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GLA Fleet Review – Phase 2

Volume 1

Work Package 8 – Overall Report and Implementation Plan

Author: Project Management Working Group
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EXECUTIVE SUMMARY

The objective of Work Package (WP) 8 is:

- The assessment of all reports to determine a consolidated report detailing a desired solution and implementation plan that offers a Value for Money (VfM) outcome which balances cost and risk to the satisfaction of each GLA board, for DfT and, where appropriate, DTTAS approval for implementation through the corporate planning process.

The acceptance criteria stated within the approved PID states that the report should be signed-off by the Chief Executives of each of the three GLAs.

- Risk Response Criteria (RRC) is the metric against which preparedness for contingent requirements is set. This methodology is endorsed by both DfT and DTTAS. An independent audit by Price Waterhouse Cooper considered the measure to be entirely appropriate and Houlder who were consultants to deliver the Fleet Review Phase 1 endorsed this stating that *'they see no reason that judgements drawn and the timescales proposed for response to contingent requirements in the area identified should not be used as a basis for assessing the risks managed by the GLAs*.'

- WP1 set out to centralise the monitoring arrangements for the 3 GLAs and provide an environment that would enable fleet disposition and AtoN data to be available to the Planning Centre Team and facilitate a co-ordinated GLA response to meet the requirements of the Risk Response Criteria. Monitoring arrangements were considered adequate for the purpose of Coordinated Planning; arrangements are in place to enable the Harwich Planning Centre to be able to monitor all GLA AtoN through 24 hours. Access to this data has enabled a full picture of actual response times in actual conditions to be understood that can be used to inform fleet construct decisions.

- WP2 focused upon the Coordinated Fleet Planning recommendations that emerged from the Centralised Fleet Planning recommendations contained within the Houlder report. There has been very significant progress with these recommendations and RRC outcomes and coverage have seen significant improvements because of it. It is however important to note that whilst it would appear that a 100% RRC coverage baseline plan is possible with 7 vessels, this assumes that all 7 vessels are available throughout the planned period and that the RRC assumption that vessels can achieve their service speeds in the prevailing conditions would apply. Clearly neither can be guaranteed and this is demonstrated by the actual operational monitored data.

- WP3 tested the Houlder assumption*: 'the ability to work with the charter market to meet contingent requirements'*; it concludes that *'the GVCM cannot be relied on to be able to supply a suitable vessel to deliver the various areas of GLA obligation and responsibility on a spot charter basis on an all year around basis'*

- WP4 ascertained that the 7-vessel structure has a measure of reserve capacity to respond to unforeseen incidents and/or breakdowns while

covering risk areas. When possible this capacity is used to undertake third party tasking which contributes ~UK£3 million to offset overall GLA costs. The capacity for commercial work would reduce dramatically with any hull reduction. However conversely the removal of the requirement to generate commercial income does not reduce the Hull requirements to maintain the RRC criteria below 7 vessels.

- WP5 incorporates the local / zone boat arrangements as an element of a layered fleet, utilised for low level tasking commensurate within their capability. These provide a cost effective supplement to the fleet to meet specific requirements but do not enable a reduction in fleet numbers.

- WP6 investigated the additional Houlder recommendations and presented analysis and conclusions.

- WP7 reviewed work packages 2, 3, 4 and 5 and makes the recommendation for the GLA Fleet Construct.

- The fleet outcomes proposed in the Houlder report have been analysed using methodologies endorsed by the 3 GLAs. Fleet outcome 1 (Maintain Existing Construct including existing charter vessel) has been shown to be the only viable outcome from those identified within the Houlder report.

- Analysis of performance and risk indicates that with a 7-vessel fleet during the reporting period of 275 days the average coverage of risk areas appears to be within the risk appetite of the GLAs however this masks the failure to meet all aspects of risk appetite in the following respects:

    - 132 days when the risk appetite in actual conditions was compromised
    - 59 days with more than 1 risk area exposed
    - 36 days when 1 or more areas had 0% coverage

- A reduction in risk could be achieved by the addition of an 8th vessel, however the GLAs believe that a pragmatic approach, driven by actual operational experience should be adopted and a 7-vessel structure maintained, supported by additional mitigation measures, some of which can be delivered sooner, while others should be incorporated into future vessels.

- As individual vessels reach the end of their service lives, the relevant GLA will be able to assess the capability requirement against the prevailing and future operational requirements and enhance the delivery of statutory compliance by:

    - the use of modern hull and machinery technologies to increase actual speed performance in heavy weather.
    - reducing running and procurement costs with modern standardised equipment.
    - the increased operational availability of newer vessels.
    - further refining coordinated fleet management processes and procedures.
    - matching capabilities where appropriate to the broader Government maritime strategy.

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Following careful review of the project data and considering the evidence presented within the Braemar report the 3 GLAs recommend:

Recommendation

The recommendation is for a layered 7-vessel fleet of mixed capability, acknowledging the likely continuation of exposed risk in actual conditions, but with additional mitigation measures aimed at closing the risk gap in a cost effective manner.

The existing fleet is currently broadly matched to the baseline requirement with no justification for urgent and major change across the fleet as a whole at this time. Vessels should be replaced however in line with this recommendation when considered justifiable by the respective GLA operator, submitted through an individual business case to the DfT and DTTAS in the case of Irish Lights in a timely manner to ensure continuity of cost effective cover at risk levels no higher than identified through the 7 ship model. Business cases will consider all aspects of capability requirement, risk mitigation, identified design considerations and business delivery options and this case by case approach will not prohibit consideration of multi-ship or multi-lateral GLA procurement opportunities.

Risk coverage has improved significantly through tighter coordination of activity with a focus on risk response coverage. With priority always given to the 6 hour Dover Strait area and with the 24 hour areas often covered purely by speed and distance, it is the 12 hour areas which have seen the most significant improvement, though it is acknowledged that risk coverage in actual conditions frequently falls below the GLA risk appetite threshold.

The addition of an 8th vessel would close the risk gap at additional cost, though this is likely to be offset by further commercial income, but at this stage it is considered pragmatic to continue with 7 vessels along with the mitigation measures. The enhanced data collection capability now in place will allow for consistency of measurement of risk coverage, which will inform future decisions and allow risk mitigation measures to be tracked. Enhanced measuring and reporting will demonstrate the degree of success and levels of efficiency of the fleet. Post project, the Tri-GLA data to be collected on an ongoing basis and KPIs used for future reporting will be determined and incorporated within internal and external routine reports.

Operation of a fleet of this nature stands to deliver similar levels of commercial income as of today (circa £3m) which is an essential element of offsetting costs using reserve capacity whilst maintaining the risk response coverage.

