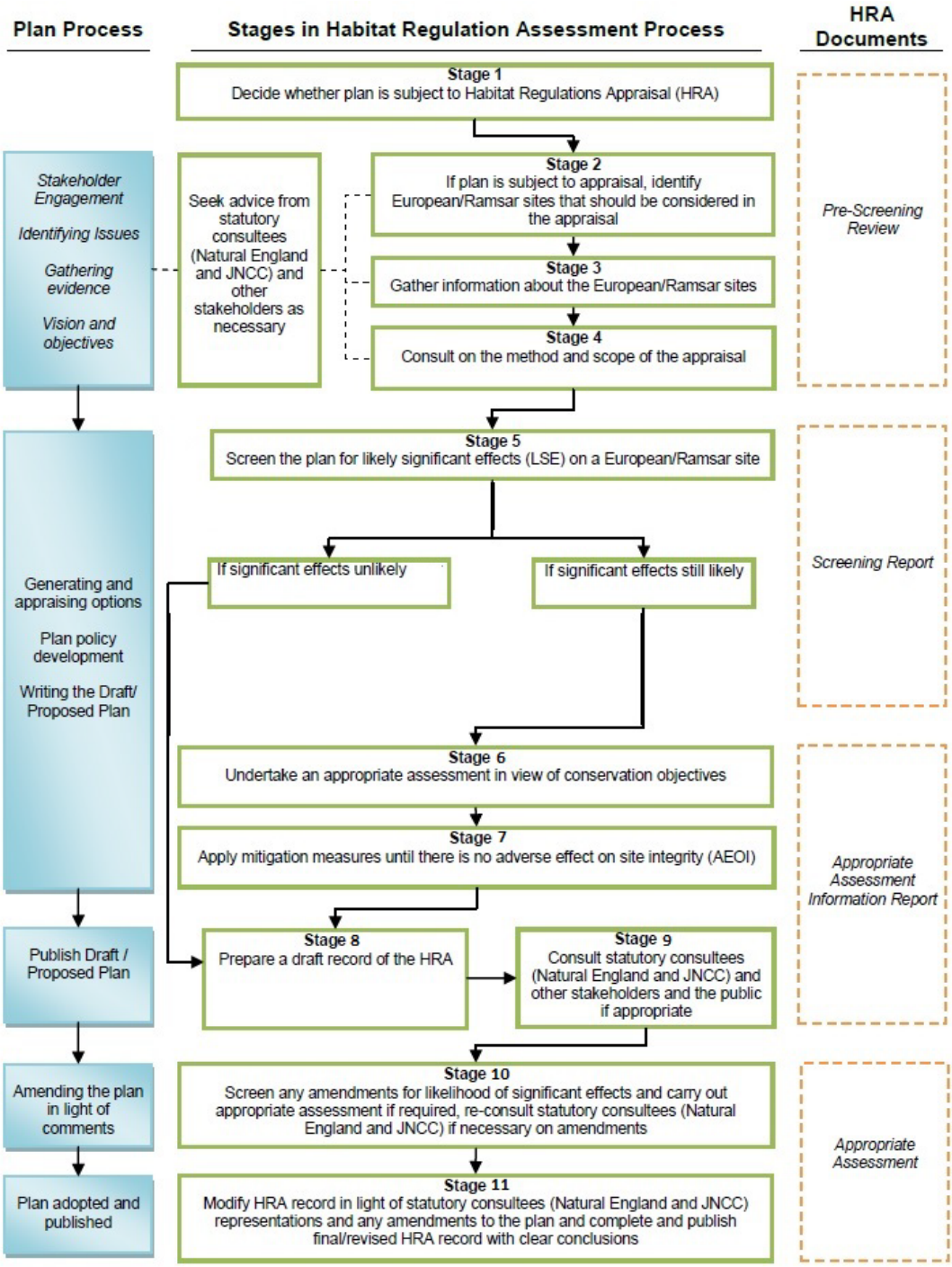


Figure 1 accessible description

Figure 1 shows the plan process, stages in Habitat Regulation Assessment process and HRA documents involved in the HRA process.

The first part of the plan process involves stakeholder engagement, identifying issues, gathering evidence and the vision and objectives. Advice may be needed from statutory consultees, such as Natural England and JNCC, and other stakeholders as necessary. The stages include:

1. Decide whether the plan is subject to Habitat Regulations Appraisal.

2. If the plan is subject to appraisal, identify European and Ramsar sites that should be considered in the appraisal.
3. Gather information about European sites and Ramsar sites.
4. Consult on the method and scope of the appraisal.

A pre-screening review document is needed for stages 1 to 4.

The second part of the plan process involves generating and appraising options, planning policy development and writing the draft/proposed plan. The stages include:

5. Screen the plan for likely significant effects (LSE) on a European or Ramsar site. If the significant effects are unlikely, then move on to stage 8. If significant effects are likely, then continue to stage 6.
6. Undertake an appropriate assessment in view of conservation objectives.
7. Apply mitigation measures until there is no adverse effect on site integrity (AEOI).

A screening report is needed for stage 5 and appropriate assessment information report is needed for stage 6 to 9.

The third part of the plan process involves publishing the draft or proposed plan. The stages include:

8. Prepare a draft record of the HRA.
9. Consult statutory consultees (Natural England and JNCC), other stakeholders and the public if appropriate.

The fourth part of the plan process involves amending the plan in light of comments. This includes stage 10:

10. Screen any amendments for likelihood of significant effects and carry out appropriate assessment if required, re-consult statutory consultees (Natural England and JNCC) if necessary, on amendments.

An appropriate assessment document is needed for stage 10 and 11 of the plan process.

In the fifth and final part of the process the plan is adopted and published. This includes stage 11:

11. Modify HRA record in light of statutory consultees (Natural England and JNCC) representations and any amendments to the plan and complete and publish final/revised HRA record with clear conclusions.

Relevant case law

2.18 As a consequence of the UK's exit from the EU, it was necessary for various amendments to be made to the Habitats Regulations. These changes were required to ensure that England and Wales (and Scotland through separate regulations) continue to maintain the same standard of protection afforded to European sites. The Habitats Regulations remain in force, including the general provisions for the protection of European sites and the procedural requirements to undertake HRA. The

changes made were only those necessary to ensure that they remain operable following the UK's exit from the EU.

2.19 Although the UK is no longer part of the EU, a series of prior rulings of the Court of Justice of the European Union (CJEU) are relevant and have been considered when preparing this document. These rulings and their implications for this HRA are summarised in Table 1.

Table 1. Case law relevant to the HRA of the FRMP

Case	Ruling	Relevance to the HRA of the FRMP
People Over Wind and Sweetman v Coillte Teoranta (C-323/17)	The ruling of the CJEU in this case requires that any conclusion of 'no likely significant effect' on a European site must be made prior to any consideration of measures to avoid or reduce harm to the European site. The determination of likely significant effects should not, in the opinion of the CJEU, constitute an attempt at detailed technical analyses. This should be conducted as part of the appropriate assessment.	NatureScot has published guidance on the implications of this ruling for HRA (SNH, 2019). It will be necessary to distinguish between those measures which are intended to avoid or reduce harmful effects on a European site and those elements of the flood management plan that may incidentally provide some degree of mitigation, but which are intrinsic or essential parts of the plan itself. SNH advises that intrinsic parts of a plan can be considered at the screening stage of HRA. If it can be concluded that the Flood management plan area will have no adverse effect on any European site, in the absence of mitigation, it will be possible to conclude 'no likely significant effects', and the need for further detailed appropriate assessment will be 'screened out'.

Case	Ruling	Relevance to the HRA of the FRMP
Waddenzee (C-127/02)	The ruling in this case clarified that appropriate assessment must be conducted using best scientific knowledge, and that there must be no reasonable scientific doubt in the conclusions drawn. The Waddenzee ruling also provided clarity on the definition of 'significant effect', which would be any effect from a plan or project which is likely to undermine the conservation objectives of any European site.	Adopting the precautionary principle, a 'likely' effect in this HRA is interpreted as one which is 'possible' and cannot be objectively ruled out. The test of significance of effects has been conducted with reference to the conservation objectives of relevant European sites.
Holohan and Others v An Bord Pleanála (C-461/17)	The conclusions of the Court in this case were that consideration must be given during appropriate assessment to: • effects on qualifying habitats and/or species of a SAC or SPA, even when occurring outside of the boundary of a European site, if these are relevant to the site meeting its conservation objectives, and • effects on non-qualifying habitats and/or species on which the qualifying habitats and/or species depend and which could result in adverse effects on the integrity of the European site.	This relates to the concept of 'functionally-linked habitat', i.e. areas outside of the boundary of a European site which supports its qualifying feature(s). In addition, consideration must be given to non-qualifying features upon which qualifying habitats and/or species rely.
T.C Briels and Others v Minister van Infrastructuur en Milieu (C-521/12)	The ruling of the CJEU in this case determined that compensatory measures cannot be used to support a conclusion of no adverse effect on site integrity.	Compensation can only be considered at the relevant stage of HRA and not during appropriate assessment. Compensation must be delivered when appropriate assessment concludes that there will be adverse effects on site integrity.

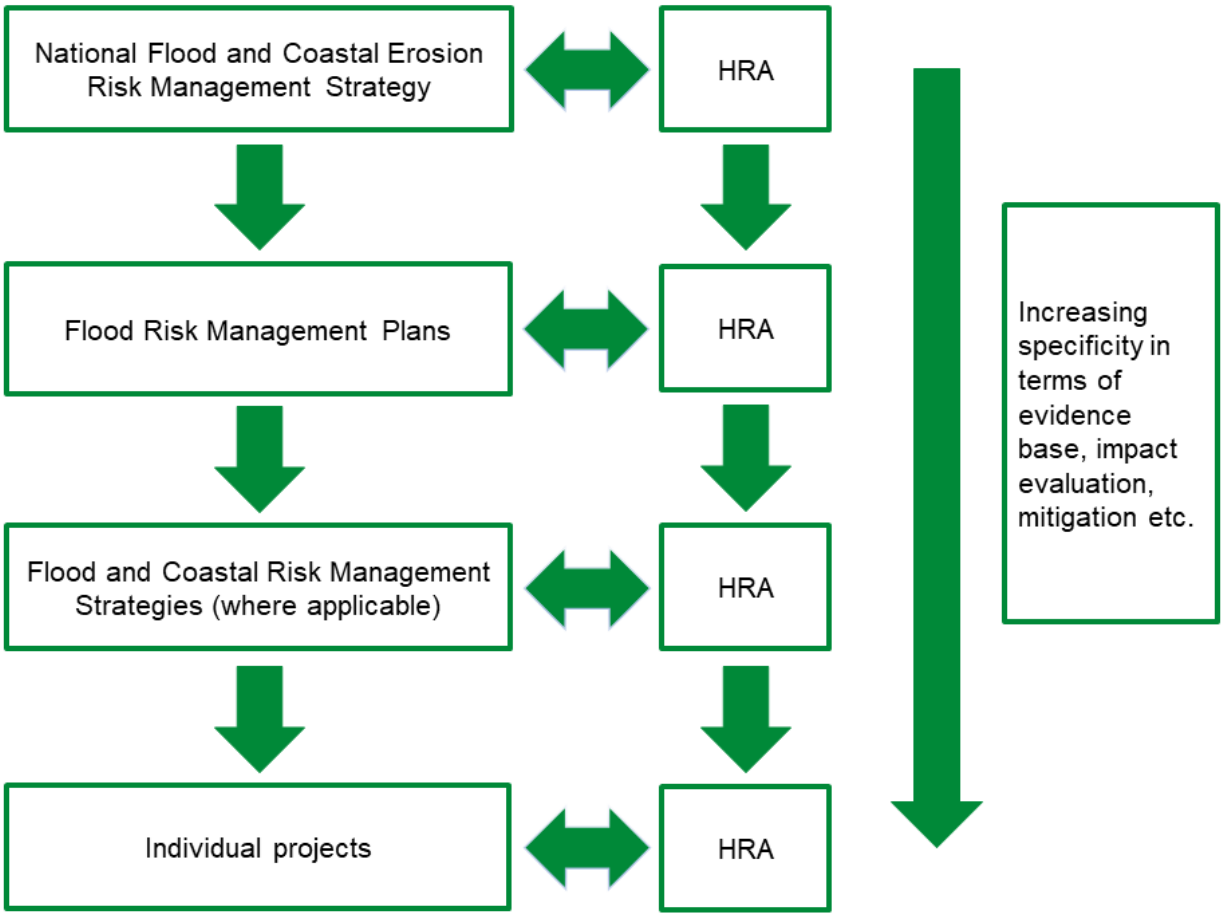
Purpose of this document

2.20 This document forms the HRA of the Northumbria FRMP. It has been prepared with regard to best scientific knowledge and an examination of potential impacts of the Flood Risk Management Plan on European Sites.

2.21 Project-related HRA often requires bespoke survey work and novel data generation in order to accurately determine the significance of effects. In other words, to look beyond the risk of an effect to a justified prediction of the actual likely effect and to the development of avoidance or mitigation measures.

2.22 However, there is a tacit acceptance that HRA can be tiered and that all impacts are not necessarily appropriate for consideration to the same degree of detail at all tiers as illustrated in Figure 2 below. Note that some measures in the FRMPs come from other plans and are reflected in the FRMP for consistency and completeness.

Figure 1. Tiering in HRA of Land Use Plans



2.23 In any strategic plan, there are numerous measures for which there is a limit to the degree of assessment that is possible at this plan level. This is because either:

- the measure in question does not contain any specific details describing what will be delivered or where so literally cannot be assessed in detail at the plan level
- development of a specific type is identified but the nature of the potential impacts are dependent on exactly how the development will be designed and constructed and therefore cannot be assessed in detail at the plan level but rather at the scheme level

2.24 For example, NatureScot has published guidance[4] that indicates a measure or initiative in a higher tier plan can be screened out without further analysis if:

a. they are intended to protect the natural environment

b. they will not themselves lead to development or other change

c. they make provision for change but could have no conceivable effect on a European site

d. they make provision for change but could have no significant effect on a European site, or

e. effects on any particular European site cannot be identified because the measures are too general or lack any spatial definition

2.25 Similarly, the Habitats Regulations Assessment Handbook[5] sets out three criteria in section F.10.1.5, that it considers would make it reasonable to defer further assessment to a lower tier plan or project:

a. the higher level plan assessment cannot reasonably predict any effect on a European site in a meaningful way

b. the lower level plan or project, which will identify more precisely the nature, timing, duration, scale or location of the measure, and thus its potential effects, will have the necessary flexibility over the exact nature, timing, duration, scale and location of the measure to enable an adverse effect on site integrity to be avoided

c. the HRA of the lower tier plan or project is required as a matter of law or government policy

2.26 In these cases, the HRA focusses on setting down-the-line requirements for more detailed assessment at the scheme level that can be included in the plan to ensure that whatever proposals come forward will not result in adverse effects on integrity. On these occasions the advice of Advocate-General Kokott[6] should be considered. She commented that: 'It would …hardly be proper to require a greater level of detail in preceding plans [rather than planning applications] or the abolition of multi-stage planning and approval procedures so that the assessment of implications can be concentrated on one point in the procedure. Rather, adverse effects on areas of conservation must be assessed at every relevant stage of the procedure to the extent possible on the basis of the precision of the plan. This assessment is to be updated with increasing specificity in subsequent stages of the procedure**'**.

2.27 Similarly, published EU guidance on HRA states: 'Where one or more specific projects are included in a plan in a general way but not in terms of project details, the assessment made at plan level does not exempt the specific projects from the assessment requirements of Article 6(3) at a later stage, when much more details about them are known.'[7]

2.28 It is also important to consider the approach taken regarding coastal defence schemes and strategies. The stance throughout all FRMP HRAs is that, provided measures are already covered by the SMP/Coastal Strategy process or another HRA process, then these measures are effectively included in the FRMPs for completeness. The FRMPs are not the source plans for these schemes and they are already committed elsewhere. The SMP and Coastal Strategies will be updated as part of their normal cycle and that will include revision to their HRAs which will take account of any changes in evidence. Each scheme will also have its own HRA before it is consented. In these cases, the DTA handbook states that plan elements can be screened out if they have, or will be subject to, HRA under another plan and this plan (the FRMP) would not materially change if they were omitted.

2.29 This is the approach taken in the HRA of the FRMP to avoid confusing the FRMP with other plan processes (such as Shoreline Management Plan (SMP) and Coastal

Strategy processes) that have their own separate HRA, or the individual schemes that are referenced in the FRMP and will be taken forward subject to significant further work including outline design, detailed design, securing of funding, community consultation and securing of necessary consents and permits. The fact that a scheme is referenced in the FRMP does not prejudge the down-the-line permitting processes.

The 'in Combination' Scope

2.30 It is a requirement of the Habitats Regulations that the impacts and effects of any land use plan being assessed are not considered in isolation but in combination with other plans and projects that may also be affecting the European site(s) in question.

2.31 When undertaking this part of the assessment it is essential to bear in mind the principal intention behind the legislation, i.e. to ensure that those projects or plans which in themselves have minor impacts are not simply dismissed on that basis but are evaluated for any cumulative contribution they may make to an overall significant effect. In practice, in combination assessment is therefore of greatest relevance when the plan would otherwise be screened out because its individual contribution is inconsequential. The overall approach is to exclude the risk of there being unassessed likely significant effects in accordance with the precautionary principle. This was first established in the seminal Waddenzee[8] case.

2.32 For the purposes of this HRA, in-combination assessment is focussed on the plans and projects identified in the Strategic Environmental Assessment (SEA) Environmental Report of the FRMP. The plans and projects were identified in the SEA as having a significant interaction with the FRMP for biodiversity, flora and fauna and required consideration. The key relevant plans and projects with a potential for in-combination effects are:

- Northumberland Local Plan 2016 – 2036 (Adopted March 2022)[9]
- North Tyneside Local Plan 2017 – 2032 (Adopted July 2017)[10]
- Draft South Tyneside Local Plan 2021 – 2039 (Consultation)[11]
- Sunderland Core Strategy and Development Plan 2015-2033 (Adopted January 2020)[12]
- County Durham Plan to 2035 (Adopted 2020)[13]
- Hartlepool Local Plan 2016 – 2031 (Adopted May 2018)[14]
- Redcar & Cleveland Local Plan to 2032 (Adopted May 2018)[15]
- Hambleton Local Plan to 2036 (Adopted February 2022)[16]
- Middlesbrough Housing Local Plan (Adopted November 2014)[17]
- Middlesbrough Emerging Local Plan (currently unavailable)
- Stockton-on-Tees Local Plan to 2032 (Adopted January 2019)[18]
- Richmondshire Preferred Options Local Plan 2018 2039[19]
- Darlington Local Plan 2016 – 2036 (Adopted February 2022)[20]
- Eden Local Plan 2014 – 2032 (Adopted October 2018)[21]
- Carlisle Local Plan 2015 – 2030 (Adopted November 2016)[22]

- Gateshead and Newcastle upon Tyne Core Strategy and Urban Core Plan 2010 – 2030 (Adopted March 2015)[23]
- Scottish Borders Local Development Plan to 2025 (Adopted May 2016)[24]
- Proposed Scottish Borders Local Development Plan to 2031 (Examination Stage)[25]
- Ryedale Local Plan to 2038 (currently unavailable)[26]
- Draft Scarborough Local Plan Review (Issues and Options Stage)[27]
- Scarborough Local Plan 2011 – 2032 (Adopted July 2017)[28]
- National Flood and Coastal Erosion Risk Management Strategy for England[29]
- Draft Northumbria River Basin Management Plan (RBMP)[30]
- Northumberland County Council Local Flood Risk Management Strategy[31]
- Newcastle City Council Local Flood Risk Management Strategy[32]
- North Tyneside Council Local Flood Risk Management Strategy[33]
- South Tyneside Council Flood and Coastal Risk Management Strategy (2017-2022)[34]
- Gateshead Council Local Flood Risk Management Strategy[35]
- Sunderland City Council Local Flood Risk Management Strategy[36]
- Durham County Council Local Flood Risk Management Strategy[37]
- Hartlepool Borough Council Local Flood Risk Management Strategy[38]
- Stockton-on-Tees Borough Council Local Flood Risk Management Strategy[39]
- Darlington Borough Council Local Flood Risk Management Strategy[40]
- Middlesbrough Council Local Flood Risk Management Strategy[41]
- SMP 1 Scottish border to the River Tyne (Northumberland and North Tyneside) Shoreline Management Plan[42]
- SMP 2 The Tyne to Flamborough Head (North-east) Shoreline Management Plan[43]
- Net Zero Newcastle – 2030 Action Plan (Adopted September 2020)[44]

2.33 The potential for ‘in combination’ effects between these plans and projects and the FRMP are discussed later in this document.

3. Pathways of Impact

Direct habitat loss

3.1 Any permanent, irreversible, habitat loss from a designated site that will result in the loss of qualifying habitats and / or species or habitats that support the designated species, will be adverse, although to affect the integrity of the site (the coherence of its structure and function) the loss must be sufficiently adverse that it materially impairs the achievement of the Conservation Objectives for the site.

3.2 Various developments can result in the loss of habitat in European Sites, either temporary or permanent. Temporary habitat loss (e.g. such as due to the need for a construction period footprint to encroach on a site) is potentially reversible depending on what the site is designated for, and there is also potential for deploying mitigation measures to avoid adverse effects on site integrity. In contrast, the permanent loss of designated habitat will result in a reduction of coverage of a potentially very rare ecosystem, with potential knock-on impacts on dependent qualifying species.

3.3 Plans or projects that result in the loss of land from a SAC can be approved in certain situations (please see Defra (2012)[45], even if the loss is sufficient to adversely affect the integrity of an SAC, if three sequential tests are met:

- no feasible alternative solutions to the plan or project exist that are less damaging
- imperative reasons of overriding public interest (IROPI)
- compensatory measures secured to ensure that the overall coherence of the European Site network is maintained

Inappropriate Coastal Management Including Coastal squeeze

3.4 Inappropriate coastal management covers any coastal management activities that would interfere with natural coastal processes to such an extent that they would potentially interfere with the ability of European sites to achieve their conservation objectives. Examples of inappropriate coastal management include:

- Reduced sediment supply to adjacent frontages, resulting in loss of habitat area. For example, defending the Holderness Coast in East Yorkshire results in a reduction in the amount of longshore sediment that would otherwise be transported into the Humber Estuary SAC/SPA/Ramsar site and this in turn could affect the persistence of features that require a continued supply of sediment, such as Spurn Point.
- Presence of flood risk management defences causing habitat erosion seawards of those defences due to wave reflection. This is more of an issue with some types of defence (such as sheet metal piling) than with other types of defence.
- Restriction of the area of intertidal habitat in front of the flood risk management defences.
- Coastal squeeze.

3.5 Coastal squeeze is defined by government as 'the loss of natural habitats or deterioration of their quality arising from anthropogenic structures or actions, preventing the landward transgression of those habitats that would otherwise naturally occur in response to sea level rise in conjunction with other coastal processes. Coastal squeeze affects habitat on the seaward side of existing structures.'[46]

3.6 Measures which involve a 'Hold the Line' approach by establishing a hard structure or maintaining the existing standard of protection by improving the defences, have the potential to result in the loss of seaward habitats as a consequence of coastal squeeze. The process of coastal squeeze prevents the landward transgression of habitats in response to climate change and resulting sea level rise. Over time, unmitigated coastal squeeze would inevitably lead to the cumulative loss of designated habitats and supporting functionally-linked habitats. Coastal squeeze impacts due to measures have already been fully explored and mitigation or compensation quantified if necessary through the SMP and Coastal Strategy process and their HRAs, and through the Flood and Coastal Erosion Risk Management (FCERM) National Strategy 2021 and compensation delivered in the form of the Habitat Compensation Programme. Therefore, coastal squeeze is scoped out of this HRA.

3.7 All the FRMPs contain measures which refer to implementing or updating Shoreline Management Plans or Coastal Strategies or flood and coastal erosion risk management schemes that are contained within those documents. In commenting on the draft version of the HRA, Natural England advised the SMP Health Check documents will include detail on what changes to SMP HRAs will be required to account for (for example) changes in sea level rise predictions. However, these reports have not yet been completed or published, and as such this information is not yet available.

3.8 The approach taken throughout all FRMP HRAs is that, provided such schemes are already covered by the SMP/Coastal Strategy process or another HRA process, these measures are effectively included in the FRMPs for completeness. The FRMPs are not the source plans for these schemes and they are already committed elsewhere. The SMP and Coastal Strategies will be updated as part of their normal cycle and that will include revision to their HRAs which will take account of any changes in evidence. Each scheme will also have its own HRA before it is consented.

Disturbance

3.9 Flood risk management construction works can result in noise or visual disturbance of qualifying species in European sites, both during the construction and operational periods. For example, noise and visual disturbance arising from construction may result in temporary behavioural changes in otters (e.g. disturbance in holts, displacement from specific stretches of the river). Piling noise during construction of defences could displace over wintering or breeding birds for which an SPA is designated. Three of the most important factors determining the magnitude of disturbance from construction schemes appear to be species sensitivity, proximity of the disturbance source and timing / duration of the disturbance.

Birds

3.10 Development schemes (such as those for flood risk management assets) can result in the disturbance of qualifying SPA / Ramsar bird species in European sites or

functionally linked habitats and this can apply whatever activity the bird is undertaking, whether nesting, foraging, loafing or roosting. Noise and visual disturbance arising from construction activities may result in behavioural changes (e.g. flight from the nest, cessation of foraging) in birds. Furthermore, post-construction disturbance from site usage, road traffic and operational lighting might also arise. Three of the most important factors determining the magnitude of disturbance appear to be species sensitivity, proximity of the disturbance source and timing / duration of the disturbance. Generally, the most disturbing visual and auditory stimuli are likely to involve irregular, infrequent, unpredictable loud noise events, movements or vibrations. Birds are least likely to be disturbed by activities that involve regular, predictable and quiet patterns of sound or movement. The further any activity is from the birds, the less likely it is to result in disturbance.

3.11 An increasing amount of research on visual and noise disturbance of waterfowl from construction (and other activities) is now available. Both visual and noise stimuli may elicit disturbance responses, potentially affecting the fitness and survival of waterfowl and waders. Noise is a complex disturbance parameter requiring the consideration of multiple parameters, including the fact that it is not described on a linear scale, its nonadditive effect and the source-receptor distance. A high level of noise disturbance constitutes a sudden noise event of over 60dB or prolonged noise of over 72dB. Bird responses to high noise levels include major flight or the cessation of feeding, both of which might affect the survival of birds if other stressors are present (e.g. cold weather, food scarcity).

3.12 Generally, research has shown that above noise levels of 84 dB waterfowl show a flight response, while at levels below 55dB there is no effect on their behaviour[47]. These two thresholds are therefore considered useful as defining two extremes. The same authors have advised that regular noise levels should be below 70 dB at the bird, as birds will habituate to noise levels below this level[48]. The Waterbird Disturbance Mitigation Toolkit published by the Institute of Estuarine & Coastal Studies in 2013, summarises the key evidence base relating to the noise disturbance impact pathway[49]. Generally, noise is attenuated by 6 dB with every doubling of distance from the source. Impact piling, the noisiest construction process of approx. 110 dB at 0.67m from source, will therefore reduce to 67-68dB by 100m away from the source. The loudest construction noise should therefore have fallen to below disturbing levels by 100m, and certainly by 200m, away from the source even without mitigation. Note that this is a rule of thumb and does not obviate the need for application-level noise modelling. However, comparison with baseline noise levels will also be important in any assessment rather than purely using comparison with the 70 dB metric (see paragraph below).

3.13 An alternative approach to assessment is to consider the relative change in the noise levels experienced by birds, rather than an absolute noise threshold. There are no formal guidelines that define a change threshold that is deemed disturbing to waterfowl and waders, but they are thought to have hearing comparable to humans. For humans a change of 3 dB defines the threshold for a change in noise to be perceptible (in other words, a change of 1 or 2 dB cannot be detected by the human ear). However, there is a significant difference between being able to notice that a noise has gotten louder and finding the increase in noise to be sufficiently intolerable that it causes displacement or otherwise significantly disrupts activity. Therefore, 3 dB may be an excessively precautionary threshold to use for judging disturbance. Due to the logarithmic nature of the decibel scale a change of 5 dB increase at the receptor is approximately a 50% increase in perceived loudness while a 10 dB increase is a

doubling in perceived loudness or sound intensity. It is reasonable to assume that an increase of 10 dB would run a high risk of causing adverse impacts to bird behaviour such as flushing, for the duration of exposure.

3.14 Visual disturbance is generally considered to have a higher impact than noise disturbance as, in most instances, visual stimuli will elicit a disturbance response at much greater distances than noise[50]. For example, a flight response is triggered in most species when they are approached to within 150m across a mudflat. Visual disturbance can be exacerbated by workers operating equipment outside machinery, undertaking sudden movements and using large machinery. Some species are particularly sensitive to visual disturbance[51], including curlew (taking flight at 275m), redshank (at 250m), shelduck (at 199m) and bar-tailed godwit (at 163m). In some areas, greater distances have been agreed between Environment Agency and Natural England, at least for purposes of HRA Screening. For example, in the Humber Estuary area have agreed a precautionary distance of 300m for the purposes of assessment of bird disturbance.

Fish / Marine Mammals

3.15 Fish use sound for vital life functions, requiring it for completion of their life cycle as well as maintaining productivity. A review of 115 primary studies (66 of which were investigating fish species) highlights that noise disturbance leads to a wide range of impacts in fish, including their development, anatomy, physiology, stress levels and behaviour[52]. A study comparing the foraging behaviour of perch and roach, found that both species showed significantly fewer feeding attempts when exposed to motorboat noise[53]. For roach, which are better hearing than perch, no habituation to noise occurred over time. In a study of pink snappers (similar to many other commercial species such as tuna, cod and haddock), it was determined that a single seismic air gun with a source noise level of 222.6dB re 1uPa resulted in extensive damage to the ears, with no apparent recovery after 58 days[54]. The impacts of noise may not be immediately visible, as demonstrated by a noise playback experiment on perch, carp and gudgeon. Exposure of the fish to underwater ship noise, resulted in cortisol increases of between 81% to 120% compared to control values[55]. Notwithstanding this evidence, it is important to note that extrapolations from noise impact studies to different settings or species should be made with caution.

3.16 Construction noise also presents a significant threat (both regarding injury and mortality) to marine mammals, including harbour porpoise and grey seals. For example, the density of harbour porpoise has been shown to be significantly reduced for several kilometres surrounding seismic surveys and impact piling activities[56] [57]. Cetaceans produce and receive sound over a great range of frequencies for use in communication, orientation, predator avoidance and foraging. Interference with these important behaviours has the potential to result in significant negative impacts. Harbour porpoise are high frequency cetaceans that have low sensitivity thresholds to impulsive sound sources. Anthropogenic sound has the potential to result in direct effects on the hearing ability of mammals (among other impacts, such as behavioural responses and masking of other underwater sounds), including Permanent Threshold Shifts (PTS) and Temporary Threshold Shifts (TTS)[58]. Some construction works within the marine environment may require Unexploded Ordnance (UXO) detonation, which involves impulsive sound elements stretching over tens of kilometres. In practice, it is typically not known whether such works will be required. Guidance from the Joint Nature Conservation Committee (as utilised for example in the HRA of the South-West England Marine Plan) confirms that a likely significant effect via

underwater noise could affect European sites up to 50km distant depending on the nature of the works.

Hydrology

3.17 The water level, its flow rates and the mixing conditions are important determinants of the condition of European sites and their qualifying features. Hydrological processes are critical in influencing habitat characteristics in wetlands and coastal waters, including current velocity, water depth, dissolved oxygen levels, salinity and water temperature. In turn these parameters indirectly determine the short- and long-term viability of plant and animal species, as well as overall ecosystem composition.

3.18 Many animal species are directly sensitive to hydrological changes, including the drying and excessive flooding of habitat. For example, many species (partially) restricted to the aquatic environment are sensitive to periodic or permanent drying, because this reduces the extent of supporting habitat available. This includes species such as the great-crested newt, southern damselfly, white-clawed crayfish and a diverse array of fish (e.g. Atlantic salmon, river lamprey, sea lamprey). In contrast, excessive flooding can result in sub-optimal water levels for foraging birds, such as small waders. If water is too deep, some species may not be able to access their primary prey species, with potential implications for foraging efficiency.

3.19 Wetland, riverine, estuarine and coastal habitats rely on hydrological connections with other surface water systems. A supply of water within natural limits is fundamental to maintaining the ecological integrity of sites. However, while the natural fluctuation of water levels within narrow limits is desirable, excess or too little water supply might cause the water level to be outside of the required range of plant and animal species. This might lead to the loss of the structure and function of aquatic habitats.

3.20 FRMPs generally propose measures to reduce the magnitude and impacts of potential flooding events. This may involve a wide range of interventions, such as flood defences and natural flood management techniques. If any such measures are delivered in the proximity to hydrology-dependent European sites, they may have implications for the water level in designated site boundaries. For example, a natural flood management intervention delivered immediately upstream of a designated floodplain or waterbody, while intended to restore the hydrological regime to a natural baseline, could reduce the volume of freshwater input to and flooding regime in that downstream European site.

Pollution

3.21 The quality of the water that feeds European sites is an important determinant of the nature of their habitats and the species they support. Poor water quality can have a range of environmental impacts:

- At high levels, toxic chemicals and metals can result in immediate death of aquatic life, and can have detrimental effects even at lower levels, including increased vulnerability to disease and changes in wildlife behaviour.
- Eutrophication, the enrichment of water with nutrients, increases plant growth and consequently results in oxygen depletion. Algal blooms, which commonly result from eutrophication, increase turbidity and decrease light penetration. The decomposition of organic wastes that often accompanies eutrophication deoxygenates water further, augmenting the oxygen depleting effects of

eutrophication. In freshwater ecosystems, plant growth is primarily determined by phosphorus concentrations, which are determined by a wide range of sources, including treated sewage effluent from Wastewater Treatment Works and urban surfaces such as roads.

- Some pesticides, industrial chemicals, and components of sewage effluent are suspected to interfere with the functioning of the endocrine system, possibly having negative effects on the reproduction and development of aquatic life.

3.22 There is an obligation for flood risk protection, management and resilience schemes to consider water quality impacts. Under the Environmental Damage (Prevention and Remediation) (England) Regulations 2015 and the Environmental Permitting (England and Wales) Regulations 2016, it is illegal to pollute watercourses. Individual planning proposals will undergo Preliminary Ecological Appraisal (PEA) or Environmental Impact Assessment (EIA), if identified as Schedule 1 or Schedule 2 proposals by the Town and Country Planning (Environmental Impact Assessment) Regulations 2017. As such, water quality protection measures must by law be introduced on any scheme that could affect the water quality of the river or coastal environment, irrespective of whether part of that environment is designated as an SAC or SPA.

3.23 For this reason, this particular impact pathway has not been used as a basis to screen in measures in this FRMP or identify the need for down-the-line HRA at lower planning tiers, as protecting water quality will be an inherent element in delivery of all measures irrespective of the designation status of linked waterbodies, watercourses and sensitive sites.

Functionally-Linked Land

3.24 While most European sites have been geographically defined in order to encompass the key features that are necessary for coherence of their structure and function, this is not the case for all such sites. Due to the highly mobile nature of waterfowl, it is inevitable that areas of habitat of crucial importance to the maintenance of their populations are outside the physical limits of the European site for which they are an interest feature. However, this area will still be essential for maintenance of the structure and function of the interest feature for which the site was designated and land use plans that may affect this land should still therefore be subject to further assessment. This has been underlined by a recent European Court of Justice ruling (C-461/17, known as the Holohan ruling[59]) which in paragraphs 37 to 40 confirms the need for an appropriate to consider the implications of a plan or project on habitats and species outside the European site boundary provided that those implications are liable to affect the conservation objectives of the site.

3.25 Certain management approaches, while positive for coastal processes, could result in the loss of landward habitats, such as coastal grazing marsh, grassland, reedbeds and arable land. Birds are mobile species and are also dependent on sites outside of formal designations and rely on the availability of a network of feeding and roosting resources over the winter period.

Spread of invasive non-native species

3.26 Invasive non-native species can have detrimental impacts on native species and habitats. Their spread can occur during construction and operation of a development,

and via multiple pathways (for example via watercourses or on the treads of construction machinery).

3.27 Under the Wildlife and Countryside Act 1981, as amended, and the Invasive Alien Species (Enforcement and Permitting) Order 2019, it is an offence to cause any plant to spread or grow in the wild outside of its native range. Appropriate biosecurity measures will therefore also be implemented during works carried out during both the construction and operational phases of any scheme to prevent the spread of invasive non-native species, irrespective of whether there are European sites in the vicinity.

4. Test of Likely Significant Effects

4.1 When seeking to identify relevant European sites, consideration has been given primarily to identified impact pathways and the source-pathway-receptor approach, rather than adopting a purely 'zones'-based approach. The source-pathway-receptor approach is a standard tool in environmental assessment. In order for an effect to occur, all three elements of this mechanism must be in place. The absence or removal of one of the elements of the mechanism means there is no possibility for an effect to occur. Furthermore, even where an impact is predicted to occur, it may not result in significant effects (i.e. those which undermine the conservation objectives of a European site). Briefly defined, pathways are routes by which a change in activity can lead to a significant effect upon a European site.

4.2 The likely zone of impact (also referred to as the likely 'zone of influence') of a plan or project is the geographic extent over which significant ecological effects are likely to occur. The zone of influence of a plan or project will vary depending on the specifics of a particular proposal and must be determined on a case-by-case basis with reference to a variety of criteria, including:

- the nature, size / scale and location of the plan
- the connectivity between the plan and European sites, for example through hydrological connections or because of the natural movement of qualifying species
- the sensitivity of ecological features under consideration
- the potential for in-combination effects

4.3 There is no geographical limit beyond which plans need not be considered by HRA. However, as a first step in identifying European sites which may be relevant, a search was made for sites within the River Basin District, or within 10km of the River Basin District. Consideration was then given to their hydrological sensitivity and the potential for them to be connected to flood risk management measures. The European sites identified within this search area is given in Table 2. Note that there are numerous European sites within the River Basin District or within 10km of it which are not hydrologically sensitive or likely to be affected by flood defences or are hydrologically sensitive but would not be linked to potential flood risk management activities. These are not listed below as they are scoped out of the HRA process.

4.4 There are clusters of hydrologically sensitive European sites across the Northumbria RBD, which can be divided into freshwater and coastal sites. These European sites are characterised by a gradient in their extent of hydrological dependency. There are no freshwater bodies within the RBD which are designed as an SAC; however, there are freshwater bodies (e.g. the River Eden SAC) in adjacent RBDs which are fed by upland moor sites within the Northumbria RBD and which form an integral component of the adjacent RBDs because they constitute freshwater bodies. Others are not themselves freshwater bodies but rely on continuous freshwater input from surface waterbodies and groundwater sources for sustained flooding and / or permanent standing water. A third category of European sites have impeded drainage and rely on freshwater supply from a combination of sources, including groundwater and surface water. Generally, rivers and sites with strong hydrological linkages (e.g. those on floodplains or bisected by major freshwater bodies), are likely to be most at risk from the measures contained in the Northumbria FRMP. Regardless, European

sites with less obvious or unclear hydrological connections that rely on extended periods of wetting, are nonetheless included in this assessment.