The operational management will be retained on the principle that whilst the interests of the three GLAs are aligned, their operational and legal accountabilities are not collective. Operational management of vessels is vested in the Individual GLAs in line with the current arrangements of Trinity House - 4 Vessels, Northern Lighthouse Board – 2 vessels and Irish Lights - 1 vessel, where no GLA is, or will be, dependent on the other for delivery of core requirements but will synchronise for operations so as to be mutually supportive in an operational context such as in the GLA peripheral areas (West coast Ireland, Farne Islands, Isle of Man), dry dockings, commercial work, unexpected multiple events where this support becomes necessary. This mutual cooperation extends beyond vessel operations into areas of

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procurement, knowledge transfer and many other areas of common activities. Coordinated planning will therefore be retained and further developed, embracing lessons learnt.

Use of the charter market remains an integral part of delivery with 'Mair' on a time charter for Trinity House and numerous zone or local boats frequently in use for suitable lower level work. Charter vessels have also been used for significant projects where the capability required matches market availability, which in turn allows GLA vessels to be deployed and utilised to best effect. The unique nature of the 'Mair' contract, being a 3rd generation family business, albeit competitively tendered, operating solely for Trinity House is significant in both cost and delivery, which is considered unlikely to be replicated through another provider but will be considered at each contract renewal. Operation of 'Mair' for any GLA could be considered up to the limits of her certification. Further consideration of charter vessels will be considered within the overall business delivery model when vessels are subsequently replaced, along with funding mechanisms to deliver a cost effective and efficient fleet.

The fleet review project has allowed a data driven process to be implemented allowing a continuous process of data capture that demonstrates fleet effectiveness. Reviews of the fleet utility against the requirement can be continually assessed through the annual reporting process therefore eliminating the need for one off reviews of this type.

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Document History and Approvals

Document Location

The definitive copy of WP8 Report is held on IManage document management system

Revision History

Document Reference	Date	Summary of Changes
374102v1	20/02/18	First draft
374102v2	22/02/18	Review comments RD / RB
374102v3	27/02/18	Review comments RD
374102v4	28/02/18	Comments TA / TD
374102v5	05/03/18	Review RD
374102v6	09/03/18	Comments J. Price, Review RD / SJK
374102v7	12/03/18	Comment MB
374102v8	12/03/18	Comment PMWG 20
374102v9	14/03/18	Amendments required by CEC's
374102v10	23/03/18	Approved by CE's / GLA Boards
374102v11	28/03/18	Approved PDF
374102v12	13/04/18	Corrected Commercial Income Figures
382721v1	28/03/18	Redacted PDF - based on 374102 v11
382721v2	17/04/18	Redacted PDF - based from 374102 v12

Reference Documents

Document No.	Document Title Project Folder: \\HA-EDMS\ha_opsms\Projects\Fleet_Review\Fleet Review - Phase Two (489)
336037v12	Fleet Review Phase 2 – Project Initiation Document
373710v3	Fleet Review_Phase 2 Revised Work Plan
337026	PROJECT Fleet Review Phase 2 – Project Risk and Issue Register
376089v1	Houlder Final Report
338,374	Project board submission to the Ministers
350099v1	Response from Department for Transport
338,377	GLA Fleet Review Phase 2 Outline Project Plan
344506v5	'GLA Fleet Review - Phase 2 (489) - WP01 Centralised Monitoring Report 04.08.16'
348274v9	'GLA Fleet Review_WP2_Phase 1_Coordinated Planning'
350025v3	GLA Fleet Review_WP2_Phase_1 – Planning Tool Update Oct27
344510v7	'GLA Fleet Review - Phase 2(489) – WP2 Memorandum of Understanding'
380033v6	GLA Fleet Review Phase 2 – WP2 Co-Ordinated Fleet management Planning Summary
355453v4	'GLA Baseline plans – 2017/18 Final'
357677v3	'GLA Baseline resource capacity document'
355458v5	'GLA Baseline annual plan summary'
355454v4	'GLA FR critical area baseline coverage'
357746v1	'GLA 17/18 Vessel baseline calendars'
373055v1	Fleet Review Phase 2 – WP3 – Braemar Final Report 3 including appendices
344517v6	'GLA Fleet Review - Phase 2 (489) - WP04 Commercial Balance Report 16.08.16 Current Commitments'
350018v4	'GLA Fleet Review_WP4_Phase 2-Methodology'
377751v7	GLA Fleet Review Phase 2 – WP4_Report_180125

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350037v5	'Local Boats Document Cover Page (3)'
350035v3	'The Northern Lighthouse Board – Zone Boat Services Directory'
350038v2	'CIL Local Boat Operations v1 (3)'
342836v6	'Trinity House - Local Boat Services Directory'
380089v6	GLA Fleet Review Phase 2 – WP5_Report
359297v13	GLA Fleet Review Phase 2 - WP06_Houlder_Additional_Recommendations
376,304v9	GLA Fleet Review Phase 2 – WP07_Fleet_Structure_Report
379386v3	Tri-GLA Fleet Review Phase 2 – Management Letter 19-02-2018
358119v6	Additional Recommendations on Risk
381263v2	WP8 - Overall Report & Implementation Plan Volume 2

Approvals

Name	Date	Signature
M. Bullock On behalf of the NLB Managing Board	28/03/2018	[redacted]
Ian McNaught On behalf of the Trinity House Lighthouse Board	28/03/2018	[redacted]
Yvonne Shields On behalf of the Commissioners of Irish Lights	28/03/2018	[redacted]

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1 Terminology definitions

List of Abbreviations

AIS Automatic Identification System
AtoN Aids to Navigation
BSL Buoy Servicing List
CAPEX Capital Expenditure
CEC Chief Executive Committee
CFMG Coordinated Fleet Management Group
CIG Commercial Income Generation
DfT UK Department for Transport
DGPS Differential Global Positioning System
DOC Document of Compliance
DTTAS Irish Department of Transport, Tourism and Sport
ECDIS Electronic Chart Display & Information System
ETV Emergency Tow Vessel
FTE Full Time Equivalent
GIAA Government Internal Audit Agency
GLA General Lighthouse Authority
GLF General Lighthouse Fund
GPS Global Positioning System
GVCM General Vessel Charter Market
IGC Inter-GLA Committee
ILDF Independent Light Dues Forum
ILV Irish Lights Vessel
ITT Invitation to Tender
JSB Joint Strategic Board
LAC Lights Advisory Committee
MANT Medium Aid to Navigation Tender
MCA Maritime and Coastguard Agency
MFA Major Floating Aid
MFT Multi-Function Tender
MoD Ministry of Defence
MOU Memorandum of Understanding
NLB Northern Lighthouse Board
NLV Northern Lighthouse Vessel
NMIC National Maritime Information Centre
PB Project Board
PID Project Initiation Document
PMWG Project Management Working Group
RACON Radar Transponder
RIB Rigid Inflatable Boat
RIV Rapid Intervention Vessel
RRC Risk Response Criteria
RA Risk Appetite
RAAC Risk Response Appetite in Actual Conditions
SANT Small Aid to Navigation Tender
SAR Search and Rescue
SATCOM Satellite Communication
SoR Statement of Requirement
SoS Secretary of State
SoSREP Secretary of State's Representative
TH Trinity House
THV Trinity House Vessel

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TORs Terms of Reference
TUDS Tender Utilisation Data Sheets

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2 Background

The United Kingdom Department for Transport (DfT) led a review of the ships required to enable the General Lighthouse Authorities' (GLAs) of the UK and Ireland to fulfil their statutory duty to maintain marine aids to navigation and respond to wrecks and new dangers. The aim was to identify the optimum number of ships, the capability of those ships, and the appropriate ownership and operational management of the ships required during the period 2016-25.