4.5 Estuarine, coastal and some inland terrestrial European sites have additional sensitivities (beyond hydrology) potentially linking to FRMP measures. For example, marine SPAs, Ramsars and SACs (e.g. Northumbria Coast SPA/Ramar, Teemouth and Cleveland Coast SPA/Ramsar) are designated for, or depend on, intertidal habitats such as Atlantic saltmarshes and mudflats. These estuarine / coastal habitats are under threat from coastal squeeze, whereby development or flood defences immediately inland, prevent their landward migration in response to sea level rise. FRMP measures adjoining these sites have the potential to contribute to habitat loss from estuarine and coastal sites through coastal squeeze. Furthermore, all SPAs / Ramsars, whether inland or on the coast, are sensitive to visual and noise disturbance arising during the implementation period of FRMP schemes, for example due to the presence of construction workers or the use of noisy construction equipment (e.g. piling).

Freshwater European sites

4.6 The majority of freshwater sites within the Northumbria RBD are upland bog, wet heath and meadow sites which include but are not limited to: North Pennine Moors SAC, Moor House-Upper Teesdale SAC, Harbottle Moors SAC and Border Mires, Keilder-Butterburn SAC.

4.7 None of the measures have been identified to result in likely significant effects on any hydrologically sensitive freshwater sites. This is generally because the measures are:

- too non-specific to assess meaningfully
- already being implemented
- already subjected to a separate HRA process (e.g. a Coastal Strategy or a SMP will have its own HRA process)
- essentially desk-based
- remote from European sites; or
- worded such that they are about ‘investigating’ or ‘reviewing’ or ‘identifying opportunities for’ interventions, rather than committing to any specific interventions or actions the ground - any specific schemes that subsequently emerge from the investigation/review will be subject to their own down-the-line HRA process

4.8 One group of measures goes beyond ‘investigating’, ‘reviewing’ or ‘identifying’ by committing to ‘delivering’ or ‘implementing’ flood management interventions, making it clear that physical work on the ground will occur. In some instances, particularly for Management Catchment measures, the broad location for these measures is known, while details of their implementation are not. Given the absence of details at the FRMP level, HRA (including Appropriate Assessment as necessary) must be deferred to later scheme development, lower tier plans, the outline business case and/or the planning application stage. Measures where this screening outcome applies have been categorised as ‘No Likely Significant Effect, but down-the-line HRA required’. This approach has been adopted to account for the strategic (and thereby necessarily non-specific) nature of the FRMP, while also identifying the measures with the highest impact potential on European sites.

4.9 One broader matter requiring consideration as part of the Likely Significant Effects process is the extent to which any measures, through committing to the *status quo*, may be contributing to the exacerbation or persistence of an existing water-related problem at European sites. However, for the Northumbrian region no specific measures have been identified that contain proposals that would reinforce a negative situation, subject to down-the-line HRA for any schemes that may emerge from the numerous studies committed to in the FRMP

4.10 Although not technically within the remit of HRA, it is nonetheless noted that there are several measures that present opportunities for improving the hydrological situation at European sites in affected areas, in conjunction with nature recovery plans and catchment sensitive farming, particularly as applied to the key foci for hydrologically sensitive European sites in the Northumbria RBD. This is discussed in the following sections within the context of the current hydrological vulnerability of relevant freshwater European sites.

4.11 Although non-specific, the following broad measures applicable to the River Basin District could give rise to initiatives and opportunities to improve European site hydrology:

- “Collaborate with Environmental Partners and major landowners to increase peatland and wetland restoration in North East of England to reduce flood risk, improve water quality, restore natural habitats, promote carbon storage or allow for carbon sequestration to counter the impacts of climate change in the Northumbria River Basin District.”
- “Identify and map opportunities to deliver nature-based solutions in North East of England to provide a shared resource that can be used to deliver schemes that reduce flood risk and benefit the natural environment in the Northumbria River Basin District.”
- “Improve engagement with Local Authorities with responsibility for estuaries in North East of England to ensure flood risk and biodiversity is understood and mitigated in estuary environments reducing flood risk to coastal communities, businesses and critical infrastructure while also aiding habitat creation and enhancement in the Northumbria River Basin District.”
- “Undertake estuary wide studies that establish intertidal linkages with flood risk and coast erosion in North East of England to identify natural flood risk management and habitat gain opportunities and establish long-term offset programme in the Northumbria River Basin District.”

4.12 Between them these measures could provide opportunities to improve the hydrological situation in sensitive European sites as well as protecting homes and economic assets.

4.13 The Site Improvement Plan (SIP) for the North Pennine Moors SAC and Moor House-Upper Teesdale SAC notes that “past drainage ('moor-gripping') has caused hydrological changes within blanket peat and some other water-dependent features such as alkaline fens. The effects on blanket bog are severe and widespread, potentially also resulting in impacts on breeding waders. Although mechanisms are underway in many areas to address the effects, through grip blocking, this work is not complete throughout the North Pennines Natura 2000 sites.”. The Supplementary Advice on Conservation Objectives (SACO) doesn’t contain more specific site based information for the Moor House-Upper Teesdale SAC or the North Pennine Moors SAC.

4.14 Although not specifically directed at the Northumbrian Moorland sites, the measures listed in paragraph 4.11 above could all be used to advance the requirements of the Northumbrian Moorland European sites and assist the sites in achieving their conservation objectives. Specifically increased peat and wetland restoration would help to rectify the existing deteriorating situation.

4.15 Other sites such as the Tyne and Allen River Gravels SAC are sustained by polluting heavy metals within the groundwaters. The SIP notes that “Sustaining the calaminarian grassland interest feature requires continuing metal toxicity and open ground. The tendency is for metal pollutant levels to decline naturally over time unless there is periodic replenishment of mine spoil metals, for example by flooding. This has been happening in the Tyne since the cessation of mining in the upper reach. Without replenishment a more enriched grassland type will result, usually at the expense of the original calaminarian grassland species. The Environment Agency (EA) are seeking to reduce pollution levels further to meet Water Framework Directive objectives for water quality. Any such work, including restoration of mine sites, to reduce metal pollutants entering the Tyne would exacerbate the reduction in metal levels, leading to a faster change in habitat type”. As the industries which created these habitats no longer operate there is a natural reduction in leachate into groundwater within the site. Additionally, reduction in heavy metal pollution within groundwater and surface water is a national target to improve freshwater habitats and drinking water and is not specific to the FRMP. There are no specific measures within the FRMP that would impact the SAC either positively or negatively and the underlying SSSI condition assessment states the reasons for decline are reduced heavy metal loads in the river system and mature growth of trees over shingle areas reducing water flows in flood events, rather than flood defences themselves.

Coastal European sites

4.16 Hydrologically sensitive coastal European sites occupy the entre Northumbria coast within the River Basin District and up into the adjacent Solway Tweed RBD. There are numerous measures in the Northumbria FRMP which refer to implementing or reviewing Coastal Strategies and SMPs. Such plans and strategies present considerable potential for impacts on sensitive coastal sites as set out in Section 3, particularly coastal squeeze, direct habitat loss from coastal defence footprints and (depending on use of land outside SPA boundaries by qualifying wildfowl and waders) loss of functionally-linked land.

4.17 However, the FRMP does not decide the content of either SMP’s or Coastal Strategies (including the package of underlying schemes) as these are subject to their own independent development and assessment processes, including HRA. The FRMP’s are essentially referencing these strategies and plans to create a complete picture of flood risk management in coastal areas. Therefore, despite the potential SMPs and Coastal Strategies possess for affecting European sites, the FRMP measures relating to those plans will not result in likely significant effects.

4.18 There are several measures within the Newcastle upon Tyne Flood Risk Area which refer to implementing quayside barriers or other flood prevention/management schemes along the River Tyne within the city limits. This puts considerable potential for impacts on sensitive coastal sites downstream as set out in Section 3, particularly coastal squeeze; increases in flooding downstream of the schemes which causes changes in hydrology, changing the river course and affecting areas of designated habitats.

4.19 Measures that commit to ‘reviewing’ SMP’s or Coastal Strategies do contain within them the potential to also commit to shaping those plans with a view not simply to managing flood risk to human assets but also positively influencing persistence and/or recovery of coastal habitats. This is not strictly an HRA consideration, since HRA is fundamentally about identifying whether given measures will interfere with the ability of European sites to achieve their conservation objectives, rather than shaping them to positively contribute towards achievement of those objectives. However, those measures could be amended to include reference to shaping the next generation of SMP’s and Coastal Strategies to not only take account of the latest sea level rise projections but also opportunities to improve achievement of conservation objectives for the European sites on the relevant frontage.

4.20 The FRMP’s are essentially referencing these strategies and plans to create a complete picture of flood risk management in coastal areas. The majority of these schemes are detailed by the EA as ongoing measures and would therefore have had their own HRA prior to consenting, to ensure no adverse impact on European sites. One measure (0288803008) is regarding installing quayside barriers to prevent flooding in the City. This is a proposed measure rather than ongoing, but there is little detail as to when, where and how this will be delivered. As such it cannot be fully assessed at this stage and will require down the line assessment. It is therefore recommended that this measure goes through a project level HRA to ensure that it does not cause adverse effects on European sites. Should this recommendation be incorporated it can be assessed that no likely significant effects will occur from the FRMP alone.

Table 2. European sites within 10km of the Northumbria River Basin District and that are potentially linked to local flood risk management measures

Site name	Qualifying feature(s) (*and latest assessed condition taken from Natural England SSSI search website*[60])	Summary of connectivity with the River Basin District
Berwickshire and North Northumberland Coast SAC	Intertidal mudflats and sandflats, shallow inlets and bays, reefs, sea caves, grey seal. Some of the underlying SSSI units are either unfavourable declining (units 2 & 5 Lindisfarne SSSI) or unfavourable no change (unit 1 Lindisfarne SSSI). Although some areas are unfavourable recovering (Farne Islands SSSI) or Favourable including some areas of Lindisfarne SSSI and the Northumberland Shore SSSI. The NE links the unfavourable declining assessment to falling waterfowl numbers, citing that: 'Poor water quality is linked to nutrient enrichment and is causing excessive algal growth in the Holy Island and Budle Bay area, including Unit 5/Fenham Flats. Excessive macroalgae can smother seagrass and saltmarsh habitats which provide an important food source for wintering birds'.	Berwick and North Northumberland Coast SAC is within the RBD and as a coastal site is hydrologically sensitive.

Site name	Qualifying feature(s) (*and latest assessed condition taken from Natural England SSSI search website*[60])	Summary of connectivity with the River Basin District
Border Mires, Kielder-Butterburn SAC	Wet heathland with cross-leaved heath, European dry heaths, blanket bogs, transition mires and quaking bogs, hard-water springs depositing lime (priority habitat). Unit 11 of the underlying SSSI units are recorded as unfavourable recovering with unit 12 unfavourable no change. The assessment states that there is management in place to restore bog and heathland habitats within Unit 11, however there is still high grazing pressure on the wet heath within this unit. Grazing pressure and increase bracken is also cited as causing additional pressure on the wet heath and blanket bog areas within unit 12. The remaining units are of favourable conservation status	Border Mires, Kielder-Butterburn SAC is within the RBD and as a bog and wet heathland site is hydrologically sensitive.
Coquet Island SPA	Breeding sandwich tern, roseate tern, common tern and arctic tern. The SSSI is recorded as unfavourable recovering, however this is due to declining breeding eider numbers partially due to overgrowth of vegetation and partially due to overall change in suitability of breeding conditions through climate change.	Coquet Island SPA is within the RBD. The surrounding marine environment supports the breeding population of terns in terms of a food source and is therefore the site is hydrologically sensitive.
Farne Islands SPA	Sandwich tern, roseate tern, common tern, arctic tern, common guillemot and sea bird assemblage. The underlying Farne Islands SSSI is recorded to be unfavourable recovering. This is due to a reduction of over 25% in the breeding tern populations. This is cited to potentially be due to a number of factors including species distribution due to sea temperatures/climate change and vegetation management on the islands.	Farne Islands SPA is within the RBD. The surrounding marine environment supports the breeding population of terns in terms of a food source and is therefore the site is hydrologically sensitive.

Site name	Qualifying feature(s) (*and latest assessed condition taken from Natural England SSSI search website*[60])	Summary of connectivity with the River Basin District
Ford Moss SAC	Active raised bogs. The underlying Ford Moss SSSI is recorded to be unfavourable recovering due to too much scrub and low water levels, although management such as spraying birch and blocking ditches is seeing these conditions improve and sphagnum species increase.	600m west of the RBD. Hydrologically sensitive, but the fact it is in a separate River Basin District indicates measures within the Northumbria RBD would not affect it.
Holburn Lake & Moss Ramsar	The site is a nationally rare example of a lowland raised mire. The underlying SSSI (unit 1) is recorded as unfavourable recovering, this is due to low water table, unblocked drains and growth of conifers on the mire.	Holburn Lake and Moss Ramsar is partially within the RBD and as a lake and mire site is hydrologically sensitive.
Holburn Lake & Moss SPA	Greylag goose (non-breeding). The underlying SSSI (unit 1) is recorded as unfavourable recovering, the over wintering population of greylag goose was recorded in 2013 to have dropped to very few individuals.	Holburn Lake and Moss SPA is partially within the RBD and the greylag goose population is supported by the hydrologically sensitive habitats within the site.
Irthinghead Mires Ramsar	The site is designated due to supporting an outstanding example of undamaged blanket bogs, a notable variety of sphagnum mosses and several rate plants and a rare spider (*Eboria caliginosa*). The Ramsar is spread across several SSSI units. Units 20, 21, 26, 27 and 30 are all unfavourable no change, with units 17, 23 and 28 unfavourable recovering and units 1, 12, 19, 29 and 31 favourable. The reasons for the unfavourable status of the units included, active drainage, low cover of sphagnum species and high cover of dwarf shrubs.	Three units are within the RBD, four units straddle the RBD boundary, four units sit immediately adjacent to the RBD with a single unit approx. 1.7km west of the RBD boundary. The Ramsar is designated for bog habitat and therefore hydrologically sensitive.

Site name	Qualifying feature(s) (*and latest assessed condition taken from Natural England SSSI search website*[60])	Summary of connectivity with the River Basin District
Lindisfarne Ramsar	The site is designated for six British Red Data Book wetland invertebrates, two nationally rare plants and five nationally scarce species. as well as a diverse assemblage of rate wetland birds. Designated birds include: gadwall (breeding and non-breeding), great bittern, northern shoveler and hen harrier (non breeding). Much of the underlying SSSI is regarded to be unfavourable declining due to poor water quality and nutrient enrichment.	Lindisfarne is within the RBD. The designated species depend on the hydrologically sensitive habitats within the site for food and shelter.
Lindisfarne SPA	Whooper swan, greylag goose, light-bellied brent goose, common shelduck, Eurasian wigeon, common eider, long-tailed duck, common scoter, red-breasted merganser, ringed plover, European golden plover, grey plover, sanderling, dunlin, bar-tailed godwit, common redshank (non breeding), roseate tern and little tern (breeding). Much of the underlying SSSI is regarded to be unfavourable declining due to poor water quality and nutrient enrichment. Species including whooper swan, greylag goose, eider, common scoter, ringed plover, grey plover, dunlin, bar-tailed godwit and redshank have decreased.	Lindisfarne is within the RBD. The designated species depend on the hydrologically sensitive habitats within the site for food and shelter.

Site name	Qualifying feature(s) (*and latest assessed condition taken from Natural England SSSI search website*[60])	Summary of connectivity with the River Basin District
Moor House-Upper Teesdale SAC	Calcium-rich nutrient-poor lakes, lochs and pools, European dry heath, alpine and subalpine heaths, juniper on heaths or calcareous grasslands, grasslands on soils rich in heavy metals, montane acid grasslands, dry grasslands and scrublands on chalk or limestone, purple moor-grass meadows, hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, mountain hay meadows, blanket bogs, hard-water springs depositing lime and base rich fens. The majority of the units were recorded as unfavourable recovering. Some areas are unfavourable declining, due to loss of blanket bog and reduced numbers of breeding birds.	The majority of Moor-House Upper Teesdale SAC is within the RBD and some of the habitats within the site are hydrologically sensitive.
Newham Fen SAC	Calcium-rich spring water fed fens. The underlying SSSI is recorded as favourable, this is due to the site being grazed by ponies and goats which is managing scrub and improving species diversity	Newham Fen SAC is within the RBD and is hydrologically sensitive.
North Northumberland Dunes SAC	Embryonic shifting dunes, shifting dunes with marram, dune grassland, dunes with creeping willow, humid dune slacks, petalwort.	Within the RBD. Most habitats are not hydrologically sensitive but humid dune slacks may be associated with permanent pools, fed by a combination of rainwater, surface water and groundwater.

Site name	Qualifying feature(s) (*and latest assessed condition taken from Natural England SSSI search website*[60])	Summary of connectivity with the River Basin District
North Pennine Dales Meadows SAC	Purple moor-grass meadows, mountain hay meadows. Climate change, lack of drainage and compaction, is changing the hydrological conditions causing water logging and changes in species diversity. At least one unit of the underlying SSSI is recorded as unfavourable declining due to increasing wet flush and declining herbs.	Several units of the SAC are within the RBD and the purple moor grass meadows are hydrologically sensitive.
North Pennine Moors SAC	Wet heathland with cross-leaved heath, European dry heaths, juniper on heaths or calcareous grasslands, grasslands on soils rich in heavy metals, montane acid grasslands, dry grasslands and scrublands on chalk or limestone, blanket bogs, hard-water springs depositing lime, calcium-rich spring water fed fens, acidic scree, plants in crevices in base-rich rocks and plants in crevices on acid rocks. The majority of the underlining SSSI is recorded as unfavourable recovering through limited floral diversity of designated habitats.	The site is within the RBD, and several designated habitats are considered hydrologically sensitive.
North Pennine Moors SPA	Hen harrier, merlin, peregrine falcon, and golden plover (breeding). The majority of the underlining SSSI is recorded as unfavourable recovering, with small areas of unfavourable declining. The unfavourable declining areas are due declining numbers of designated breeding birds.	The site is within the RBD, and several designated habitats for which the designated species are dependent on for food and shelter are considered hydrologically sensitive.
North York Moors SAC	Wet heathland with cross-leaved heath, European dry heaths, blanket bogs. The majority of underlying SSSI units within the RBD are recorded as unfavourable recovering.	A limited area of the SAC is present within the RBD and is designated for hydrologically sensitive

Site name	Qualifying feature(s) (*and latest assessed condition taken from Natural England SSSI search website*[60])	Summary of connectivity with the River Basin District
North York Moors SPA	Merlin and golden plover. The majority of underlying SSSI units within the RBD are recorded as unfavourable recovering.	A limited area of the SAC is present within the RBD and the habitats for which the designated species are dependent on for food and shelter are considered hydrologically sensitive
Northumberland Marine SPA	Sandwich tern, roseate tern, common tern, artic tern, little tern, common guillemot, Atlantic puffin and seabird assemblage. The majority of the SPA does not fall into a SSSI, however, is part of the Lindisfarne SSSI which is recorded as unfavourable declining due to eutrophication of the bay.	The SPA is within the RBD and the habitats for which the designated species depend on for food and shelter are considered hydrologically sensitive.
Northumbria Coast Ramsar	Little tern (breeding), purple sandpiper, turnstone (non-breeding). The majority of the underlying SSSI units for the Ramsar are recorded as favourable.	The Ramsar is within the RBD and the habitats for which the designated species depend on for food and shelter are considered hydrologically sensitive.
Northumbria Coast SPA	Little tern (breeding), purple sandpiper, turnstone (non-breeding). The majority of the underlying SSSI units for the SPA are recorded as favourable.	The SPA is within the RBD and the habitats for which the designated species depend on for food and shelter are considered hydrologically sensitive.
River Tweed SAC	Rivers dominated with floating vegetation often dominated by water-crowfoot, sea lamprey, brook lamprey, river lamprey, Atlantic salmon, otter. The majority of the underlying SSSIs for this site are unfavourable no change. This is due to eutrophication and macroalgal growth.	The Site is approximately 4.5 km north of the RBD and is discussed in the HRA of the Solway Tweed FRMP.
Roman Walls Loughs SAC	Naturally nutrient-rich lakes or lochs which are often dominated by pondweed. The majority of the underlying SSSI is regarded to be of favourable status.	The site is within the RBD and is hydrologically sensitive.