This Fleet Review was undertaken by a Project Board chaired by DfT with representatives from each GLA, the Lights Advisory Committee (representing light dues payers) and the Irish Department of Transport, Tourism and Sport (DTTAS). The Board procured a specialist maritime consultant (Houlder Ltd) to assist with the Review, which was initiated on the assumption that there were no constraints within the scope established for the work. It delivered to that remit, identifying in a schedule the political, geographic and organisational constraints that would need to be taken into account, and which means that the outcomes required significant further analysis to verify feasibility.

In particular the report validated the GLA Risk Response Criteria and identified clear deficiencies in the current arrangements for risk response.

The Project Board submitted the Houlder report to Ministers with a number of recommendations. The Minister responded to the chair of the Joint Strategic Board (JSB) dated 15th March 2016 stating that:

'I would like you, working with each GLA, to develop and then implement a full project plan for this next phase, which should include:

- *In relation to centralised fleet planning, draw up a proposal for implementation that is fully compliant with existing UK and Irish legislation and present these arrangements by 31st October 2016;*
- *Be ambitious in the aim of securing the most efficient and effective fleet construct, which maintains appropriate levels of navigation safety and, overall, reduces risk compared to current arrangements;*
- *Maintain the existing momentum, working at pace to develop and implement responses to the recommendations, in particular with a view to securing quick wins by October 2016, while remaining alive to emerging opportunities, delivery models and funding mechanisms;*
- *Involve external partners closely throughout, in particular the Lights Advisory Committee and the UK and Irish governments to ensure and effective sharing of ideas, challenge and information about progress; and,*
- *Evaluate the financial impacts on each individual GLA at each stage of implementation, seeking approvals from the UK and Irish governments as necessary before proceeding to implementation.'*

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3 Introduction

The Fleet Review Phase 2 Project Initiation Document (PID) was approved by the Project Board, DfT and DTTAS during September 2016.

Eight work packages were defined within the PID to assess methods of working to improve Risk Response Criteria (RRC) and to test the assumptions made within the Houlder report and identify future fleet construct and operational management.

The report that follows concludes the Fleet Review Phase 2 project with the Overall Project Report and Implementation Plan (WP8)

Work Package 8 – The 'Overall Report and Implementation Plan Volume 1' is made up of the following tasks:

- Consolidate reports from WP1-7
- Develop implementation plan
- Develop overall report
- Sign-off of overall report

This report collates the results and conclusions and presents an implementation plan for the future fleet construct.

It is the intention of this document to allow the reader a full assessment of the process undertaken and the conclusions reached during the Fleet Review Phase 2 project. This Work Package (WP8) report presents the data in an abridged format. The full detail of all the work package reports can be found within Volume 2 (Work package reports and supporting data).

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4 Project Process, Governance and Audit

4.1 Process

A PRINCE 2 project structure was followed throughout the Fleet Review Phase 2 project with 2 audits of the process being provided by the Government Internal Audit Agency (GIAA) as described in 4.4 below.

The Project deliverables are aligned to Phase 1 and Phase 2 of the Government Green book such that the outcome from the project can be incorporated within future business cases:

- Phase 0 – Strategic Outline Plan (SOP); Addressed within the PID
- Phase 1 – Strategic Outline Case (SOC); Internally reviewed reports informing Phase 2 'Outline Business Case':
- Phase 2 – Outline Business Case (OBC); Reports that detail evidence and answers to the project objectives and for external communication
- Phase 3 – Full Business Case (FBC); this is not covered by this project and is a requirement Post Project within individual GLA business cases upon vessel replacement.

Throughout the process a clear communication structure has been maintained utilising the monthly highlight reports being delivered by the Project Manager for approval at the monthly Project Management Working Group (PMWG) meetings before onward distribution to the Project Board (PB) and Reference Group (see 4.3 below).
The monthly PMWG meetings invite the work package leader to update the PMWG group on the progress of their respective work package. This then has formed the basis of the highlight report. The output deliverables from the work packages in the form of the work package reports have been reviewed and approved by the appropriate level of governance as described within the approved PID.

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4.2 Project Risk

Project risk has been managed throughout the project using the project risk register (risk register source document 337026). The risk register created during the project initiation phase has been reviewed at each of the monthly PMWG meetings. Assessment during the review are made for risk scoring, mitigation, new emerging risks and any comment. The top 5 scored risks for both risk before mitigation and risk after mitigation have been presented within the monthly highlight report distributed to Project Board and to the Reference Group following the PMWG meeting.
Major changes were seen to the risk register following Project Board approval of the Braemar report. A number of the identified risks were able to be closed due to the conclusion of WP3. As work packages are completed the risk associated with that WP was then closed out.
Project Risk was audited by the Government Internal Audit Agency. The following comment was made about the risk review process:

> *The risk register was a key document subject to regular review by project management. Updates and mitigating actions were documented in line with developments and identified changes in exposure, a key example being the Communications Strategy to mitigate the top risk of uncertainty and impact on GLA personnel.*

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4.3 Governance

This project was where possible designed to utilise existing GLA structure drawing on JSB, Chief Executive Committee (CEC), and Inter GLA operations Committee (IGC5) to make up the Project Board. It has been supplemented by the creation of a Reference Group to ensure successful and meaningful external liaison is continued as in the DfT led Phase 1 Fleet Review process.

The Project Board has drawn upon the Coordinated Fleet Management Group (CFMG) and other internal resources to undertake project work packages. These have been overseen by the Phase 2 Project Management Working Group (PMWG) formed of the GLA Operations Director, Project Manager and GLA finance representative. The Project Manager role was as project coordinator and had a non-executive role in the working group.
The Governance Structure for the 'Phase 2 Fleet Review Project' consisted of:

- Project Board (PB) - Having overall responsibility for the project and made up of the Chief Executives from each GLA and the GLA Directors involved within the day to day management of the Fleet Review Phase 2 project.
- Project Management Working Group (PMWG) - Reporting into the Project Board and having day to day responsibility for project tasks and was made up of the Operational Directors that sit within the Project Board and Fleet Review Work Package leaders
- Reference Group - providing support and challenge to the project and chaired by the DfT and made up of members from DfT, DTTAS, Transport Scotland, JSB, Lights Advisory Committee (LAC), SOSREP and a number of independent maritime professionals

Independent external experts on brokerage and market analysis have been utilised under the supervision of the PMWG.

The role of the JSB was to coordinate joint GLA strategic oversight of the project and act as a vehicle for ongoing tri-GLA cooperation.