Site name	Qualifying feature(s) (*and latest assessed condition taken from Natural England SSSI search website*[60])	Summary of connectivity with the River Basin District
Simonside Hills SAC	European dry heaths, blanket bogs. The majority of the underlying SSSI is regarded to be of unfavourable recovering status.	The site is within the RBD and is hydrologically sensitive.
Teesmouth and Cleveland Coast Ramsar	Common redshank, red knot (non-breeding) and internationally important waterfowl assemblage of 9,528 individuals.	The site is within the RBD and the habitats for which the designated species depend on for food and shelter are hydrologically sensitive.
Teesmouth and Cleveland Coast SPA (Marine)	Pied avocet, red knot, ruff, common redshank, sandwich tern (non-breeding), common tern, little tern (breeding) and waterbird assemblage. The SPA is a European marine site and therefore does not have underlying SSSIs for the open water areas, however, units within the river mouth that have an assessment are regarded to be unfavourable declining due to water pollution and industrial discharges with declining numbers of designated species	The site is within the RBD and the habitats for which the designated species depend on for food and shelter are hydrologically sensitive
Tweed Estuary SAC	Estuaries, intertidal mudflats and sandflats, sea lamprey and river lamprey. The majority of the underlying SSSIs for this site are unfavourable no change. This is due to eutrophication and macroalgal growth.	The site is approximately 4.5 km north of the RBD at the mouth of the river.
Walton Moss SAC	Active raised bog and degraded raised bogs still capable of natural regeneration. The SAC is failing to reach favourable status, with some areas of the underlying SSSI unfavourable recovering and unfavourable no change due to inappropriate water levels	The site is approximately 9 km outside of the RBD at its closest and hydrologically sensitive.

Site name	Qualifying feature(s) (*and latest assessed condition taken from Natural England SSSI search website*[60])	Summary of connectivity with the River Basin District
Tyne & Allen River Gravels SAC	Grasslands on soils rich in heavy metals. The underlying SSSIs are recorded as unfavourable declining this is due to loss of habitat through reduced heavy metal loads in the river system and mature growth of trees over shingle areas reducing water flows in flood events.	The site is within the RBD. Although the site improvement plan does not list water quality or hydrological changes as a threat or pressure, the declining status of the SAC is in part due to changes in the hydrology and is therefore considered hydrologically sensitive.
River Eden SAC	Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels, rivers with floating vegetation often dominated by water-crowfoot, alder woodland on flood plains, white clawed crayfish, sea lamprey, brook lamprey, river lamprey, Atlantic salmon, bullhead, and otter. The underlying SSSI units closest to the RBD are either unfavourable recovering or favourable, however there are no condition assessment currently recorded on Natural England's website for the unfavourable units.	The site is approximately 0.4 km west of the RBD as its closest point and hydrologically sensitive. However, it is in another RBD and is discussed in the Solway Tweed and North West FRMP HRAs.

4.21 Having identified the European sites within 10km that are likely to be hydrologically linked to flood risk management activities, consideration was next given to the potential impact sources from the FRMP at all stages and pathways to European sites (including those located at distances of more than 10km if there is connectivity) by which effects could arise on qualifying features.

4.22 Based on all possible impacts, pathways, and receptors, the Test of Likely Significant Effects for each measure in the FRMP is undertaken in the following tables.

Table 3. Screening table showing the Test of Likely Significant Effects results for Lead Local Flood Authority (LLFA) national measures contained within all Flood Risk Management Plans

Measure ID	Measure	Likely Significant Effects on European sites
0299999007	Act as a consultee for major planning applications in their area	No likely significant effect – This measure describes the role of LLFAs
0299999011	Designate third party flood risk assets and maintain a register of designated flood risk assets in their area	No likely significant effect – Designating assets and maintaining a register will not affect European sites
0299999003	Implement relevant government guidance on taking climate change into account where necessary for flood risk decision making in their area	No likely significant effect – Taking climate change into account will not affect European sites
0299999018	Investigate local flood events where appropriate and necessary in their area	No likely significant effect – Investigating local flood events will not affect European sites
0299999002	Maintain, keep under review, apply and monitor a local flood risk management strategy in their area	No likely significant effect – The production of a local flood risk management strategy will not itself affect European sites
0299999015	Plan flood risk management projects to achieve wider environmental benefits where appropriate in their area	No likely significant effect – Ensuring that flood risk projects achieve wider environmental benefits will not negatively affect European sites
0299999006	Provide information to inform spatial and infrastructure planning, development and regeneration in their area	No likely significant effect – The provision of information will not affect European sites
0299999013	Regulate the condition of, and third party activity on, ordinary watercourses and review new works on ordinary watercourses in their area	No likely significant effect – Regulating activities and works will not affect European sites
0299999004	Start implementing steps to work towards net zero carbon in their area	No likely significant effect – Implementing net zero carbon will not affect European sites

Measure ID	Measure	Likely Significant Effects on European sites
0299999016	Support communities to increase their resilience to flooding in their area	No likely significant effect – Supporting communities to increase resilience to flooding will not affect European sites
0299999017	Support emergency response partners and communities to plan, prepare and exercise for future flood scenarios in their area	No likely significant effect – Supporting planning for emergency response to flooding will not affect European sites
0299999012	Take a risk based approach to develop and maintain a register of flood risk assets/features in their area	No likely significant effect – Maintaining a register of assets will not affect European sites
0299999005	Work in partnership with other risk management authorities to reduce the risk of flooding from all sources in their area	No likely significant effect – This is a wide-ranging measure and the details include that by 2027, risk management authorities will have developed and/or delivered a programme of flood risk management capital schemes and/or maintenance to reduce risk of flooding and coastal change and its adverse consequences for human health and wellbeing. Individual capital schemes may have an effect on European sites depending on what and where they are and how they are to be delivered. However, developing a programme of capital schemes will not itself lead to likely significant effects on European sites. Any individual capital schemes will need to be subject to HRA before being consented, in order to comply with legislation.
0299999009	Work with other flood asset owners and riparian landowners to raise awareness of, and where necessary enforce, maintenance responsibilities in their area	No likely significant effect – specific maintenance measures could have an adverse effect on European sites (although they are unlikely to be approved measures if so) but a requirement to raise awareness of, and enforce where required, necessary flood asset maintenance will not adversely affect European sites.
0299999010	Work with other risk management authorities to identify a programme of nature based approaches in their area	No likely significant effect – working with other authorities to identify a programme of nature-based approaches will not adversely affect European sites.

Measure ID	Measure	Likely Significant Effects on European sites
0299999008	Work with other risk management authorities to provide information where necessary to update flood maps in their area	No likely significant effect – providing information will not adversely affect European sites.
0299999014	Work with other risk management authorities to support the delivery of flood projects in their area	No likely significant effect – providing support to other authorities will not adversely affect European sites.
0299999019	Work with others to support communities through the recovery phase of a significant flood event in their area	No likely significant effect – supporting communities will not adversely affect European sites.

Table 4. Screening table showing the Test of Likely Significant Effects results for Environment Agency national measures contained within all Flood Risk Management Plans

Measure ID	Measure	Likely Significant Effects on European sites
0299999041	Continue to review flood events to improve and develop flood services in England	No likely significant effect – reviewing flood events will not adversely affect European sites.
0299999025	Designate flood risk assets where necessary in England	No likely significant effect – designating flood risk assets will not adversely affect European sites.
0299999046	Drive down carbon emissions and deliver the required flood risk management outcomes when planning and carrying out flood risk management works in England	No likely significant effect – driving down carbon emissions will not adversely affect European sites.
0299999030	In its strategic overview role, work with risk management authorities, including facilitating effective partnerships in local places in England	No likely significant effect – working with risk management authorities will not adversely affect European sites.

Measure ID	Measure	Likely Significant Effects on European sites
0299999044	Invest in flood risk management projects to contribute to improving the natural, built and historic environments	No likely significant effect – investing in projects will not adversely affect European sites.
0299999035	Issue and maintain guidance on taking climate change into account for flood risk decision making in England	No likely significant effect – issuing guidance will not adversely affect European sites.
0299999026	Maintain and update a database of its flood risk assets in England	No likely significant effect – maintaining a database will not adversely affect European sites.
0299999020	Monitor weather, tidal, rainfall and river conditions to provide flood forecasts in England	No likely significant effect – monitoring will not adversely affect European sites.
0299999042	Plan all flood risk management projects in England to achieve biodiversity net gain and wider environmental benefits	No likely significant effect – planning for biodiversity net gain will not adversely affect European sites.
0299999043	Plan all flood risk management projects in England to help achieve river basin management plan objectives	No likely significant effect – this measure is about achieving the environmental objectives of river basin management plans. This will not adversely affect European sites.
0299999033	Provide quality and timely planning advice to help avoid inappropriate development in areas at risk of flooding in England	No likely significant effect – provision of planning advice will not adversely affect European sites.
0299999031	Regulate large, raised reservoirs in England	No likely significant effect – regulating reservoirs to reduce the risk of flooding from dam and reservoir failures will not adversely affect European sites.
0299999028	Regulate new works to main rivers and sea defences in England	No likely significant effect – regulating new works to reduce the likelihood of flooding will not adversely affect European sites.

Measure ID	Measure	Likely Significant Effects on European sites
0299999039	Respond to flood events and support other emergency responders in England	No likely significant effect – responding to flood events to reduce the consequences of flooding will not adversely affect European sites.
0299999040	Support communities to increase their resilience to flooding in England	No likely significant effect – supporting communities to help them increase their resilience will not adversely affect European sites.
0299999023	Take a risk based approach to inspect, maintain and operate assets in England	No likely significant effect – adopting a risk based approach will not adversely affect European sites.
0299999027	Take targeted enforcement action where there are blockages or unpermitted structures in England	No likely significant effect – taking enforcement action regarding blockages or unpermitted structures will not adversely affect European sites.
0299999024	Understand the long term needs of its assets and plan for their whole life management in England	No likely significant effect – developing an understanding of long-term asset needs will not adversely affect European sites.
0299999045	Work with catchment partnerships, communities and other risk management authorities to maximise the use of nature based solutions in England	No likely significant effect – working to maximise the use of nature-based solutions rather than other methods of flood risk management will not adversely affect European sites.
0299999021	Work with emergency response partners to issue appropriate flood warnings in England	No likely significant effect – issuing flood warnings will not adversely affect European sites.
0299999022	Work with emergency response partners to plan, prepare and exercise for future flood scenarios in England	No likely significant effect – preparing for flood scenarios will not adversely affect European sites.
0299999032	Work with local planning authorities, developers and other place makers in England	No likely significant effect – working with other authorities to ensure all new development is resilient to flooding will not adversely affect European sites.

Measure ID	Measure	Likely Significant Effects on European sites
0299999029	Work with research partners and the wider scientific community in England	No likely significant effect – working with research partners into new approaches to reduce risk of flooding will not adversely affect European sites.
0299999036	Work with risk management authorities and other partners to implement the National Flood and Coastal Erosion Risk Management Strategy in England	No likely significant effect – individual proposals within the National Flood and Erosion Risk Management Strategy may pose likely significant effects to European sites but the Strategy has been subject to its own HRA. The measure concerns working with other authorities to implement the Strategy, which will not itself adversely affect European sites.
0299999038	Work with risk management authorities to identify a programme of future flood risk management projects in England	No likely significant effect – a commitment to identify a programme of future projects will not adversely affect European sites. Individual schemes and projects may have an effect on European sites depending on what and where they are and how they are to be delivered. However, all schemes will need to be subject to HRA before being consented, in order to comply with legislation.
0299999034	Work with risk management authorities to maintain and update where necessary flood maps in England	No likely significant effect – maintaining and updating flood maps will not adversely affect European sites.
0299999037	Work with risk management authorities to support the delivery of flood risk management projects in England	No likely significant effect – supporting risk management authorities in delivering flood risk management projects will not itself adversely affect European sites. Individual schemes and projects may have an effect on European sites depending on what and where they are and how they are to be delivered. However, all schemes will need to be subject to HRA before being consented, in order to comply with legislation.

Table 5. Screening table showing the Test of Likely Significant Effects results for measures contained within the Northumbria Flood Risk Management Plan for the RBD

Measure ID	Measure	Likely Significant Effects on European sites
0203903021	By 2022, the Environment Agency will begin to implement long-term whole-life asset management plans in North East of England to deliver efficiencies, reduce carbon, secure future funding, improve resource planning, improve stakeholder engagement and establish a strategic view of the capital pipeline in the Northumbria River Basin District.	No likely significant effect – implementing whole-life asset management plans will not adversely affect European sites
0203903010	By 2027, the Environment Agency will carry out a strategic review of Environment Agency debris screen assets in North East of England to identify opportunities to reduce the risk of flooding to properties in the Northumbria River Basin District.	No likely significant effect, but down-the-line HRA required – reviewing debris screen assets will not itself adversely affect European sites. Individual schemes and projects may have an effect on European sites depending on what and where they are and how they are to be delivered. Therefore, all schemes will need to be subject to HRA before being consented, in order to comply with legislation. In line with the guidance quoted in paragraph 2.24, down-the-line assessment will be required as further details emerge regarding what will be done to deliver this measure.
0203903026	By 2027, the Environment Agency and Risk Management Authorities will collaborate with Environmental Partners and major landowners to increase peatland and wetland restoration in North East of England to reduce flood risk, improve water quality, restore natural habitats, promote carbon storage or allow for carbon sequestration to counter the impacts of climate change in the Northumbria River Basin District.	No Likely Significant Effect – significantly increasing peatland and wetland restoration will not adversely affect European sites and could benefit them.

Measure ID	Measure	Likely Significant Effects on European sites
0203903013	By 2027, the Environment Agency and Northumbrian Water Limited will consider the potential implications of climate change to flood risk and water resource requirements and sustainable management of water in North East of England to aid optioneering and help prioritise future investment needs in the Northumbria River Basin District.	No likely significant effect – considering implications of climate change to assist priority of future investment needs does not adversely affect European sites.
0203903022	Between 2021 and 2027, the Environment Agency and Risk Management Authorities within the Northumbria Integrated Drainage Partnership will deliver a collaborative programme of flood risk management works in North East of England to protect communities from multiple sources of flooding and implement environmental improvements in the Northumbria River Basin District.	No likely significant effect – committing to collaboratively deliver a program of works does not in itself adversely affect European sites. Individual schemes and projects regarding flood management may have an effect on hydrologically sensitive European sites depending on what and where they are and how they are to be delivered. Therefore, all schemes will need to be subject to HRA before being consented, in order to comply with legislation.
0203903027	By 2027, the Environment Agency will identify and map opportunities to deliver nature-based solutions in North East of England to provide a shared resource that can be used to deliver schemes that reduce flood risk and benefit the natural environment in the Northumbria River Basin District.	No Likely Significant Effect – Identifying opportunities for nature-based solutions will not adversely affect European sites and could benefit them.

Measure ID	Measure	Likely Significant Effects on European sites
0203903014	Between 2021 and 2025, the Environment Agency will support the North East Coastal Group to review, update and where appropriate change their shoreline management plans in North East of England to better reflect adaptive approaches to managing coastal change in the Northumbria River Basin District.	No likely significant effect – committing to support the North East Coastal Group to review/update/change their Shoreline Coastal Management Plans (SMPs) will not in itself adversely affect European sites. Previously adopted SMPs were subjected to their own HRA and this confirmed any mitigation needed to avoid adverse effects on the integrity of European sites or identified any need for compensation for those impacts where adverse effects on integrity could not be avoided or mitigated but an Imperative Reasons of Overriding Public Interest (IROPI)/No Alternatives justification could be made, with compensation being/to be delivered in the form of the Habitat Compensation Scheme and therefore no likely significant effects will arise from including the measure in the FRMP. Any updates/changes to these SMPs will also have to go through the HRA process before being adopted and the individual schemes from these will also be required to go through HRA before being consented. This measure in the FRMP is simply a commitment to support the North East Coastal Group in updating the SMPs.
0203903012	By 2027, the Environment Agency and Risk Management Authorities and partners will undertake Flood and Coastal Erosion Risk Management Schemes in line with government policy at identified places in North East of England to prioritise schemes which will significantly help communities in the Northumbria River Basin District.	No likely significant effect, but down-the-line HRA assessment required – The process of identifying FCERM schemes is separate from the FRMP process and is undertaken through the Lead Local Flood Authority via their Coastal Strategy process or their Local Flood Risk Management Plan process. Both these processes have their own HRA requirements and each plan must be subject to HRA before it is adopted. Each scheme that falls out of each plan must also be subject to HRA by law before being consented. This measure is simply a commitment to implementing adopted plans and prioritising the schemes in those plans in line with greatest need.

Measure ID	Measure	Likely Significant Effects on European sites
0203903007	By 2027, the Environment Agency will undertake investigations to compare the monitoring and forecast of risk levels in North East of England to assess if an adaptive pathways approach is sustainable to managing flood risk in the Northumbria River Basin District.	No likely significant effect – investigations for monitoring and forecasting risk levels will not adversely affect European sites. This is a commitment to assess (through monitoring) if the adaptive pathways approach is sustainable, rather than committing to on the ground flood management works.
0203903024	Between 2021 and 2027, the Environment Agency and Risk Management Authorities will undertake joint training to improve capabilities, streamline approaches, make efficiencies and increase understanding of funding mechanisms in North East of England to improve our ability to attract investment for reducing flood risk in the Northumbria River Basin District.	No likely significant effect – this is a commitment to train EA and Risk Management Authorities (RMAs) staff to improve capabilities, and approaches, make efficiencies and increase understanding of funding mechanisms, rather than committing to on the ground flood management works. Training staff will not adversely affect European sites.
0203903020	By 2021, the Environment Agency and Northumbrian Water Limited will work collaboratively to plan, prioritise and deliver co-ordinated maintenance and use of new and existing assets in North East of England to improve the agility and efficiency of flood response in the Northumbria River Basin District.	No likely significant effect – this is a commitment to work collaboratively with Northumbrian Water Limited, working collaboratively in itself will not adversely affect European sites.

Measure ID	Measure	Likely Significant Effects on European sites
0203903023	Between 2021 and 2027, the Environment Agency and Risk Management Authorities will work together to align strategic objectives in the Flood Risk, River Basin and Drainage and Wastewater Management Plans in North East of England to establish a set of agreed strategic measures that support a collaborative programme of flood risk management works and environmental improvements in the Northumbria River Basin District.	No likely significant effect, but down-the-line HRA required – this is a commitment to work collaboratively to align strategic objectives and agree strategic measures. This in itself will not have an adverse effect on European sites. The down the line implementation of the agreed programme of works may have the potential to adversely affect European sites, however the measure is not committing to implementing the programme. Therefore, all schemes resulting from this measure will need to be subject to HRA before being consented, in order to comply with legislation. In line with the guidance quoted in paragraph 2.24, down-the-line assessment will be required as further details emerge regarding what will be done to deliver this measure.
0203903005	By 2027, the Environment Agency and Risk Management Authorities and communities will work together to develop approaches to improve collective learning in North East of England to learn from each other and collate the benefits arrived in the Northumbria River Basin District.	No likely significant effect – committing to work together to develop approaches to collective learning will not adversely affect European sites.

Measure ID	Measure	Likely Significant Effects on European sites
0203903015	Between 2021 and 2027, the Environment Agency will work with Coast Protection Authorities in the North East Coastal Group to improve engagement with Local Authorities with responsibility for estuaries in North East of England to ensure flood risk and biodiversity is understood and mitigated in estuary environments reducing flood risk to coastal communities, businesses and critical infrastructure while also aiding habitat creation and enhancement in the Northumbria River Basin District.	No likely significant effect, but down-the-line HRA required – committing to work with Coast Protection Agencies (CPAs) to improve engagement with Local Authorities (LAs) with responsibility for Estuaries is in itself not going to adversely affect European sites and there are references to biodiversity as well as flood risk that mean such activities and schemes that fall out of this measure could be positive for European sites. Although the measure does not commit to implementing mitigation strategies, any strategies devised as a down the line action of this measure could potentially adversely affect European sites and therefore, all schemes resulting from this measure will need to be subject to HRA before being consented, in order to comply with legislation. In line with the guidance quoted in paragraph 2.24, down-the-line assessment will be required as further details emerge regarding what will be done to deliver this measure.
0203903019	Between 2021 and 2027, the Environment Agency will work with Coast Protection Authorities to undertake estuary wide studies that establish intertidal linkages with flood risk and coast erosion in North East of England to identify natural flood risk management and habitat gain opportunities and establish long-term offset programme in the Northumbria River Basin District.	No Likely Significant Effect – Undertaking studies to better understand linkages between flooding, erosion and habitat will not adversely affect European sites and the identification of habitat gain opportunities may benefit them.
0203903008	By 2027, the Environment Agency will work with Risk Management Authorities and communities at risk of flooding to develop engagement plans that improves how we work together in North East of England to help communities respond to and recover from flood events and to improve the resilience of communities in the Northumbria River Basin District.	No likely significant effect – working with Risk Management Authorities (RMAs) and communities to develop engagement plans to help communities respond to, recover from and improve resilience to flood events will not adversely affect European sites.

Measure ID	Measure	Likely Significant Effects on European sites
0203903016	Between 2021 and 2027, the Environment Agency will work with Risk Management Authorities and communities for whom long term maintenance of current flood protection is uneconomical in North East of England to proactively support them and improve their resilience to flooding by considering adaption options, improving incident warnings and aid the creation of action plans in the Northumbria River Basin District.	No likely significant effect, but down-the-line HRA required – committing to working with RMAs and communities, by providing support to improve their resilience to flooding by aiding the creation of action plans will in itself not adversely affect European sites. Down the line implementation of the action plans, which this measure does not commit to, may have the potential to adversely affect European sites. Therefore, all schemes resulting from this measure will need to be subject to HRA before being consented, in order to comply with legislation. In line with the guidance quoted in paragraph 2.24, down-the-line assessment will be required as further details emerge regarding what will be done to deliver this measure.
0203903018	By 2027, the Environment Agency will work with Risk Management Authorities and wider communities to deliver innovative and natural improvements to flood risk and habitat quality in North East of England to reduce community flood risk and improve water quality while improving future collaborative working in the Northumbria River Basin District.	No likely significant effect, but down-the-line HRA required – measure is too broadly defined to fully assess for significant effects. Implementing innovative and natural improvements to flood risk and habitat quality may have an effect upon European sites but this would depend on what, where and how these improvements are implemented, which is not defined within the measure and therefore, all schemes resulting from this measure will need to be subject to HRA before being consented, in order to comply with legislation. In line with the guidance quoted in paragraph 2.24, down-the-line assessment will be required as further details emerge regarding what will be done to deliver this measure.

Measure ID	Measure	Likely Significant Effects on European sites
0203903009	By 2027, the Environment Agency will work with Risk Management Authorities to develop a collaborative plan for proactive and reactive maintenance in North East of England to allow for a more agile response to flooding whilst allowing for efficiencies to be made in the Northumbria River Basin District.	No likely significant effect, but down-the-line HRA required – measure commits only to develop a collaborative plan for maintenance, rather than any on the ground works. On the ground works may affect European sites, but the measure does not define or commit to these. Therefore, all schemes resulting from this measure will need to be subject to HRA before being consented, in order to comply with legislation. In line with the guidance quoted in paragraph 2.24, down-the-line assessment will be required as further details emerge regarding what will be done to deliver this measure.
0203903002	By 2027, the Environment Agency will work with Risk Management Authorities to establish long term pipeline of investment proposals based on shared flood risk management drivers in North East of England to deliver investment efficiency, reduce flood risk and improve wider community benefits in the Northumbria River Basin District.	No likely significant effect – the measure commits to establishing a long-term pipeline of investment proposals. This will not adversely affect European sites.
0203903017	Between 2021 and 2027, the Environment Agency will work with Risk Management Authorities to investigate how flood risk management can contribute to reducing carbon in North East of England to contribute to achieving carbon reduction targets in the Northumbria River Basin District.	No likely significant effect – the measure commits to investigate how flood risk management can contribute to reducing carbon. This will not adversely affect European sites.
0203903006	By 2027, the Environment Agency will work with Risk Management Authorities to investigate unmanaged and unadopted third party assets which have potential to pose future flood risk in North East of England to identify remedial actions in the Northumbria River Basin District.	No Likely Significant Effect – Investigating and quantifying flood risk issues from unadopted assets will not adversely affect European sites.

Measure ID	Measure	Likely Significant Effects on European sites
0203903011	By 2027, the Environment Agency will work with planners, developers and local enterprise partnerships in North East of England to ensure that new developments are designed to be safe and provide sustainable growth to communities in the Northumbria River Basin District.	No likely significant effect – committing to work with planners and developers and local enterprise partnerships to ensure the design of developments are safe will not in itself adversely affect European sites. The developments themselves may or may not adversely affect European sites, but the implementation of the developments are not in the remit of the EA and will have their own HRAs to ensure they are compliant with legislation.
0203903003	By 2027, the Environment Agency will work with the Coal Authority and Risk Management Authorities to undertake studies of the groundwater at identified areas within coal fields in North East of England to understand which current and future developments are at risk from rising mine water in the Northumbria River Basin District.	No likely significant effect – committing to undertake studies of groundwater in coal fields will not adversely affect European sites.
0203903004	By 2027, the Environment Agency will work with the Regional Flood and Coastal Committee through engaging with the education sector in North East of England to increase awareness of flood risk and climate change within schools and communities in the Northumbria River Basin District.	No likely significant effect – committing to engage with educators to increase awareness of flood risk and climate change will not adversely affect European sites.

Table 6. Screening table showing the Test of Likely Significant Effects results for measures contained within the Northumbria Flood Risk Management Plan for the Newcastle upon Tyne Flood Risk Area

Measure ID	Measure	Likely Significant Effects on European sites
0288803008	Between 2021 and 2027, Newcastle City Council's Lead Local Flood Authority and Environment Agency and other project partners will deliver a permanent Quayside barrier in Newcastle City Centre Flood Risk Area to protect the City Centre from tidal flooding in the Newcastle upon Tyne, Northumbria Flood Risk Area.	No likely significant effect – although there are no European sites on or along the river within the city of Newcastle, implementation of permanent flood barriers along the river, within the city, may have downstream impacts upon coastal sites such as Northumbria Coast SPA and Ramsar at the mouth of the River Tyne. These impacts could include waterborne pollution altering qualifying species water and food sources, changes in hydrology, river flow and direction leading to increased coastal erosion processes on habitats supporting qualifying species. However, it is understood that this barrier (replacing current temporary barriers) would be on the quayside itself and therefore out of the river channel. Moreover, this is an already committed scheme and has been subject to consideration of impacts on biodiversity and the environment. This measure is simply a commitment to continue with an ongoing project.
0288803007	Between 2021 and 2027, Newcastle City Council's Lead Local Flood Authority and Risk Management Authorities will deliver strategic schemes in line with the Newcastle City Surface Water Management Plan and the Tyneside Investment Plan in Newcastle City Centre Flood Risk Area to reduce flood risk for businesses and residents and improve wider community benefits in the Newcastle upon Tyne, Northumbria Flood Risk Area.	No likely significant effect – although there are no European sites on or along the river within the city of Newcastle, implementation of strategic schemes along the river, within the city, may have downstream impacts upon coastal sites such as Northumbria Coast SPA and Ramsar at the mouth of the River Tyne. These impacts could include waterborne pollution altering qualifying species water and food sources, changes in hydrology, river flow and direction leading to increased coastal erosion processes on habitats supporting qualifying species. However, this is simply a commitment to implement schemes that have already been identified in committed plans and are entirely located out of the river.

Measure ID	Measure	Likely Significant Effects on European sites
0288803011	Between 2021 and 2027, Newcastle City Council's Lead Local Flood Authority will internal highways, transport and resilience planning teams to develop engagement plans that improves how we work together in Newcastle City Centre Flood Risk Area to help communities respond to and recover from flood events and to improve the resilience of communities in the Newcastle upon Tyne, Northumbria Flood Risk Area.	No likely significant effect – committing to develop engagement plans which will help communities respond to and recover from flooding events and improve resilience will not adversely affect European sites.
0288803015	Between 2021 and 2027, Newcastle City Council's Lead Local Flood Authority and Tyne Estuary Project Partners will manage flood risk to communities, businesses and critical infrastructure while also aiding habitat creation and biodiversity enhancement in Newcastle City Centre Flood Risk Area to protect communities from multiple sources of flooding and implement environmental improvements in the Newcastle upon Tyne, Northumbria Flood Risk Area.	No likely significant effect, but down-the-line HRA required – Flood management may or may not have an adverse effect on European sites, however, the measure is too broad to fully assess. Therefore, any strategies devised as a down the line action of this measure could potentially adversely affect European sites and therefore, all schemes resulting from this measure will need to be subject to HRA before being consented, in order to comply with legislation. In line with the guidance quoted in paragraph 2.24, down-the-line assessment will be required as further details emerge regarding what will be done to deliver this measure.
0288803010	Between 2021 and 2027, Newcastle City Council's Lead Local Flood Authority and the Environment Agency will utilise the Community Engagement Officers in Newcastle City Centre Flood Risk Area to increase awareness of flood risk and climate change within schools and communities in the Newcastle upon Tyne, Northumbria Flood Risk Area.	No likely significant effect – working with community engagement officers in the community to increase awareness of flood risk and climate change will not adversely affect European sites.

Measure ID	Measure	Likely Significant Effects on European sites
0288803009	Between 2021 and 2027, Newcastle City Council's Lead Local Flood Authority and Risk Management Authorities within the Northumbria Integrated Drainage Partnership will work together to deliver a collaborative programme of flood risk management works in Newcastle City Centre Flood Risk Area to protect communities from multiple sources of flooding and implement environmental improvements in the Newcastle upon Tyne, Northumbria Flood Risk Area.	No likely significant effect, but down-the-line HRA required – although there are no European sites on or along the river within the city of Newcastle, implementation of flood risk management schemes along the river, within the city, may have downstream impacts upon coastal sites such as Northumbria Coast SPA and Ramsar at the mouth of the River Tyne. These impacts could include waterborne pollution altering qualifying species water and food sources, changes in hydrology, river flow and direction leading to increased coastal erosion processes on habitats supporting qualifying species. However, this measure is simply a commitment to work together without specifying the detail of the Newcastle City Centre flood risk management works. No details are provided (as they are yet to be determined) and therefore down-the-line HRA may be required before any schemes are consented. In line with the guidance quoted in paragraph 2.24, down-the-line assessment will be required as further details emerge regarding what will be done to deliver this measure.
0288803014	Between 2021 and 2027, Newcastle City Council's Lead Local Flood Authority will work with Risk Management Authorities to investigate how flood risk management can contribute to reducing carbon in Newcastle City Centre Flood Risk Area to contribute to achieving carbon reduction priorities in the Net Zero Newcastle - 2030 Action Plan in the Newcastle upon Tyne, Northumbria Flood Risk Area.	No likely significant effect – committing to work with RMAs to investigate how flood risk management can contribute to reducing carbon will not adversely affect European sites.

Measure ID	Measure	Likely Significant Effects on European sites
0288803006	Between 2021 and 2027, Newcastle City Council's Lead Local Flood Authority will work with other Risk Management Authorities to deliver Flood and Coastal Erosion Risk Management schemes in Newcastle City Centre Flood Risk Area to reduce flood risk for businesses and residents and improve wider community benefits in the Newcastle upon Tyne, Northumbria Flood Risk Area.	No likely significant effect – although there are no European sites on or along the river within the city of Newcastle, implementation of flood and coastal erosion risk management schemes along the river, within the city, may have downstream impacts upon coastal sites such as Northumbria Coast SPA and Ramsar at the mouth of the River Tyne. These impacts could include waterborne pollution altering qualifying species water and food sources, changes in hydrology, river flow and direction leading to increased coastal erosion processes on habitats supporting qualifying species. However, the process of identifying FCERM schemes is separate from the FRMP process and is undertaken through the Lead Local Flood Authority via their Coastal Strategy process or their Local Flood Risk Management Plan process. Both these processes have their own HRA requirements and each plan must be subject to HRA before it is adopted. Each scheme that falls out of each plan must also be subject to HRA by law before being consented. This measure is simply a commitment to implementing adopted plans and prioritising the schemes in those plans in line with greatest need.
0288803012	Between 2021 and 2027, Newcastle City Council's Lead Local Flood Authority will work with the Local Planning Authority and developers to ensure that new developments are appropriately designed in Newcastle City Centre Flood Risk Area to be safe from flooding and provide sustainable growth to communities in the Newcastle upon Tyne, Northumbria Flood Risk Area.	No likely significant effect – committing to work with the Local Planning Authority (LPA) and developers to ensure the design of developments are safe will not in itself adversely affect European sites. The developments themselves may or may not adversely affect European sites, but the implementation of the developments are not in the remit of the EA and will have their own HRAs to ensure they are compliant with legislation.

5. Other plans and projects

5.1 This section covers potential for effects in combination with other plans and projects. While the potential for the FRMP to occur 'in combination' with other FRMPs was considered for inclusion, each FRMP is specific to a relatively hydrologically self-contained River Basin District, meaning that potential for effects in combination with each other generally only exists where a European site straddles multiple RBDs. In this case the Berwickshire & North Northumberland Coast SAC, Northumbria Coast SPA, Moor House-Upper Teesdale SAC, and North Pennine Moors SPA/SAC straddle the boundary between the Northumbria FRMP and the Solway Tweed and North West FRMPs respectively. However, no mechanism has been identified for the actual measures in this FRMP (rather than any schemes that may emerge down-the-line) to operate in combination with those in the other FRMPs.

5.2 Natural England suggested inclusion of Diffuse Water Pollution Plans in the 'in combination' assessment of FRMP HRAs. Diffuse Water Pollution Plans are environmentally positive and intended to reduce diffuse pollution through fairly broad measures such as 'influencing management of farm infrastructure such as farm tracks, yards, buildings etc' through agri-environment schemes and similar. As such, no adverse likely significant effects or conflicts are expected to arise with the FRMP HRAs.

5.3 Potential in combination effects with Minerals and Waste Local Plans were also considered. However, Waste Local Plans are rarely technology-specific and potential impacts depend very much on the type of facility the market decides to bring forward on a given allocated site, or within a broad area of search where these exist. Minerals excavation can affect hydrologically sensitive European sites through dewatering for example. However, many minerals allocations are extensions to existing consented facilities to enable the site to be worked for longer (rather than to enable a net increase in consented extraction) and whose acceptability of effects on European sites are kept under review through the minerals planning authorities' Review of Consents process as required by the Conservation of Habitats and Species Regulations 2017 (as amended). In addition, many Minerals Plans include 'areas of search' for minerals rather than making specific allocations, leaving the market to bring forward proposals at the planning application level. As such, no specific likely significant effects in combination with the FRMP measures have been identified.

Local Plans

5.4 The delivery of c. 99,000+ dwellings to 2030 from districts fully within the Northumbria RBD as well as a further approx. 37,000 dwellings from districts partially within the RBD or adjacent to the RBD will result in the potential for a range of likely significant effects on the European sites surrounding the sub-region. The Northern Powerhouse is a government-backed initiative to help improve the economic prospects of Northern cities. The project combines the Northern Powerhouse Investment Fund, the Northern Powerhouse Partnership, the European Regional Development Fund and Local Enterprise Partnerships (LEPS).

5.5 Potential impact pathways include recreational pressure, a potential for increased atmospheric pollution from an increase in traffic on the road network close to European sites, possible loss of functionally-linked habitat for SPAs (depending on where the development takes place) and water quality impacts on European sites.

Depending on where construction takes place direct disturbance impacts on SPA birds could also occur.

5.6 This section focusses only on hydrologically sensitive European sites and on the main European sites where adverse effects from residential and employment development have been identified in Local Plan HRAs. In this RBD the European sites most identified to be at risk from housing and employment growth in Local Plan HRAs are the popular coastal sites with regard to recreational disturbance of SPA birds and potential for damage of SAC habitats, particularly the Northumbria Coast SPA/Ramsar, Durham Coast SAC and Teesmouth & Cleveland Coast SPA/Ramsar. To this end, Sunderland Council, for example, has developed recreation mitigation strategies for the Northumbria Coast SPA.

5.7 Another key anthropological pressure relating to European sites in the RBD is excessive nitrogen and/or phosphorus inputs, particularly from agriculture and also from treated sewage effluent. In advice to local planning authorities in March 2022 Natural England flagged that the following European sites of relevant to the RBD were suffering from excessive nutrients leading to eutrophication: Teesmouth and Cleveland Coast SPA and Ramsar site, Lindisfarne SPA/Ramsar site and Roman Walls Loughs SAC.

5.8 However, it is considered that the nature of the FRMP is such that no in combination effects will arise between adoption of the FRMP and delivery of housing and associated development across the sub-region. This is due either to the fact that the measures in the FRMP do not pose mechanisms to connect negatively to European sites, or because the measures of the FRMP are sufficiently high level (generally consisting of identifying a scheme and committing to its further development, design and implementation without committing to details) that they allow flexibility for measures necessary to be designed into schemes to protect European sites to be incorporated at further planning tiers as each scheme is devised.

River Basin Management Plans

5.9 River Basin Management Plans (RBMPs) describe the challenges that threaten the water environment and how these challenges can be managed and funded. The Northumbria FRMP covers the same area as the Northumbria River Basin Management Plan.

5.10 The 2021 RBMP sets out a series of measures to bring about improvements in the waterbodies covered by the RBMP. By definition, the measures in the RBMP are positive and includes the following initiatives: partnership working with farmers and land managers, sustainable management of water resources, restoring rivers and removing man-made barriers to fish migration and controlling invasive non-native species.

5.11 The RBMPs generally include projects that improve the water environment, for example by:

- enhancing and restoring rivers and floodplains
- creating sustainable drainage
- cleaning up metal pollution
- improving habitats and water quality by addressing diffuse pollution issues
- adapting weirs to provide fish passage

- involving the community
- using existing regulations to tackle agricultural and rural land pollution, such as lagoon construction

5.12 Since the measures within RBMPs are positive and are often necessary to restore freshwater aquatic European sites to favourable condition, there is no mechanism for them to have a negative effect on European sites in combination with the measures in the FRMP.

Shoreline Management Plans and Local Flood Risk Management Plans

5.13 SMPs provide a policy context for shoreline/coastal zone management and development. As acknowledged throughout this document, SMPs and the Coastal Strategies that result from them often result in adverse effects on the integrity of European sites through a combination of coastal squeeze, loss of functionally-linked land for SPA/Ramsar birds, direct habitat loss due to defence footprint and changes to long-shore sediment transport and other aspects of natural sediment dynamics. They also present opportunities for positive effects on European sites if opportunities for managed realignment are included that will enable a more natural coastline to be established.