The role of the Reference Group was to provide challenge and ideas for the Project Board and with their independent expertise provide information useful for the effective completion of the project.

The GLA Boards were responsible for the approval of the project plan, monitoring of progress and final sign off of project conclusions and recommendations.

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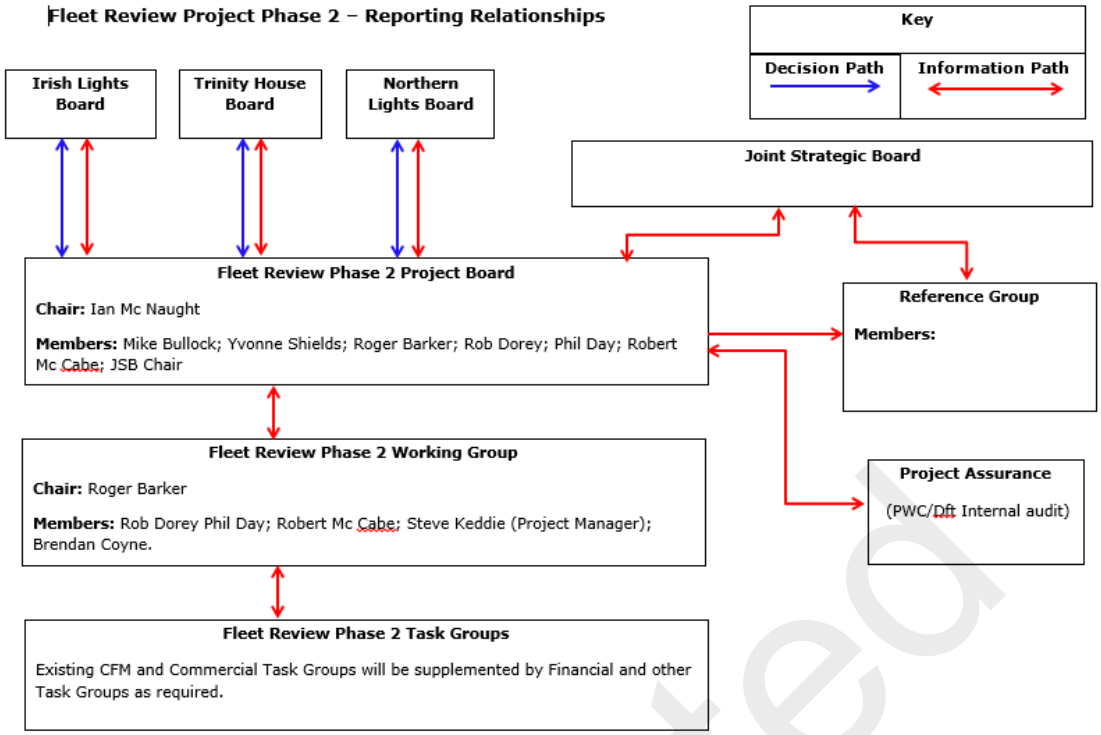

- Situation reflects the members at time of PID implementation (September 2016).

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4.4 Audit

Assurance for the project has been provided by independent project audits carried out by the Government Internal Audit Agency (GIAA). Two audits have been completed.

The latest review by GIAA concluded that:

The processes we reviewed developed conclusions that were clearly drawn from a well-structured, data-rich and evidence-based methodology, reflecting a good level of wider engagement. We consider that this provides a sound platform to develop the Implementation Plan Process.

Our key findings were as follows:

- ***Engagement***
  The Reference Group provided an effective forum for challenge and advice from a range of stakeholders. Members were provided with in-depth updates on the progress of the Review and had opportunities to challenge the method and conclusions of the work performed.

  A Communications Strategy was developed and implemented to ensure information needs of stakeholders internal and external to the Fleet Review process were identified and met. Suggestions and questions from stakeholders were addressed by project management to provide confidence in the outcome of the Review.

- ***Risk Review***
  The risk register was a key document subject to regular review by project management. Updates and mitigating actions were documented in line with developments and identified changes in exposure, a key example being the Communications Strategy to mitigate the top risk of uncertainty and impact on GLA personnel.

- ***Escalation Processes***
  The governance structure was complex but the membership overlaps from Project Management Working Group through to GLA board's facilitated escalation of approval and communication. Acceptance criteria were defined for each work package phase and testing indicated compliance for work packages completed to date.

- ***Meeting / Reporting Mechanisms***
  Reporting provided a timely and informative basis for governance bodies to operate effectively. Meetings had a co-operative atmosphere and actions agreed were implemented. While complex, the well-structured meeting process and related governance structure, combined with the length of the Review, were generally considered necessary to have obtained the resulting level of engagement and evidential support.

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5 Project Work Package Definition and Report Structure

It was agreed that the project would deliver an implementation plan for future Fleet Structure which draws information and conclusions from the work package (WP1) through to work package (WP7) with an overall report within work package (WP8) as detailed in Section 5.1.1 below:

5.1 Scope

The scope of the project was defined by the project objective being delivered through the work-packages

5.1.1 Project Structure

The project was sub-divided into seven main work packages and a final report from WP8.

- WP1) Centralised Monitoring
- WP2) Coordinated Planning
- WP3) Charter, Test and Evaluation
- WP4) Commercial Impact and Future Balance
- WP5) Supplementary Solutions Assessment
- WP6) Additional Recommendations Review
- WP7) Fleet Structure Report including GLA risk reduction analysis
- WP8) Overall report and implementation plan

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6 Work Package 1 (WP1) – Centralised Monitoring

This summarises the key points of the work package from objectives through to conclusions. For a full detailed report of the work package including supporting data (where relevant) see the relevant section within GLA Fleet Review Phase 2_WP8_ Overall_Project_Plan_and_Implementation_Plan_Volume 2

6.1 WP1 Objective

- To Provide 24 Hour monitoring to the Coordinated Planning Team

6.2 WP1 Deliverable

- Extend existing monitoring arrangements to make data visible to central planner 24/7 (Go-Live and Report)

6.3 WP1 Acceptance Criteria

- Three GLA Operations Directors to sign document that 24/7 monitoring arrangements are adequate for the purpose of coordinated planning
- Ensure that 24/7 data is provided by each GLA is available for use by the Central Planning Team

6.4 WP1 Analysis

A review undertaken on then current GLA monitoring systems (Oct 2016) concluded that all GLA monitoring systems in use were available within the Lighthouse Monitoring Centre providing all the required monitoring of AtoN data across the GLAs with regards to the Safety of the Mariner and the availability and performance of:

- Lights
- RACON
- AtoN positions
- Hazard Warning Signals (HWS)
- AIS AtoN

By extending the monitoring arrangement through 24 hours would enable this information to be available to the Planning Centre Team and facilitate a co-ordinated GLA response to meet the requirements of the Risk Response Criteria. Access to this data has enabled a full picture of actual response times in actual conditions to be understood that can be used to inform fleet construct decisions.

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6.5 WP1 Conclusion

Following a review of all GLA monitoring systems and procedures the coordinated monitoring report was agreed at the Fleet Review Project Board held on the 6th October 2016. The monitoring arrangements have been considered as adequate for the purpose of Coordinated Planning and arrangements are in place to enable the Planning Centre Team to be able to monitor all GLA AtoN through 24 hours commencing 29th July 2016.

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7 Work Package 2 (WP2) – Coordinated Planning

This summarises the key points of the work package from objectives through to conclusions. For a full detailed report of the work package including supporting data (where relevant) see the relevant section within GLA Fleet Review Phase 2_WP8_ Overall_Project_Plan_and_Implementation_Plan_Volume 2
WP2 was split into 4 phases of work to deliver a coordinated planning package

7.1 WP2 Objective

7.1.1 Phase 0 – Project MOU

To establish a framework agreement acceptable to each GLA Board which forms the basis for Coordinated Planning of tri-GLA vessels. MOU to include level of commitment of asset availability to conduct routine maintenance work, response to RRC, arrangements for the conduct of commercial activity and funding arrangements.

7.1.2 Phase 1 – Establish Tri-GLA framework, organisation, procedures, initial planning tool

To establish an agreed organisational structure and framework of procedures for the coordination and execution of a Tri-GLA plan.

7.1.3 Phase 2 – Establish individual GLA operational requirements and develop to coordinated fleet plan

Execute current (16/17) plans and establish 2017/18 operational requirements entering into planning tool for period commencing 01 April 17.

7.1.4 Phase 3 – Evaluate, refine Coordinated Planning model, build coordinated plan

Measure success against planned operational requirements, AtoN casualty, wreck and new danger response, ability to meet risk response criteria, effect on commercial activities

7.1.5 Phase 4 – MOU (Operation of recommended fleet construct)

To establish a framework agreement acceptable to each GLA Board which forms the basis for post project Coordinated Planning of tri-GLA vessels. To include level of commitment of asset availability to conduct routine maintenance work, response to RRC, arrangements for the conduct of commercial activity and funding arrangements.

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7.2 WP2 Deliverables

7.2.1 Phase 0 – Project MOU incorporating

- Coordinated Planning - Funding agreement
- Coordinated Planning - Vessel availability
- Coordinated Planning - Commercial activity integration
- Coordinated Planning – Casualty, wrecks, new dangers

7.2.2 Phase 1 – Establish Tri-GLA framework, organisation, procedures, initial planning tool

- Coordinated Planning - Tri-GLA framework proposal
- Coordinated Planning - Organisational proposal
- Coordinated Planning – Establish planning procedures
- Coordinated Planning - Establish initial planning tool
- Coordinated Planning – Input current plans to Coordinated Planning tool
- Coordinated Planning – Go Live and Report

7.2.3 Phase 2 – Establish Individual GLA operational requirements and develop coordinated fleet plan

- Coordinated Planning – 2017/18 NLB Operational requirement
- Coordinated Planning – 2017/18 Irish Lights Operational requirement
- Coordinated Planning – 2017/18 Trinity House Operational requirement
- Coordinated Planning – Overlay 2017/18 Individual GLA requirements into coordinated fleet plan demonstrating risk reduction
- Coordinated Planning – Sign-off coordinated fleet plan incorporating 2017/18 GLA operational requirements

7.2.4 Phase 3 – Evaluate, Refine centralise planning model, build coordinated plan

- Coordinated Planning – Measure success against planned operational requirements, AtoN casualty, wreck and new danger response, ability to meet risk response criteria, effect on commercial activities
- Coordinated Planning – Review and refine central planning tool processes and procedures
- Coordinated Planning – Report on implementation

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7.2.5 Phase 4 – Final Post Project MOU (Operation of recommended fleet construct)

- Coordinated Planning – Consider phase 3 report
- Coordinated Planning – Post Project Funding agreement
- Coordinated Planning - Post Project vessel availability
- Coordinated Planning - Post Project commercial activity integration
- Coordinated Planning – Post Project casualty, wrecks, new dangers
- Coordinated Planning – Sign-Off MOU and implement

7.3 WP2 Acceptance Criteria

7.3.1 Phase 0 – Project MOU incorporating

MOU developed to the satisfaction of each GLA Board, (including funding arrangements endorsed by DfT/DTTAS) and signed by GLA Chief Executives.

7.3.2 Phase 1 – Establish Tri-GLA framework, organisation, procedures, initial planning tool

16/17 operational plan incorporated live into agreed planning tool with associated organisational procedures established to the satisfaction of the PMWG.

7.3.3 Phase 2 – Establish Individual GLA operational requirements and develop coordinated fleet plan

All statutory work and RRC achieved plus all operational requirements entered into the planning tool for period commencing 1st April 2017.

7.3.4 Phase 3 – Evaluate, Refine centralise planning model, build coordinated plan

A comprehensive record and report for the period 01 Apr 17 – 01 Apr 18 identifying performance in the following areas:

- Buoy Type1&2/ Buoy Type3&4 maintenance
- Buoy Type1&2/ Buoy Type3&4 outage
- New danger / wreck location and marking

In addition, record where charter vessels were called upon to supplement existing Fleet.

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7.3.5 Phase 4 – Final Post Project MOU (Operation of recommended fleet construct)

MOU developed to the satisfaction of each GLA Board, including funding arrangements, with the additional endorsement of DfT/DTTAS and signed by GLA Chief Executives.

7.4 WP2 Analysis

7.4.1 Phase 0 – Project MOU incorporating

The Principles guiding this MOU were defined as:

- *The objective underpinning this MOU is that, at any time, each of the three GLAs will have access to the services of sufficient ship capacity to meet their routine planned operations and risk and casualty response requirements*
- *Required ship capacity may be delivered by GLA operated vessels or by chartered/contracted tonnage*
- *This MOU will be reviewed by the GLAs on conclusion of the Fleet Review process. If the Fleet Review process has not concluded by 1st December 2018, this MOU will be reviewed at that time*
- *Nothing in this MOU shall detract from the agreed position that each GLA requires sufficient control of adequate resources to meet its statutory responsibilities to the satisfaction of its board*

The MOU was signed and approved by all three GLAs on the 8th June 2017 and superseded the previous MOU for Inter-GLA ship Support signed between GLAs dated 17th November 2010.

7.4.2 Phase 1 – Establish Tri-GLA framework, organisation, procedures, initial planning tool

The draft Houlder Report identifies Centralised Fleet Control and scheduling as a prerequisite for efficient operation of the GLA Fleet. Houlder have modelled this approach on the advances already made in Coordinated Fleet Management and recommend the development of a fully integrated fleet schedule which would be actively managed and controlled centrally.

This approach requires vessel capacity to be managed from a fleet wide perspective with fully coordinated programmes down to Buoy Servicing List (BSL) level and integration of operations across GLA boundaries. Houlder consider that this will enhance the GLA ability to meet their statutory requirements while still potentially allowing use of reserve capacity for commercial purposes.

Houlder also recognise that responsibility and legal liability for the delivery of the AtoN service lies with each GLA.