5.14 The following SMPs apply to the Northumbria RBD and were considered for in-combination impacts:

- SMP 1 Scottish border to the River Tyne
- SMP 2 The Tyne to Flamborough Head (North East)

5.15 The assessments for any potential in-combination impacts between these plans and the measures contained within the Northumbria FRMP were considered with regards to spatial proximity and/or hydrological and/or hydrographical connectivity. No in-combination likely significant effects were identified in respect of the policies set out in the plans because the FRMP essentially draws upon measures in the SMP and subsequent Coastal Strategies for its measures in the coastal environment.

5.16 Similarly, Local Flood Risk Management Plan measures for relevant areas within the River Basin District have been included within the FRMP so there is no potential for in combination effects as the same measures are contained in both sets of plans.

Water Resource Management Plans

5.17 Northumbria Water have produced a Water Resource Management Plan. Scottish Water a similar strategy covering the bordering parts of the RBD in Scotland. These set out the water supply strategy for their areas and could therefore have negative effects on European sites in their own right.

5.18 However, Water Resource Management Plans are required to have their own HRAs undertaken. The HRAs for each of the latest adopted WRMPs considered whether their future supply strategy to meet water needs would affect European sites and it was concluded that the supply needs of their areas could be met without an adverse effect on the integrity of European sites, primarily through a combination of improved water efficiency measures and bringing new water supply areas into consideration that do not result in increased abstraction from European sites. As such, there would be no in combination effect with the FRMPs.

5.19 In addition to the WRMP, Northumbria Water is also producing Drainage and Wastewater Management Plan (DWMP)s. However, that plan has not yet been published and therefore cannot be included in this assessment.

Drought Plans, Permits and Orders

5.20 As discussed in the previous chapter, the Northumbria RBD encompasses European sites that are sensitive to a wide range of anthropogenic pressures, including hydrology, water quality, recreational pressure, coastal squeeze and others. Multiple simultaneously acting impacting pathways can compound negative impacts on qualifying habitats and species.

5.21 For example, water companies, under their duty of delivering potable water to households and businesses, can apply for drought permits, enabling them to abstract water beyond existing abstraction consents for an agreed period of time. Granting of drought periods has the potential for negative environmental impacts, particularly in European sites that are already subject to existing unfavourable flow conditions or water levels, including the River Tweed SAC. While most measures included in the FRMP are likely to be positive for European sites by renaturalising hydrological function, inadequately planned or sited natural flood management and hard defence structures have the potential to negatively interact with Environment Agency Drought Orders and water company Drought Permits.

5.22 Drought conditions will also impose further pressures on designated sites such as by reducing water quality (reduced flows would typically result in higher nutrient concentrations, exacerbating the impact of treated sewage effluent) and water flow. In addition, climate change has the potential to increase the frequency and severity of drought conditions. Drought Plan Orders and Permits would compound drought issues and operate in-combination with impact pathways associated with the FRMP. However, drought plans will generally only operate at times of low water levels and low rainfall, which is the opposite scenario to when the majority of FRMP measures will be active.

5.23 Notwithstanding this, Drought Plans of water companies are subject to their own assessment process including HRA. This ensures that potential adverse effects on the integrity of European sites are adequately mitigated or, where this cannot be achieved, suitable compensation is provided. Overall, given that the Drought Plans of water companies undergo robust HRA, no in-combination effects with the FRMP will occur.

Environment Agency National Drought Plan

5.24 The potential for in-combination effects of the Northumbria FRMP with the Environment Agency's National Drought Action Plan has been assessed and no in-combination impacts are anticipated. However, this should be considered further at the time of any potential implementation of drought management measures in liaison with the Environment Agency, particularly regarding local actions in the supply and water source catchment areas utilised by Northumbria Water. Moreover, drought plans will generally only operate at times of low water levels and low rainfall, which is the opposite scenario to when the majority of FRMP measures will be active.

Conclusion

5.25 In summary, is considered that the nature of the FRMP is such that no in combination effects will arise between adoption of the FRMP and delivery of housing and associated development across the sub-region. This is due either to the fact that the measures in the FRMP do not pose mechanisms to connect negatively to European sites, or because the measures of the FRMP are sufficiently high level (generally consisting of identifying a scheme and committing to its further development, design and implementation without committing to details) that they allow flexibility for measures necessary to be designed into schemes to protect European sites to be incorporated at further planning tiers as each scheme is devised.

6. Conclusion

6.1 All European sites have been screened out of further assessment. There are no likely significant effects on any European site as a result of the Northumbria Flood Risk Management Plan 2021-2027, either alone or in combination with other projects and plans. This is due either to the fact that the measures in the FRMP do not pose mechanisms to connect negatively to European sites, or because the measures of the FRMP are sufficiently high level (generally consisting of identifying a scheme and committing to its further development, design and implementation without committing to details) that they allow flexibility for measures necessary to be designed into schemes to protect European sites to be incorporated at further planning tiers as each scheme is devised. It should be noted that notwithstanding references in the FRMP, scheme level HRAs will be undertaken as part of the business case for all schemes, and many schemes will also need planning consent, which will also be accompanied by an HRA, thus ensuring legal requirements are met.

Appendix A Information on European Sites

A.1 Berwickshire and North Northumberland Coast SAC

Conservation Objectives

6.2 With regard to the SAC[61] and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change.

6.3 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitats and habitats of qualifying species
- the structure and function (including typical species) of qualifying natural habitats
- the structure and function of the habitats of qualifying species
- the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely
- the populations of qualifying species
- the distribution of qualifying species within the site

Qualifying Features

- mudflats and sandflats not covered by seawater at low tide
- large shallow inlets and bays
- reefs
- submerged or partially submerged sea caves
- Grey seal Halichoerus grypus

Environmental Vulnerabilities

6.4 With regards to this SAC and others included within the Northumberland Costal 2015 SIP[62] the following are threats and pressure listed for those sites:

- public access/disturbance
- water pollution
- invasive species
- changes in species distributions
- predation
- coastal squeeze
- direct impact from third party

- transportation and service corridors
- changes in land management
- air pollution: risk of atmospheric nitrogen deposition

6.5 The 2020 Supplementary Advice to the Conservation Objectives[63] (SACO) goes into more detail on these vulnerabilities.

A.2 Border Mires, Kielder-Butterburn SAC

Conservation Objectives

6.6 With regard to the SAC[64] and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change.

6.7 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitats
- the structure and function (including typical species) of qualifying natural habitats
- the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely

Qualifying Features

- Wet heathland with cross-leaved heath *Erica tetralix*
- European dry heaths
- Blanket bogs
- Very wet mores often identified by an unstable 'quaking' surface
- Hard-water springs depositing lime

Environmental Vulnerabilities

6.8 With regards to the SAC the following are threats and pressure listed within the 2014 SIP[65]:

- hydrological changes
- forestry and woodland management
- change in land management
- air pollution: impact of atmospheric nitrogen deposition
- species decline

6.9 The 2019 Supplementary Advice to the Conservation Objectives[66] (SACO) goes into more detail on these vulnerabilities.

A.3 Coquet Island SPA

Conservation Objectives

6.10 With regard to the SPA[67] and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change.

6.11 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:

- the extent and distribution of the habitats of the qualifying features
- the structure and function of the habitats of the qualifying features
- the supporting processes on which the habitats of the qualifying features rely
- the population of each of the qualifying features
- the distribution of the qualifying features within the site

Qualifying Features

- Sandwich tern *Sterna sandvicensis* (Breeding)
- Roseate tern *Sterna dougallii* (Breeding)
- Common tern *Sterna hirundo* (Breeding)
- Arctic tern *Sterna paradisaea* (Breeding)

Environmental Vulnerabilities

6.12 With regards to this SPA and others included within the Northumberland Costal 2015 SIP[68] the following are threats and pressure listed for those sites:

- public access/disturbance
- water pollution
- invasive species
- changes in species distributions
- predation
- coastal squeeze
- direct impact from third party
- transportation and service corridors
- changes in land management
- air pollution: risk of atmospheric nitrogen deposition

6.13 The 2020 Supplementary Advice to the Conservation Objectives[69] (SACO) goes into more detail on these vulnerabilities.

A.4 Farne Islands SPA

Conservation Objectives

6.14 With regard to the SPA[70] and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change.

6.15 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:

- the extent and distribution of the habitats of the qualifying features
- the structure and function of the habitats of the qualifying features
- the supporting processes on which the habitats of the qualifying features rely
- the population of each of the qualifying features
- the distribution of the qualifying features within the site

Qualifying Features

- Sandwich tern *Sterna sandvicensis* (Breeding)
- Roseate tern *Sterna dougallii* (Breeding)
- Common tern *Sterna hirundo* (Breeding)
- Arctic tern *Sterna paradisaea* (Breeding)
- Common guillemot *Uria aalge* (Breeding)
- Seabird assemblage

Environmental Vulnerabilities

6.16 With regards to this SPA and others included within the Northumberland Costal 2015 SIP[71] the following are threats and pressure listed for those sites:

- public access/disturbance
- water pollution
- invasive species
- changes in species distributions
- predation
- coastal squeeze
- direct impact from third party
- transportation and service corridors
- changes in land management
- air pollution: risk of atmospheric nitrogen deposition

6.17 The 2020 Supplementary Advice to the Conservation Objectives[72] (SACO) goes into more detail on these vulnerabilities.

A.5 Ford Moss SAC

Conservation Objectives

6.18 With regard to the SAC[73] and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change.

6.19 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of the qualifying natural habitat
- the structure and function (including typical species) of the qualifying natural habitat
- the supporting processes on which the qualifying natural habitat rely

Qualifying Features

6.20 Active raised bogs

Environmental Vulnerabilities

6.21 With regards to the SAC the following are threats and pressure listed within the 2014 SIP[74]:

- hydrological changes
- forestry and woodland management
- air pollution: impact of atmospheric nitrogen deposition

6.22 The 2019 Supplementary Advice to the Conservation Objectives[75] (SACO) goes into more detail on these vulnerabilities.

A.6 Holburn Lake & Moss SPA & Ramsar

Conservation Objectives

6.23 With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change.

6.24 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:

- the extent and distribution of the habitats of the qualifying features
- the structure and function of the habitats of the qualifying features
- the supporting processes on which the habitats of the qualifying features rely
- the population of each of the qualifying features
- the distribution of the qualifying features within the site

Qualifying Features

6.25 With regards to the SPA the following are reasons for designation of the site:

- Greylag goose *Anser anser* (non-breeding)

6.26 With regards to the Ramsar[76] the following are reasons for designation of the site:

Ramsar Criterion 1

6.27 The site is a nationally rate example of lowland raised mire

Ramsar Criterion 3

6.28 The site is an important winter roost site for greylag geese, of which the entire islandic race winters in Britain.

Ramsar Criterion 4

6.29 Regularly visited by large flocks of mallard *Anas platyrhynchos*, wigeon *Anas penelope*, and teal *Anas crecca*, provides an inland roost for coastal wildfowl during unfavourable weather conditions. A few pairs of shelduck *Tadorna tadorna*, shoveler *Anas clypeata* and tufted duck *Aythya fuligula* regularly breed here.

Ramsar Criterion 6 – species/populations occurring at levels of international importance

6.30 Species with peak counts in the winter:

- Greylag goose *Anser anser* – 2150 individuals representing an average of 2.4% of the population.

Environmental Vulnerabilities

6.31 With regards to the SPA the following are threats and pressure listed within the 2015 SIP[77]:

- change in species distribution
- drainage
- natural changes to site conditions

6.32 The 2019 Supplementary Advice to the Conservation Objectives[78] (SACO) goes into more detail on these vulnerabilities.

A.7 Irthinghead Mires Ramsar

Qualifying Features

6.33 With regards to the Ramsar[79] the following area reasons for designation:

Ramsar Criterion 1

6.34 Supports an outstanding example of undamaged blanket bogs which are characteristic of the vegetation of upland north-western Britain. Most English (and many Scottish) blanket bogs have been extensively degraded by afforestation, burning, agricultural drainage and overgrazing. The Irthinghead Mires are one of few examples of this vegetation type in a near-natural state. There is also good representation of different topographic mire type and surface patterning.

Ramsar Criterion 2

6.35 A notable variety of *sphagnum* mosses.

Ramsar Criterion 3

6.36 Butterburn Flow several rare plants, whilst a rare spider, *Eboria caliginosa*, as been recorded at Croom Rogg Moss.

A.8 Lindisfarne SPA & Ramsar

Conservation Objectives

6.37 With regard to the SPA[80] and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change.

6.38 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:

- the extent and distribution of the habitats of the qualifying features
- the structure and function of the habitats of the qualifying features
- the supporting processes on which the habitats of the qualifying features rely
- the population of each of the qualifying features
- the distribution of the qualifying features within the site

Qualifying Features

6.39 With regards to the SPA the following are reasons for designation:

- Whooper swan *Cygnus cygnus* (Non-breeding)
- Greylag goose *Anser anser* (Non-breeding)
- Light-bellied brent goose *Branta bernicla hrota* (Non-breeding)
- Common shelduck *Tadorna tadorna* (Non-breeding)
- Eurasian wigeon *Anas penelope* (Non-breeding)
- Common eider *Somateria mollissima* (Non-breeding)
- Long-tailed duck *Clangula hyemalis* (Non-breeding)
- Black (common) scoter *Melanitta nigra* (Non-breeding)
- Red-breasted merganser *Mergus serrator;* (Non-breeding)
- Ringed plover *Charadrius hiaticula;* (Non-breeding)
- European golden plover *Pluvialis apricaria* (Non-breeding)
- Grey plover *Pluvialis squatarola* (Non-breeding)
- Sanderling *Calidris alba* (Non-breeding)
- Dunlin *Calidris alpina alpina* (Non-breeding)
- Bar-tailed godwit *Limosa lapponica* (Non-breeding)

- Common redshank *Tringa totanus* (Non-breeding)
- Roseate tern *Sterna dougallii* (Breeding)
- Little tern *Sterna albifrons* (Breeding)

6.40 With regards to the Ramsar[81] the following are reasons for designation:

Ramsar Criterion 1

6.41 This site contains extensive intertidal flats, together with a large area of saltmarsh, and major sand dune system with well-developed dune slacks.

Ramsar Criterion 5 – assemblage of international importance

6.42 Species with a peak count in the winter:

- 44,970 waterfowl

Ramsar Criterion 6 – species/population occurring at levels of international importance.

6.43 Species with peak counts in the spring/autumn:

- Light-bellied brent goose *Branta bernicla hrota* – 2,799 individuals – 55.7% of the population
- Eurasian wigeon *Anas penelope* – 10,857 individuals – 2.6% of the GB population
- Ringed plover *Charadrius hiaticula* – 114 individuals – 0.3% of the GB population
- Common redshank *Tringa totanus totanus* – 1,572 individuals – 1.3% of the GB population

6.44 Species with peak counts in the winter:

- Greylag goose *Anser anser anser* – 750 individuals – 0.9% of the GB population
- Bar-tailed godwit *Limosa lapponica lapponica* 3,757 individuals – 3.1% of the population

Species/populations identified subsequent to designations for possible future consideration under Criterion 6

6.45 Species with peak counts in the spring/autumn:

- Pink-footed goose *Anser brachyrhynchus* – 2,531 individuals – 1% of the population

Environmental Vulnerabilities

6.46 With regards to this SPA and others included within the Northumberland Costal 2015 SIP[82] the following are threats and pressure listed for those sites:

- public access/disturbance
- water pollution
- invasive species
- changes in species distributions
- predation

- coastal squeeze
- direct impact from third party
- transportation and service corridors
- changes in land management
- air pollution: risk of atmospheric nitrogen deposition

6.47 The 2020 Supplementary Advice to the Conservation Objectives[83] (SACO) goes into more detail on these vulnerabilities.

A.9 Moor House – Upper Teesdale SAC

Conservation Objectives

6.48 With regard to the SAC[84] and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change.

6.49 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitats and habitats of qualifying species
- the structure and function (including typical species) of qualifying natural habitats
- the structure and function of the habitats of qualifying species
- the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely
- the populations of qualifying species
- the distribution of qualifying species within the site

Qualifying Features

- Calcium-rich nutrient-poor lakes, lochs and pools
- European dry heaths
- Alpine and subalpine heaths
- Juniper on heaths or calcareous grasslands
- Grasslands on soils rich in heavy metals
- Montane acid grasslands
- Dry grasslands and scrublands on chalk or limestone
- Purple moor-grass meadows
- Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
- Mountain hay meadows
- Blanket bogs

- Hard-water springs depositing lime
- Base rich fens
- High-altitude plant communities associated with areas of water seepage
- Acidic scree
- Base-rich scree
- Plants in crevices in base-rich rocks
- Plants in crevices on acid rocks
- Limestone pavements
- Round-mouthed whorl snail *Vertigo genesii*
- Marsh saxifrage Saxifraga hirculus

Environmental Vulnerabilities

6.50 With regards to this SAC and others included within the North Pennines Group 2014 SIP[85] the following are threats and pressure listed for those sites:

- low breeding success/poor recruitment
- managed rotational burning
- inappropriate grazing
- change in land management
- disease
- hydrological changes
- game management: grouse moors
- direct land take from development
- air pollution: risk of atmospheric nitrogen deposition
- fertiliser use
- inappropriate cutting/mowing
- invasive species
- agricultural management practices
- vehicles
- public access/disturbance
- deer
- feature location/extent/condition unknown
- climate change

6.51 The 2019 Supplementary Advice to the Conservation Objectives[86] (SACO) goes into more detail on these vulnerabilities.

A.10 Newham Fen SAC

Conservation Objectives

6.52 With regard to the natural habitats and/or species for which the SAC[87] has been designated (the 'Qualifying Features' listed below), and subject to natural change.

6.53 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitats
- the structure and function (including typical species) of qualifying natural habitats, and
- the supporting processes on which qualifying natural habitats rely

Qualifying Features

- calcium-rich spring water-fed fens

Environmental Vulnerabilities

6.54 With regards to the SAC the following are threats and pressure listed within the 2014 SIP[88]:

- air pollution: risk of atmospheric nitrogen deposition

6.55 The 2019 Supplementary Advice to the Conservation Objectives[89] (SACO) goes into more detail on these vulnerabilities.

A.11 North Northumberland Dunes SAC

Conservation Objectives

6.56 With regard to the SAC[90] and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change.

6.57 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitats and habitats of qualifying species
- the structure and function (including typical species) of qualifying natural habitats
- the structure and function of the habitats of qualifying species
- the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely
- the populations of qualifying species
- the distribution of qualifying species within the site

Qualifying Features

- Embryonic shifting dunes
- Shifting dunes with marram
- Dune grassland
- Dunes with creeping willow
- Humid dune slacks
- Petalwort Petalophyllum ralfsii

Environmental Vulnerabilities

6.58 With regards to this SPA and others included within the Northumberland Costal 2015 SIP[91] the following are threats and pressure listed for those sites:

- public access/disturbance
- water pollution
- invasive species
- changes in species distributions
- predation
- coastal squeeze
- direct impact from third party
- transportation and service corridors
- changes in land management
- air pollution: risk of atmospheric nitrogen deposition

6.59 The 2020 Supplementary Advice to the Conservation Objectives[92] (SACO) goes into more detail on these vulnerabilities.

A.12 North Pennine Dales Meadows SAC

Conservation Objectives

6.60 With regard to the SAC[93] and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change.

6.61 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitats
- the structure and function (including typical species) of qualifying natural habitats
- the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely

Qualifying Features

6.62 Purple moor-grass meadows

6.63 Mountain hay meadows

Environmental Vulnerabilities

6.64 With regards to the SAC the following are threats and pressure listed within the 2015 SIP[94]:

- fertiliser use
- change in land management
- air pollution: impact of atmospheric nitrogen deposition
- inappropriate cutting/mowing
- changes in species distribution
- inappropriate CSS/ESA prescription
- overgrazing
- drainage
- undergrazing
- hydrological changes
- inappropriate weed control
- invasive species
- direct impact from third party

6.65 The 2019 Supplementary Advice to the Conservation Objectives[95] (SACO) goes into more detail on these vulnerabilities.