The GLAs accept the Houlder analysis of the benefits of this arrangement. However, the GLAs believe that their individual statutory obligations require control of vessel operations, AtoN provision and primary response decisions in relation to AtoN casualties, wreck and new dangers within their geographical areas. The GLAs have developed the following arrangements which retain control with the individual GLA,

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while still delivering the benefits of integrated operations as recommended by Houlder.

Coordinated Planning has demonstrated that GLA Integrated Fleet Deployment and Response Arrangements as recommended by Houlder while still respecting the individual GLA statutory obligations and in accordance with the GLA Fleet Review – Phase 2 – WP2 Memorandum of Understanding (MOU) as revised 17th November 2017 delivered benefits of integrated operations as recommended by Houlder. The principal features of this arrangement are:

- The principles of individual GLA statutory responsibility, optimised fleet operations and active risk management are core to these arrangements.
- Control and safe management of each ship rest with the GLA holding the Document of Compliance for the vessel
- Statutory responsibilities are as set out in Merchant Shipping Acts and ultimate liability rests with individual GLA Boards
- As accepted by Houlder the arrangements will be largely manpower neutral with the benefits arising from improved fleet operations.

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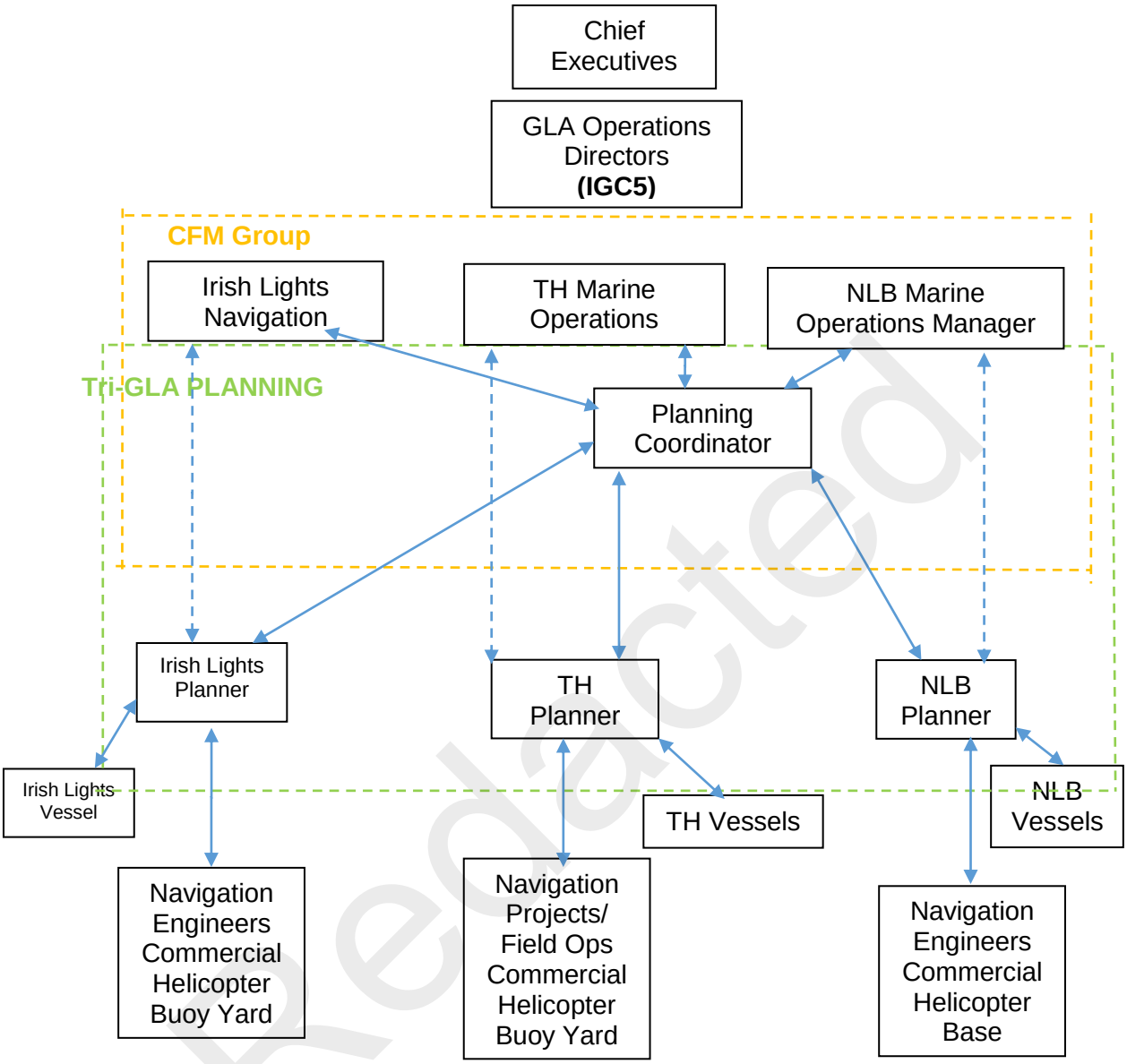
The organisational structure put in place to achieve these benefits is outlined in the diagram below:



Any changes required to the approved GLA plan either planned or unplanned would be escalated using two escalation processes defined within the WP2 Coordinated planning document escalating the change when necessary through the CFM chair to Operations Director and CEC level when required.

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7.4.3 Phase 2 – Establish Individual GLA operational requirements and develop coordinated fleet plan

The GLA Fleet Plan has considered all of the requirements to meet RRC, AtoN Maintenance, Projects and then pre-existing contractual commitments utilising the GLA Fleet in a manner that minimises risk and optimises fleet efficiency.

The plan commenced utilising a GLA's vessel(s) to cover their risk response areas and other planned work in the first instance and then looked to the interaction of other vessels where this could not be achieved, thus overall, gaining greater efficiency from the fleet.

The process in compiling the GLA Fleet Plan was:

- Irish Lights, TH, NLB Planners obtained the requirements for ship resources from their respective internal departments.
- The Planning Coordinator with the Planners compiled the GLA Fleet Plan from the resource requirements ensuring that the requirements under the GLA Project MOU were accounted for.
- The draft annual GLA Fleet Plan was agreed by the CFM Managers prior to the Plan being submitted to IGC5 for sign-off.
- GLA Fleet Plan was made operational from 1st April 2017.

7.4.4 Phase 3 – Evaluate, Refine centralise planning model, build coordinated plan

The baseline plan for operational requirements was approved on the 23rd March and went live on the 1st April 2017.

7.4.4.1 Baseline Plan

The following documents were frozen on 23rd March 2017 prior to the 2017-18 planning year which commenced 1st April 2017.
The Base Line Plan consists of the following calendars and spreadsheets:

- GLA Annual Plan Summary
- GLA Risk Response Analysis (Bubble Assessments – software package that provides vessel coverage analysis)
- GLA Work Plan Calendars
- GLA Resource Capacity
- GLA Critical Area Coverage

The plan created allowed for 100% coverage of the RRC and completion of the operational tasking using the existing 7-vessel fleet.

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7.4.4.2 Daily Dashboard

During the project, data was collected to form the basis for fleet analysis through the 'Daily Dashboard'. The Daily Dashboard was designed to meet the KPI requirements of the project from the period 1st April to 31st December 2017

The daily dashboard allows for an ongoing record of when it has become necessary to change the baseline plan and record the consequent impact of the ability to respond.

7.4.4.3 Changes to Baseline Plan

A significant element of GLA work is responding to wreck, new dangers and AtoN casualties to maintain the essential safety service for the mariner and therefore the baseline plan is expected to be compromised by one or more of the following reasons:

- Response to wreck or new danger
- AtoN casualty
- Unplanned vessel breakdown
- Significant adverse weather conditions
- Environmental constraints
- Impact of unplanned helicopter use
- Consequential reschedule of planned work
- Urgent requirement for hydrographic survey
- Urgent in year changes to AtoN requirements
- Unexpected changes to user requirements
- Impact of supplier product or delivery failure

As a result the baseline plan has changed by over 61% over the trial period from 1st April 2017 to 31st December 2017.

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7.4.4.4 GLA Risk Terminology

- **Risk Response Criteria (RRC)** – A baseline requirement as defined in Risk Response Criteria document revised and published 2014.The key points are 6, 12 and 24hour areas 100% of time in moderate conditions where service speed can be achieved
- **Risk Appetite (RA)** - as defined in Paper 'Additional Recommendations on risk' (document number. 358,119) The key points are 6, 12 and 24-hour areas are 95%, 90% and 85% respectively which introduces a risk tolerance in terms of area and time but only accepting one area to be within this tolerance at any given time
- **Risk Appetite in Actual Conditions (RAAC)** - utilising the basis of the RRC coupled with risk response appetite in terms of tolerance and using the actual operational conditions and 'layered vessel' capabilities experienced on the day gives the GLA boards a more realistic appreciation of the ability to respond

The GLAs have resources for response to wrecks and new dangers and the waters around the British Isles have varying volumes of traffic and degree of risk. To ensure an appropriate distribution of resources, and speed of response 'Response Criteria' are allocated.
The Risk Response Criteria (RRC) are based upon service speeds in moderate weather conditions and are categorised into 3 areas shown in the figure below:

- The Red area (south east England) indicates the requirement for a response within 6 hours
- The three yellow areas (approaches to the Humber, Solent and Lands' End) indicate up to 12 hours
- Darker blue hashed areas up to 24 hours
- The remaining pale blue mottled area indicates that a response in excess of 24 hours would be acceptable

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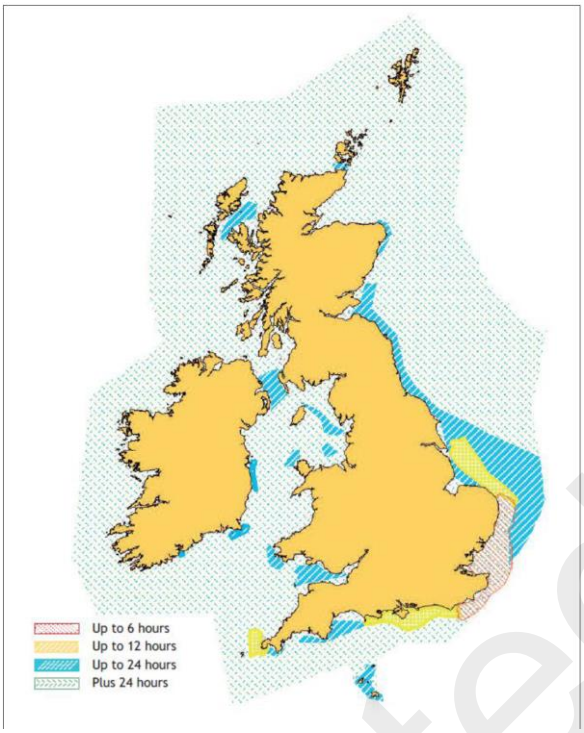

Risk Response Criteria (RRC) Areas

7.4.4.5 RRC Covered / Planned Work Completed

Prior to implementing the Coordinated Fleet Planning recommended in the Houlder Report, the coverage of the 12-hour RRC area was on average 17%. However, with the introduction of Coordinated Fleet Planning, during the trial period this has improved to 93% using RAAC. This was achieved by taking a holistic view across all GLA areas and by giving primacy to Risk Response.

Whilst embracing the Houlder model of coordinated positioning, in reality once the baseline plan changes it can be impractical for the other vessels in the fleet to move in a synchronised way. This can be due to the requirement to maintain risk cover in other areas and the necessary prioritisation of some planned work such as helicopter operation and other resource constraints. The baseline plan, giving risk response primacy, aims to give full coverage to the risk response areas throughout the year whilst completing all the planned work. However, it has been seen within the trial period that the following factors all had an impact on the baseline plan, reducing the likelihood of being able to deliver the required risk response and completion of planned work.

- Supply issues
- Planned downtime
- Unplanned downtime - Failures etc.
- Weather downtime
- Environmental windows and constraints
- Limitations of capabilities in some vessels
- Aids to Navigation (AtoN) casualty

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- Helicopter availability
- Dock Bookings
- Committed commercial work

The coordinated plan trial has demonstrated that the knock-on effect of the above events make it often impractical to move vessels away from the planned work.

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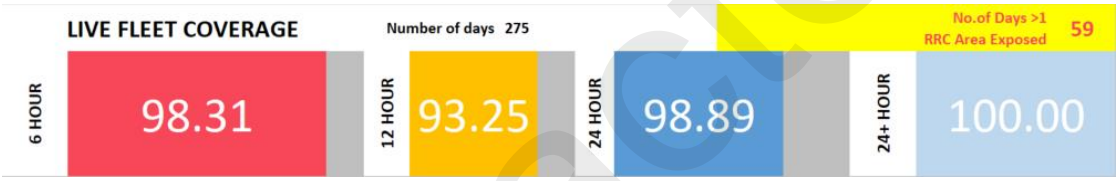
7.4.4.6 Seven Vessel Dashboard Analysis

Assessing actual operating conditions on a daily basis (actual vessel disposition reports), the resulting average risk response coverage following the changes and events throughout the trial period was extracted from the daily dashboard measured against the RAAC.

The average risk response coverage over the trial period as collected on 31st December 2017 can be measured using the two following metrics:

1. The number of tasked days at 275 days (reporting period) together with the number of times within those tasked days that more than 1 risk response area is exposed
2. The figures given show the performance from the 7-vessel fleet as an average percentage coverage for the trial period for the collected 6, 12 and 24hour period.

However, as with all averages, it does not show significantly poorer performance in individual areas on specific days which includes occasions when the baseline RRC are compromised. To understand the significant effect this has on the ability for the GLAs to respond, further analysis of each individual event is required on a case-by-case basis and presented later within this section.