A.13 North Pennine Moors SAC

Conservation Objectives

6.66 With regard to the SAC[96] and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change.

6.67 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitats and habitats of qualifying species
- the structure and function (including typical species) of qualifying natural habitats
- the structure and function of the habitats of qualifying species
- the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely
- the populations of qualifying species

- the distribution of qualifying species within the site

Qualifying Features

- Wet heathland with cross-leaved heath
- European dry heaths
- Juniper on heaths or calcareous grasslands
- Grasslands on soils rich in heavy metals
- Montane acid grasslands
- Dry grasslands and scrublands on chalk or limestone
- Blanket bogs
- Hard-water springs depositing lime
- Calcium-rich springwater-fed fens
- Acidic scree
- Plants in crevices in base-rich rocks
- Plants in crevices on acid rocks
- Western acidic oak woodland
- Marsh saxifrage Saxifraga hirculus

Environmental Vulnerabilities

6.68 With regards to this SAC and others included within the North Pennines Group 2014 SIP[97] the following are threats and pressure listed for those sites:

- low breeding success/poor recruitment
- managed rotational burning
- inappropriate grazing
- change in land management
- disease
- hydrological changes
- game management: grouse moors
- direct land take from development
- air pollution: risk of atmospheric nitrogen deposition
- fertiliser use
- inappropriate cutting/mowing
- invasive species
- agricultural management practices
- vehicles
- public access/disturbance
- deer

- feature location/extent/condition unknown
- climate change

6.69 The 2019 Supplementary Advice to the Conservation Objectives[98] (SACO) goes into more detail on these vulnerabilities.

A.14 North Pennine Moors SPA

Conservation Objectives

6.70 With regard to the SPA[99] and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change.

6.71 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:

- the extent and distribution of the habitats of the qualifying features
- the structure and function of the habitats of the qualifying features
- the supporting processes on which the habitats of the qualifying features rely
- the population of each of the qualifying features
- the distribution of the qualifying features within the site

Qualifying Features

- Hen harrier *Circus cyaneus* (Breeding)
- Merlin *Falco columbarius* (Breeding)
- Peregrine falcon *Falco peregrinus* (Breeding)
- European golden plover *Pluvialis apricaria* (Breeding)

Environmental Vulnerabilities

6.72 With regards to this SAC and others included within the North Pennines Group 2014 SIP[100] the following are threats and pressure listed for those sites:

- low breeding success/poor recruitment
- managed rotational burning
- inappropriate grazing
- change in land management
- disease
- hydrological changes
- game management: grouse moors
- direct land take from development
- air pollution: risk of atmospheric nitrogen deposition
- fertiliser use

- inappropriate cutting/mowing
- invasive species
- agricultural management practices
- vehicles
- public access/disturbance
- deer
- feature location/extent/condition unknown
- xlimate change

6.73 The 2019 Supplementary Advice to the Conservation Objectives[101] (SACO) goes into more detail on these vulnerabilities.

A.15 North York Moors SAC

Conservation Objectives

6.74 With regard to the SAC[102] and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change;

6.75 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- the extent and distribution of the qualifying natural habitats
- the structure and function (including typical species) of the qualifying natural habitats
- the supporting processes on which the qualifying natural habitats rely

Qualifying Features

- Wet heathland with cross-leaved heath
- European dry heaths
- Blanket bogs

Environmental Vulnerabilities

6.76 With regards to this SAC and others included within the North York Moors 2014 SIP[103] the following are threats and pressure listed for those sites:

- climate change
- air pollution: risk of atmospheric nitrogen deposition
- disease
- invasive species
- managed rotational burning
- planning permission: other minerals and waste

- game management: grouse moors
- change in species distributions
- agriculture: other
- energy production
- arson/wildfire

6.77 The 2019 Supplementary Advice to the Conservation Objectives[104] (SACO) goes into more detail on these vulnerabilities.

A.16 North York Moors SPA

Conservation Objectives

6.78 With regard to the SPA[105] and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change.

6.79 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:

- the extent and distribution of the habitats of the qualifying features
- the structure and function of the habitats of the qualifying features
- the supporting processes on which the habitats of the qualifying features rely
- the population of each of the qualifying features
- the distribution of the qualifying features within the site

Qualifying Features

- Merlin *Falco columbarius* (Breeding)
- European golden plover *Pluvialis apricaria* (Breeding)

Environmental Vulnerabilities

6.80 With regards to this SAC and others included within the North York Moors 2014 SIP[106] the following are threats and pressure listed for those sites:

- climate change
- air pollution: risk of atmospheric nitrogen deposition
- disease
- invasive species
- managed rotational burning
- planning permission: other minerals and waste
- game management: grouse moors
- change in species distributions
- agriculture: other

- energy production
- arson/wildfire

6.81 The 2019 Supplementary Advice to the Conservation Objectives[107] (SACO) goes into more detail on these vulnerabilities.

A.17 Northumberland Marine SPA

6.82 With regard to this SPA[108] and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change

6.83 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:

- the extent and distribution of the habitats of the qualifying features
- the structure and function of the habitats of the qualifying features
- the supporting processes on which the habitats of the qualifying features rely
- the population of each of the qualifying features
- the distribution of the qualifying features within the site

Qualifying Features

- Sandwich tern *Sterna sandvicensis* (Breeding)
- Roseate tern *Sterna dougallii* (Breeding)
- Common tern *Sterna hirundo* (Breeding)
- Arctic tern *Sterna paradisaea* (Breeding)
- Little tern *Sternula albifrons* (Breeding)
- Common guillemot *Uria aalge* (Breeding)
- Atlantic puffin *Fratercula arctica* (Breeding)
- Seabird assemblage

Environmental Vulnerabilities

6.84 With regards to this SPA and others included within the Northumberland Costal 2015 SIP[109] the following are threats and pressure listed for those sites:

- public access/disturbance
- water pollution
- invasive species
- changes in species distributions
- predation
- coastal squeeze
- direct impact from third party

- transportation and service corridors
- changes in land management
- air pollution: risk of atmospheric nitrogen deposition

6.85 The 2020 Supplementary Advice to the Conservation Objectives[110] (SACO) goes into more detail on these vulnerabilities.

A.18 Northumbria Coast SPA & Ramsar

Conservation Objectives

6.86 With regard to the SPA[111] and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change.

6.87 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:

- the extent and distribution of the habitats of the qualifying features
- the structure and function of the habitats of the qualifying features
- the supporting processes on which the habitats of the qualifying features rely
- the population of each of the qualifying features
- the distribution of the qualifying features within the site

Qualifying Features

6.88 With regards to the SPA the following are reasons for designation:

- Purple sandpiper *Calidris maritima* (Non-breeding)
- Ruddy turnstone *Arenaria interpres* (Non-breeding)
- Little tern *Sternula albifrons* (Breeding)

6.89 With regards to the Ramsar[112] the following are reasons for designation:

Ramsar Criterion 6 – species/populations occurring at levels of international importance

6.90 Species regularly supported during the breeding season:

- Little tern *Sternula albifrons* – 43 apparently occupied nests – average of 2.2% of the GB population

6.91 Species with peak counts in the winter:

- Purple sandpiper *Calidris maritima* – 291 individuals – average 1.6% of the GB population
- Ruddy turnstone *Arenaria interpres* – 978 individuals – average 1% of the GB population

Environmental Vulnerabilities

6.92 With regards to this SPA and others included within the Northumberland Costal 2015 SIP[113] the following are threats and pressure listed for those sites:

- public access/disturbance
- water pollution
- invasive species
- changes in species distributions
- predation
- coastal squeeze
- direct impact from third party
- transportation and service corridors
- changes in land management
- air pollution: risk of atmospheric nitrogen deposition

6.93 The 2019 Supplementary Advice to the Conservation Objectives[114] (SACO) goes into more detail on these vulnerabilities.

A.19 River Tweed SAC

Conservation Objectives

6.94 With regard to the SAC[115] and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change;

6.95 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- the extent and distribution of qualifying natural habitats and habitats of qualifying species
- the structure and function (including typical species) of qualifying natural habitats
- the structure and function of the habitats of qualifying species
- the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely
- the populations of qualifying species
- the distribution of qualifying species within the site

Qualifying Features

- Rivers with floating vegetation often dominated by water-crowfoot
- Sea lamprey Petromyzon marinus
- Brook lamprey Lampetra planeri
- River lamprey Lampetra fluviatilis
- Atlantic salmon *Salmo salar*
- Otter Lutra lutra

Environmental Vulnerabilities

6.96 With regards to this SAC the 2014 SIP[116] lists the following as threats and pressures:

- water pollution
- invasive species
- physical modification
- water abstraction

6.97 The 2019 Supplementary Advice to the Conservation Objectives[117] (SACO) goes into more detail on these vulnerabilities.

A.20 Roman Walls Loughs SAC

Conservation Objectives

6.98 With regard to the SAC[118] and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change.

6.99 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of the qualifying natural habitats
- the structure and function (including typical species) of the qualifying natural habitats
- the supporting processes on which the qualifying natural habitats rely

Qualifying Features

- naturally nutrient-rich lakes or lochs which are often dominated by pondweed

Environmental Vulnerabilities

6.100 With regards to this SAC the 2014[119] SIP lists the following as threats and pressures:

- water pollution
- invasive species
- feature location/extent/condition unknown

6.101 The 2019 Supplementary Advice to the Conservation Objectives[120] (SACO) goes into more detail on these vulnerabilities.

A.21 Simonside Hills SAC

Conservation Objectives

6.102 With regard to the SAC[121] and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change.

6.103 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring.

- the extent and distribution of the qualifying natural habitats
- the structure and function (including typical species) of the qualifying natural habitats
- the supporting processes on which the qualifying natural habitats rely

Qualifying Features

- European dry heaths
- Blanket bogs

Environmental Vulnerabilities

6.104 With regards to this SAC the 2014 SIP[122] lists the following as threats and pressures:

- change in land management
- managed rotational burning
- invasive species
- wildfire/arson
- public access/disturbance
- air pollution: impact of atmospheric nitrogen deposition

6.105 The 2019 Supplementary Advice to the Conservation Objectives[123] (SACO) goes into more detail on these vulnerabilities.

A.22 Teesmouth & Cleveland Coast SPA & Ramsar

Conservation Objectives

6.106 The site's conservation objectives[124] apply to the site and the individual species and/or assemblage of species for which the site has been classified (the "Qualifying features" listed above).

6.107 The objectives are to ensure that, subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:

- the extent and distribution of the habitats of the qualifying features
- the structure and function of the habitats of the qualifying features
- the supporting processes on which the habitats of the qualifying features rely
- the populations of each of the qualifying features
- the distribution of qualifying features within the site

Qualifying Features

6.108 With regards to the SPA the following are reasons for designation:

- Avocet Recurvirostra avosetta (Breeding)
- Common tern *Sterna hirundo* (Breeding)
- Knot *Calidris canutus* (Non-breeding)
- Little tern *Sternula albifrons* (Breeding)
- Redshank *Tringa totanus* (Non-breeding)
- Ruff *Calidris pugnax* (Non-breeding)
- Sandwich tern *Thalasseus sandvicensis* (Non-breeding)
- Waterbird assemblage (Non-breeding)

6.109 With regards to the Ramsar[125] the following are reasons for designation:

Ramsar Criterion 5 – assemblage of international importance

6.110 Species with peak counts in the winter:

- 9,528 waterfowl

Ramsar Criterion 6 – species/populations occurring at levels of international importance

6.111 Species with peak counts in the spring/autumn:

- Common redshank *Tringa totanus* – 883 individuals – average of 0.7% of GB population

6.112 Species with peak counts in the winter:

- Red knot *Calidris canutus* – 2,579 individuals – average of 0.9% of the GB population.

Environmental Vulnerabilities

6.113 The following are listed as environmental vulnerabilities for the site within the 2000 Teesmouth and Cleveland Coast SPA Regulation 33 Conservation Advice Package[126]:

6.114 Physical damage:

- Abrasion e.g. boating, anchoring, trampling
- Selective extraction e.g. aggregate dredging, entanglement, sea coal extraction

6.115 Non-physical damage:

- Noise e.g. boat activity
- Visual e.g. recreational activity

6.116 Toxic contamination:

- Introduction of synthetic compounds e.g. pesticides
- Introduction of non-synthetic compounds e.g. heavy metals, hydrocarbons

6.117 Non-toxic contamination:

- Changes in nutrient loading e.g. agricultural run off, outfalls
- Changes in organic loading e.g. mariculture, outfalls

6.118 Biological disturbance:

- Selective extraction of species e.g. bait digging, wildfowling, commercial and recreational

A.23 Tweed Estuary SAC

Conservation Objectives

6.119 With regard to the SAC[127] and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change.

6.120 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitats and habitats of qualifying species
- the structure and function (including typical species) of qualifying natural habitats
- the structure and function of the habitats of qualifying species
- the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely
- the populations of qualifying species
- the distribution of qualifying species within the site

Qualifying Features

- Estuaries
- Intertidal mudflats and sandflats
- Sea lamprey Petromyzon marinus
- River lamprey Lampetra fluviatilis

Environmental Vulnerabilities.

6.121 With regards to this SPA and others included within the Northumberland Costal 2015 SIP[128] the following are threats and pressure listed for those sites:

- public access/disturbance
- water pollution
- invasive species
- changes in species distributions
- predation
- coastal squeeze
- direct impact from third party
- transportation and service corridors
- changes in land management

- air pollution: risk of atmospheric nitrogen deposition

6.122 The 2019 Supplementary Advice to the Conservation Objectives[129] (SACO) goes into more detail on these vulnerabilities.

A.24 Walton Moss SAC

Conservation Objectives

6.123 With regard to the SAC[130] and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change.

6.124 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitats
- the structure and function (including typical species) of qualifying natural habitats
- the supporting processes on which qualifying natural habitats rely

Qualifying Features

- Active raised bogs
- Degraded raised bogs still capable of natural regeneration

Environmental Vulnerabilities

6.125 With regards to this SAC the 2014 SIP[131] lists the following as threats and pressures:

- drainage
- change in land management
- hydrological change
- air pollution: impact of atmospheric nitrogen

6.126 The 2019 Supplementary Advice to the Conservation Objectives[132] (SACO) goes into more detail on these vulnerabilities.

A.25 Tyne & Allen River Gravels SAC

Conservation Objectives

6.127 With regard to the SAC[133] and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change.

6.128 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitats

- the structure and function (including typical species) of qualifying natural habitats
- the supporting processes on which qualifying natural habitats rely

Qualifying Features

- Grasslands on soils rich in heavy metals

Environmental Vulnerabilities

6.129 With regards to this SAC the 2014 SIP[134] lists the following as threats and pressures:

- change to site conditions
- invasive species
- inappropriate scrub control
- air pollution: impact of atmospheric nitrogen deposition

6.130 The 2018 Supplementary Advice to the Conservation Objectives[135] (SACO) goes into more detail on these vulnerabilities.

A.26 River Eden SAC

Conservation Objectives

6.131 With regard to the SAC[136] and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change.

6.132 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitats and habitats of qualifying species
- the structure and function (including typical species) of qualifying natural habitats
- the structure and function of the habitats of qualifying species
- the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely
- the populations of qualifying species
- the distribution of qualifying species within the site

Qualifying Features

- Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels
- Rivers with floating vegetation often dominated by water-crowfoot
- Alder woodland on floodplains
- Austropotamobius pallipes; White-clawed (or Atlantic stream) crayfish
- Sea lamprey Petromyzon marinus

- Brook lamprey Lampetra planeri
- River lamprey Lampetra fluviatilis
- Atlantic salmon *Salmo salar*
- Bullhead Cottus gobio
- Otter Lutra lutra

Environmental Vulnerabilities

6.133 With regards to this SAC the 2014 SIP[137] lists the following as threats and pressures:

- water pollution
- agricultural management practices
- physical modification
- invasive species
- changes in species distribution
- forestry and woodland management
- hydrological changes
- disease
- air pollution: risk of atmospheric nitrogen deposition

6.134 The 2019 Supplementary Advice to the Conservation Objectives[138] (SACO) goes into more detail on these vulnerabilities.

References

[1] https://www.gov.uk/guidance/national-planning-policy-framework

[2] https://www.gov.uk/guidance/habitats-regulations-assessments-protecting-a-european-site

[3] The Precautionary Principle, which is referenced in Article 191 of the Treaty on the Functioning of the European Union, has been defined by the United Nations Educational, Scientific and Cultural Organisation (UNESCO, 2005) as: *"When human activities may lead to morally unacceptable harm* [to the environment] *that is scientifically plausible but uncertain, actions shall be taken to avoid or diminish that harm. The judgement of plausibility should be grounded in scientific analysis".*

[4] SNH (2015). Habitats Regulations Assessment of Plans: Guidance for Plan-Making Bodies in Scotland. Version 3.0, January 2015. Available from: https://www.nature.scot/habitats-regulations-appraisal-plans-guidance-plan-making-bodies-scotland-jan-2015.

[5] https://www.dtapublications.co.uk/

[6] Opinion of Advocate General Kokott, 9th June 2005, Case C-6/04. Commission of the European Communities v United Kingdom of Great Britain and Northern Ireland, paragraph 49. http://curia.europa.eu/juris/document/document.jsf?docid=58359&doclang=EN

[7] https://ec.europa.eu/environment/nature/natura2000/management/docs/art6/EN_art_6_guide_jun_2019.pdf

[8] Waddenzee case (Case C-127/02, [2004] ECR-I 7405)

[9] Northumberland Local Plan 2016-2036 [Accessed 16/06/2022]

[10] North Tyneside Local Plan 2017-2032 [Accessed 16/06/22]

[11] Draft South Tyneside Local Plan 2021 - 2039 [Accessed 16/06/22]

[12] Sunderland Core Strategy and Development Plan 2015-2033 [Accessed 16/06/2022]

[13] County Durham Plan to 2035 [Accessed 16/06/2022]

[14] Hartlepool Local Plan 2016-2031 [Accessed 16/06/2022]

[15] Redcar & Cleveland Local Plan to 2032 [Accessed 16/06/2022]

[16] Hambleton Local Plan to 2036 [Accessed 16/06/2022]

[17] Middlesbrough Housing Local Plan [Accessed 16/06/22]

[18] Stockton-on-Tees Borough Council Local Plan 2019 [Accessed 16/06/2022]

[19] Richmondshire Emerging Local Plan [Accessed 16/06/2022]

[20] Darlington Borough Local Plan 2016 - 2036 [Accessed 16/06/2022]

[21] Eden Local Plan 2014 - 2032 [Accessed 16/06/2022]

[22] Carlisle District Local Plan 2015-2030.pdf [Accessed 16/06/2022]

[23] Gateshead and Newcastle Core Strategy 2010 - 2030 [Accessed 16/06/2022]

[24] Scottish Borders Local Development Plan to 2025 [Accessed 16/06/2022]

[25] Proposed Scottish Borders Local Development Plan to 2031 [Accessed 16/06/2022]

[26] Review of the Ryedale Plan - Ryedale District Council [Accessed 16/06/2022]

[27] Scarborough Local Plan Review (Issues and Options) - August 2020 [Accessed 16/06/2022]

[28] Scarborough Borough Local Plan - 2011/32 [Accessed 16/06/2022]

[29] Environment Agency - National Flood and Coastal Erosion Risk Management Strategy for England [Accessed 16/06/2022]

[30] Draft river basin management plans: 2021 - GOV.UK (www.gov.uk) [Accessed 16/06/2022]

[31] Northumberland Local Flood Risk Management Strategy [Accessed 16/06/2022

[32] Newcastle Local Flood Risk Management Strategy [Accessed 16/06/2022]

[33] North Tyneside Local Flood Risk Management Strategy [Accessed 16/06/2022]

[34] South Tyneside Flood and Coastal Risk Strategy [Accessed 17/06/2022

[35] Gateshead Local Flood Risk Management Strategy [Accessed 17/06/2022]

[36] Sunderland Local Flood Risk Management Strategy [Accessed 17/06/2022]

[37] Durham Local Flood Risk Management Strategy [Accessed 17/06/2022]

[38] Hartlepool Local Flood Risk Management Strategy [Accessed 17/06/2022]

[39] Local flood risk management strategy (stockton.gov.uk) [Accessed 17/06/2022]

[40] Darlington Local Flood Risk Management Strategy [Accessed 17/06/2022]

[41] Middlesbrough Local Flood Risk Management Strategy [Accessed 17/06/2022]

[42] Northumberland and North Tyneside Shoreline Management Plan [Accessed 17/06/2022]

[43] River Tyne to Flamborough Head Shoreline Management Plan [Accessed 17/06/2022]

[44] Net Zero Newcastle - 2030 Action Plan [Accessed 17/06/2022]

[45] Department for Environment, Food and Rural Affairs. August 2012. Habitats Directive: Guidance on the application of article 6(4). Alternative solutions, imperative reasons of overriding public interest (IROPI) and compensatory measures. 9pp. Available at: www.defra.gov.uk [Accessed on the 03/11/2020].

[46] https://www.gov.uk/flood-and-coastal-erosion-risk-management-research-reports/what-is-coastal-squeeze

[47] Cutts N & Allan J. 1999. Avifaunal Disturbance Assessment. Flood Defence Works: Saltend. Report to Environment Agency).

[48] Cutts, N., Phelps, A. and Burdon, D. 2009. Construction and waterfowl: Defining Sensitivity, Response, Impacts and Guidance. Report to Humber INCA, Institute of Estuarine and Coastal Studies, University of Hull.

[49] The University's research is available at the following link: http://bailey.persona-pi.com/Public-Inquiries/M4%20-%20Revised/11.3.67.pdf.

[50] Research undertaken by the Institute of Estuarine & Costal Studies, University of Hull. 2013. Available at: http://bailey.persona-pi.com/Public-Inquiries/M4%20-%20Revised/11.3.67.pdf [Accessed on the 01/12/2020]

[51] Ibid. Response distances to visual stimuli are given in the Estuarine & Coastal Studies report.

[52] Weilgart L. (2018). The impact of ocean noise pollution on fish and invertebrates. Oceancare & Dalhousie University. 36pp.

[53] Magnhagen C., Johansson K. & Sigray P. (2017). Effects of motorboat noise on foraging behaviour in Eurasian perch and roach: A field experiment. *Marine Ecology Progress Series* **564**: 115-125.

[54] McCauley R., Fewtrell J. & Popper A.N. (2003). High intensity anthropogenic sound damages fish ears. *Journal of the Acoustic Society America* **113**: 638-642.

[55] Wysocki L.E., Dittami J.P. & Ladich F. (2006). Ship noise and cortisol secretion in European freshwater fishes. *Biological Conservation* **128**: 501-508.

[56] Thompson P.M., Brookes K.L., Graham I.M. Barton T.R., Needham K., Bradbury G. & Merchant N.D. (2013). Short-term disturbance by a commercial two-dimensional seismic survey does not lead to long-term displacement of harbour porpoise. *Proceedings of the Royal Society B* **280**, DOI: http://dx.doi.org/10.1098/rspb.2013.2001.

[57] Brandt M.J., Diederichs A., Betke K. & Nehls G. (2011). Responses of harbour porpoises to pile driving at the Horns Rev II offshore wind farm in the Danish North Sea. *Marine Ecology Progress Series* **421**: 205-2016.

[58] Southall B. L., Bowles A. E., Ellison W. T., Finneran J. J., Gentry R. J., Greene Jr C. R., Kastak D., Ketten D.R., Miller J.H., Nachtigall P.E., Richardson J.W., Thomas J.A, and Tyack P.L. (2007). Marine mammal noise exposure criteria: Initial scientific recommendations. *Aquatic Mammals* **33**: 411–522.

[59] The Holohan ruling also requires all the interest features of the European sites discussed to be catalogued (i.e., listed) in the HRA. That is the purpose of Appendix A.

[60] https://designatedsites.naturalengland.org.uk/SiteSearch.aspx; data correct as of 29/07/22

[61] Natural England, 2018. Berwickshire & North Northumberland Coast SAC Conservation Objectives. Accessed 05/08/2022 via: Berwickshire & North Northumberland Coast SAC Conservation Objectives (publications.naturalengland.org.uk)

[62] Natural England, 2015. Northumberland Coast Site Improvement Plan. Accessed 05/08/2022 via: Northumberland Coast SIP (publications.naturalengland.org.uk)

[63] Natural England, 2020. Berwickshire & North Northumberland Coast SAC Supplementary Advice on Conservation Objectives. Accessed 05/08/2022 via: Berwickshire & North Northumberland Coast SAC SACO (naturalengland.org.uk)

[64] Natural England, 2018. Border Mires, Kielder-Butterburn SAC Conservation Objectives. Accessed 05/08/2022 via: Border Mires, Kielder-Butterburn SAC Conservation Objectives (publications.naturalengland.org.uk)

[65] Natural England, 2014. Border Mires, Kielder-Butterburn SAC Site Improvement Plan. Accessed 05/08/2022 via: Border Mires & Kielder-Butterburn SAC SIP (publications.naturalengland.org.uk)

[66] Natural England, 2019. Border Mires, Kielder-Butterburn SAC Supplementary Advice on Conservation Objectives. Accessed 05/08/2022 via: Border Mires, Kielder-Butterburn SAC SACO (publications.naturalengland.org.uk)

[67] Natural England, 2019. Coquet Island SPA Conservation Objectives. Accessed 09/08/2022 via: Coquet Island SPA Conservation Objectives (publications.naturalengland.org.uk)

[68] Natural England, 2015. Northumberland Coast Site Improvement Plan. Accessed 05/08/2022 via: Northumberland Coast SIP (publications.naturalengland.org.uk)

[69] Natural England, 2019. Coquet Island Supplementary Advice on Conservation Objectives. Accessed 09/08/2022 via: Coquet Island SPA SACO (naturalengland.org.uk)

[70] Natural England, 2019. Farne Islands SPA Conservation Objectives. Accessed 09/08/2022 via: Farne Island SPA Conservation Objectives (publications.naturalengland.org.uk)

[71] Natural England, 2015. Northumberland Coast Site Improvement Plan. Accessed 05/08/2022 via: Northumberland Coast SIP (publications.naturalengland.org.uk)

[72] Natural England, 2019. Farne Islands SPA Supplementary Advice on Conservation Objectives. Accessed 09/08/2022 via: Farne Islands SPA SACO (naturalengland.org.uk)

[73] Natural England 2019. Ford Moss SAC Conservation Objectives. Accessed 09/08/2022 via: Ford Moss SAC Conservation Objectives (publications.naturalengland.org.uk)

[74] Natural England, 2014. Ford Moss SAC Site Improvement Plan. Accessed 09/08/2022 via: Ford Moss SAC Site Improvement Plan (publications.naturalengland.org.uk)

[75] Natural England, 2019. Ford Moss SAC Supplementary Advice on Conservation Objectives. Accessed 09/08/2022 via: Ford Moss SAC SACO (publications.naturalengland.org.uk)

[76] Joint Nature Conservation Committee, 2008. Holburn Lake & Moss Ramsar Information Sheet. Accessed 09/08/2022 via: Holburn Lake & Moss Ramsar Information Sheet (jncc.gov.uk)

[77] Natural England, 2015. Holburn Lake & Moss SPA Site Improvement Plan. Accessed 09/08/2022 via: Site Improvement Plan: Holburn Lake & Moss (naturalengland.org.uk)

[78] Natural England, 2019. Holburn Lake & Moss SPA Supplementary Advice on Conservation Objectives. Accessed 09/08/2022 via: Holburn Lake & Moss SPA SACO (publications.naturalengland.org.uk)

[79] Joint Nature Conservation Committee, 2008. Irthinghead Mires Ramsar Information Sheet. Accessed 09/08/2022 via: Irthinghead Mires Ramsar Information Sheet (jncc.gov.uk)

[80] Natural England, 2019. Lindisfarne SPA Conservation Objectives. Accessed 09/08/2022 via: Lindisfarne SPA Conservation Objectives (publications.naturalengland.org.uk)

[81] Joint Nature Conservation Committee, 2008. Lindisfarne Ramsar Information Sheet. Accessed 09/08/2022 via: Lindisfarne Ramsar Information Sheet (jncc.gov.uk)

[82] Natural England, 2015. Northumberland Coast Site Improvement Plan. Accessed 05/08/2022 via: Northumberland Coast SIP (publications.naturalengland.org.uk)

[83] Natural England, 2019. Lindisfarne SPA Supplementary Advice on Conservation Objectives. Accessed 09/08/2022 via: Lindisfarne SPA SACO (naturalengland.org.uk)

[84] Natural England, 2018. Moor House – Upper Teesdale SAC Conservation Objectives

[85] Natural England, 2014. North Pennines Group Site Improvement Plan. Accessed 09/08/2022 via: North Pennines Group Site Improvement Plan (publications.naturalengland.org.uk)

[86] Natural England, 2019. Moor House – Upper Teesdale SAC Supplementary Advice on Conservation Objectives. Accessed 09/08/2022 via: Moor House - Upper Teesdale SAC SACO (publications.naturalengland.org.uk)

[87] Natural England, 2018. Newham Fen SAC Conservation Objectives. Accessed 09/08/2022 via: Newham Fen SAC Conservation Objectives (publications.naturalengland.org.uk)

[88] Natural England, 2014. Newham Fen SAC Site Improvement Plan. Accessed 09/08/2022 via: Newham Fen SAC Site Improvement Plan (publications.naturalengland.org.uk)

[89] Natural England, 2015. Newham Fen SAC Supplementary Advice on Conservation Objectives. Accessed 09/08/2022 via: Newham Fen SAC SACO (publications.naturalengland.org.uk)

[90] Natural England, 2019. North Northumberland Dunes SAC Conservation Objectives. Accessed 09/08/2022 via: North Northumberland Dunes SAC Conservation Objectives (publications.naturalengland.org.uk)

[91] Natural England, 2015. Northumberland Coast Site Improvement Plan. Accessed 05/08/2022 via: Northumberland Coast SIP (publications.naturalengland.org.uk)

[92] Natural England, 2019. North Northumberland Dunes SAC Supplementary Advice on Conservation Objectives. Accessed 09/08/2022 via: North Northumberland Dunes SAC SACO (publications.naturalengland.org.uk)

[93] Natural England, 2019. North Pennine Dales Meadows SAC Conservation Objectives. Accessed 09/08/2022 via: North Pennine Dales Meadows SAC Conservation Objectives (publications.naturalengland.org.uk)

[94] Natural England, 2015. North Pennine Dales Meadows SAC Site Improvement Plan. Accessed 09/08/2022 via: North Pennine Dales Meadows SAC Site Improvement Plan (publications.naturalengland.org.uk)

[95] Natural England, 2019. North Pennine Dales Meadows SAC Supplementary Advice on Conservation Objectives. Accessed 09/08/2022 via: North Pennine Dales Meadows SAC SACO (publications.naturalengland.org.uk)

[96] Natural England, 2018. North Pennine Moors SAC Conservation Objectives. Accessed 09/08/2022 via: North Pennine Moors SAC Conservation Objectives (publications.naturalengland.org.uk)

[97] Natural England, 2014. North Pennines Group Site Improvement Plan. Accessed 09/08/2022 via: North Pennines Group Site Improvement Plan (publications.naturalengland.org.uk)

[98] Natural England, 2019. North Pennine Moors SAC Supplementary Advice on Conservation Objectives. Accessed 09/08/2022 via: North Pennine Moors SAC SACO (publications.naturalengland.org.uk)

[99] Natural England, 2019. North Pennine Moors SPA Conservation Objectives. Accessed 09/08/2022 via: North Pennine Moors SPA Conservation Objectives (publications.naturalengland.org.uk)

[100] Natural England, 2014. North Pennines Group Site Improvement Plan. Accessed 09/08/2022 via: North Pennines Group Site Improvement Plan (publications.naturalengland.org.uk)

[101] Natural England, 2019. North Pennine Moors SPA Supplementary Advice on Conservation Objectives. Accessed 09/08/2022 via: North Pennine Moors SPA SACO (publications.naturalengland.org.uk)

[102] Natural England, 2018. North York Moors SAC Conservation Objectives. Accessed 09/08/2022 via: North York Moors SAC Conservation Objectives (publications.naturalengland.org.uk)

[103] Natural England, 2014. North York Moors Site Improvement Plan. Accessed 09/08/2022 via: North York Moors Site Improvement Plan (publications.naturalengland.org.uk)

[104] Natural England, 2019. North York Moors SAC Supplementary Advice on Conservation Objectives. Accessed 09/08/2022 via: North York Moors SAC SACO (publications.naturalengland.org.uk)

[105] Natural England, 2019. North York Moors SPA Conservation Objectives. Accessed 10/08/2022 via: North York Moors SPA Conservation Objectives (publications.naturalengland.org.uk)

[106] Natural England, 2014. North York Moors Site Improvement Plan. Accessed 09/08/2022 via: North York Moors Site Improvement Plan (publications.naturalengland.org.uk)

[107] Natural England 2019, North York Moors SPA Supplementary Advice on Conservation Objectives. Accessed 10/08/2022 via: North York Moors SPA SACO (publications.naturalengland.org.uk)

[108] Natural England, 2019. Northumberland Marine SPA Conservation Objectives. Accessed 10/08/2022 via: Northumberland Marine SPA Conservation Objectives (publications.naturalengland.org.uk)

[109] Natural England, 2015. Northumberland Coast Site Improvement Plan. Accessed 05/08/2022 via: Northumberland Coast SIP (publications.naturalengland.org.uk)

[110] Natural England, 2020. Northumberland Marine SPA Supplementary Advice on Conservation Objectives. Accessed 10/08/2022 via: Northumberland Marine SPA SACO (naturalengland.org.uk)

[111] Natural England, 2019. Northumbria Coast SPA Conservation Objectives. Accessed 10/08/2022 via: Northumbria Coast SPA Conservation Objectives (publications.naturalengland.org.uk)

[112] Joint Nature Conservation Committee, 2008. Northumbria Coast Ramsar Information Sheet. Accessed 10/08/2022 via: Northumbria Coast Ramsar Information Sheet (jncc.gov.uk)

[113] Natural England, 2015. Northumberland Coast Site Improvement Plan. Accessed 05/08/2022 via: Northumberland Coast SIP (publications.naturalengland.org.uk)

[114] Natural England, 2019. Northumbria Coast SPA Supplementary Advice for Conservation Objectives. Accessed 10/08/2022 via: Northumbria Coast SPA SACO (naturalengland.org.uk)

[115] Natural England, 2019. River Tweed SAC Conservation Objectives. Accessed 10/08/2022 via: River Tweed SAC Conservation Objectives (publications.naturalengland.org.uk)

[116] Natural England, 2014. River Tweed SAC Site Improvement Plan. Accessed 10/08/2022 via: River Tweed SAC Site Improvement Plan (publications.naturalengland.org.uk)

[117] Natural England, 2019. River Tweed SAC Supplementary Advice on Conservation Objectives. Accessed 10/08/2022 via: River Tweed SAC SACO (publications.naturalengland.org.uk)

[118] Natural England, 2018. Roman Wall Loughs SAC Conservation Objectives. Accessed 10/08/2022 via: Roman Wall Loughs SAC Conservation Objectives (publications.naturalengland.org.uk)

[119] Natural England, 2014. Roman Wall Loughs SAC Site Improvement Plan. Accessed 10/08/2022 via: Roman Wall Loughs SAC Site Improvement Plan (publications.naturalengland.org.uk)

[120] Natural England, 2019. Roman Wall Loughs SAC Supplementary Advice on Conservation Objectives. Accessed 10/08/2022 via: Roman Wall Loughs SAC SACO (publications.naturalengland.org.uk)

[121] Natural England, 2019. Simonside Hills SAC Conservation Objectives. Accessed 10/08/2022 via: Simonside Hills SAC Conservation Objectives (publications.naturalengland.org.uk)

[122] Natural England, 2014. Simonside Hills SAC Site Improvement Plan. Accessed 10/08/2022 via: Simonside Hills SAC Site Improvement Plan (publications.naturalengland.org.uk)

[123] Natural England, 2019. Simonside Hills SAC Supplementary Advice on Conservation Objectives. Accessed 10/08/2022 via: Simonside Hills SAC SACO (publications.naturalengland.org.uk)

[124] Natural England, 2021. Teesmouth and Cleveland Coast SPA Conservation Objectives. Accessed 10/08/2022 via: Teesmouth & Cleveland Coast SPA Conservation Objectives (naturalengland.org.uk)

[125] Joint Nature Conservation Committee, 2008. Teesmouth and Cleveland Coast Ramsar Information Sheet. Accessed 10/08/2022 via: Teesmouth amd Cleveland Coast Ramsar Information Seet (jncc.gov.uk)

[126] Natural England, 2000. Teesmouth and Cleveland Coast SPA Regulation 33 Conservation Advice Package. Accessed 10/08/2022 via: Teesmouth and Cleveland Coast SPA Conservation Advice Package (publications.naturalengland.org.uk)

[127] Natural England, 2018. Tweed Estuary SAC Conservation Objectives

[128] Natural England, 2015. Northumberland Coast Site Improvement Plan. Accessed 05/08/2022 via: Northumberland Coast SIP (publications.naturalengland.org.uk)

[129] Natural England, 2020. Tweed Estuary SAC Supplementary Advice on Conservation Objectives. Accessed 10/08/2022 via: Tweed Estuary SAC SACO (naturalengland.org.uk)

[130] Natural England, 2018. Walton Moss SAC Conservation Objectives. Accessed 10/08/2022 via: Walton Moss SAC Conservation Objectives (publications.naturalengland.org.uk)

[131] Natural England, 2014. Walton Moss SAC Site Improvement Plan. Accessed 10/08/2022 via: Walton Moss SAC Site Improvement Plan (publications.naturalengland.org.uk)

[132] Natural England, 2019. Walton Moss SAC Supplementary Advice on Conservation Objectives. Accessed 10/08/2022 via: Walton Moss SAC SACO (publications.naturalengland.org.uk)

[133] Natural England, 2018. Tyne & Allen River Gravels SAC Conservation Objectives. Accessed 10/08/2022 via: Tyne & Allen River Gravels SAC Conservation Objectives (publications.naturalengland.org.uk)

[134] Natural England, 2014. Tyne & Allen River Gravels SAC Site Improvement Plan. Accessed 10/08/2022 via: Tyne & Allen River Gravels SAC Site Improvement Plan (publications.naturalengland.org.uk)

[135] Natural England, 2018. Tyne & Allen River Gravels SAC Supplementary Advice on Conservation Objectives. Accessed 10/08/2022 via: Tyne & Allen River Gravels SAC SACO (publications.naturalengland.org.uk)

[136] Natural England 2018. River Eden SAC Conservation Objectives. Accessed 10/08/2022 via: River Eden SAC Conservation Objectives (publications.naturalengland.org.uk)

[137] Natural England, 2014. River Eden SAC Site Improvement Plan. Accessed 10/08/2022 via: River Eden SAC Site Improvement Plan (publications.naturalengland.org.uk)

[138] Natural England, 2019. River Eden SAC Supplementary Advice on Conservation Objectives. Accessed 10/08/2022 via: River Eden SAC SACO (publications.naturalengland.org.uk)