During the reporting period within individual areas there were:

- 132 days when the RAAC was compromised
- 59 days with more than 1 risk area exposed
- 36 days when 1 or more areas have 0% coverage

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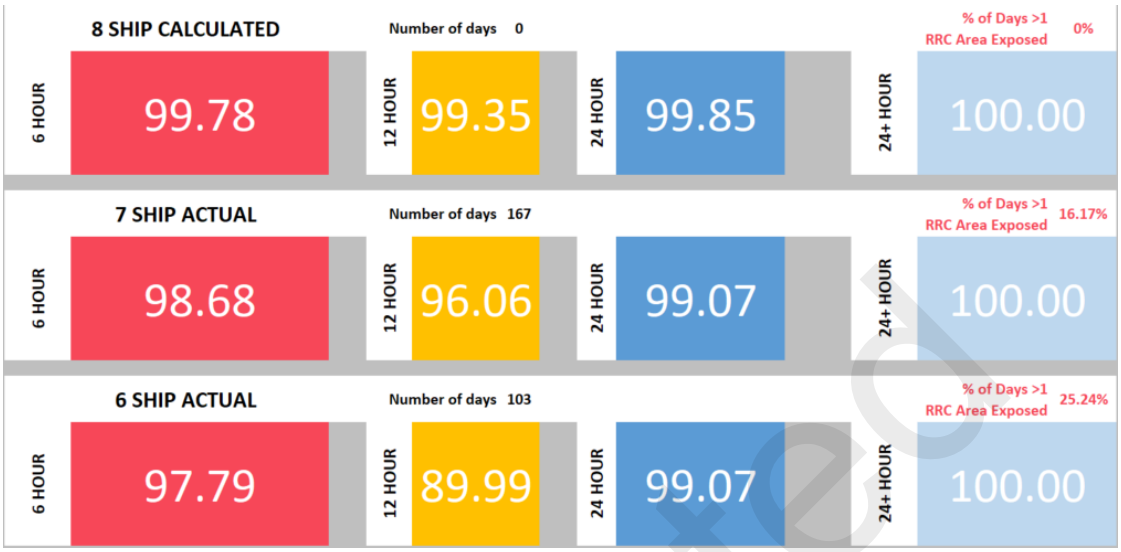
7.4.4.7 Vessel Numbers Dashboard Analysis

To demonstrate the effect of vessel numbers on the overall average coverage. Analysis was conducted to determine the effects of a 6, 7 and 8 vessel fleet.
This is detailed within the table below.



Note: The number of days referes to the number of days within the trial period that 8, 7 or 6 vessels were available and relates to graph in Section 7.5.1.

The impact of having a 6-vessel fleet on the 6, 12 and 24-hour areas is that the overall average fails to meet the RAAC and that more than one risk area is exposed 25% of the time. Similarly the impact of having a 7-vessel fleet is that more than one risk area is exposed 17% of the time. This analysis being built on actual data when during the trial period only 6 or 7 vessels have been available.

This figure also shows a calculated average based upon an 8-vessel fleet, which enables the GLAs to fully meet the RAAC and is deemed the optimum fleet construct.

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7.4.4.8 Detailed Analysis of Selected Days

The following analysis gives an extract from the detailed series of events that describe actual vessel disposition with and without incidents (full detail of the scenario and vessel disposition can be found within WP2 Volume 2)
The RRC areas of 6, 12 and 24 hours and the tolerance set upon these are built on achieving service speed of vessels in moderate conditions. The analysis below shows the impact on the Risk Coverage of service speed and actual speed on the day.

13th April 2017

Fleet No.	Coverage with 7 Vessels		Coverage with 6 Vessels	
Actual Plan, Service Speed	Portland to Beachy 12 Hrs RRC	*100% coverage*	Portland to Beachy 12 Hrs RRC	*79% coverage*
	Cromer to Dover 6 Hrs RRC	*100% coverage*	S. North Sea to Tay 24 Hrs RRC	*95% coverage*
Actual Speed	Portland to Beachy 12 Hrs RRC	*36% coverage*	Portland to Beachy 12 Hrs RRC	*36% coverage*
	Cromer to Dover 6 Hrs RRC	*92% coverage*	Cromer to Dover 6 Hrs RRC	*86% coverage*
	Humber to Cromer 12 Hrs RRC	*95% coverage*	Humber to Cromer 12 Hrs RRC	*64% coverage*
	S. North Sea to Tay 24 Hrs RRC	*89% coverage*	S. North Sea to Tay 24 Hrs RRC	*87% coverage*
Comment	On this day with 7 vessels coverage could be maintained at a theoretical service speed, however given the actual conditions of the day and the resulting speeds achievable as reported by the vessels the ability to respond was significantly compromised. If only 6 vessels were available, analysis shows that we would fail to meet the agreed risk appetite threshold on two counts at service speed. At actual speeds achievable on the day the resulting response is further compromised.			

2nd June 2017

Fleet No.	Coverage with 7 Vessels		Coverage with 6 Vessels	
Actual Plan, Service Speed	All RRC Areas	*100% Coverage*	Land's End 12 Hrs RRC Area	*44% Coverage*
Actual Speed	All RRC Areas	*100% Coverage*	Land's End 12 Hrs RRC Area	*44% Coverage*
Comment	There were no incidents on this day; with 7 vessels coverage in each individual area was achieved on the Actual speeds on the day. However if only 6 vessels were available, analysis shows that there would potentially have been some exposure in the Land's End 12 Hrs RRC area even at full service speeds.			

Braemar reported that during the 6th and 7th June 2017 an opportunity arose to gain support from and to test the short term charter market. Braemar approached 100+ charter companies to support vessel operations off the east coast of Great Britain. Of the 100+ companies contacted only 6 offers were received and of the 6 offers no vessels were technically and economically suitable to undertake the role. The Braemar report is described in more detail in Section 8.

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6th July 2017

Fleet No.	Coverage with 7 Vessels		Coverage with 6 Vessels	
Actual Plan, Service Speed	Cromer to Dover 6 Hrs RRC	*95% Coverage*	Cromer to Dover 6 Hrs RRC	*95% Coverage*
	Portland to Beachy 12 Hrs RRC	*90% Coverage*	Portland to Beachy 12 Hrs RRC	*90% Coverage*
	Humber to Cromer 12 Hrs RRC	*100% Coverage*	Humber to Cromer 12 Hrs RRC	*100% Coverage*
	S. North Sea to R. Tay 24 Hrs RRC	*100% coverage*	S. North Sea to R. Tay 24 Hrs RRC	*100% coverage*
Actual Speed	Cromer to Dover 6 Hrs RRC	*0% Coverage*	Cromer to Dover 6 Hrs RRC	*0% Coverage*
	Portland to Beachy 12 Hrs RRC	*0% Coverage*	Portland to Beachy 12 Hrs RRC	*0% Coverage*
	Humber to Cromer 12 Hrs RRC	*34% Coverage*	Humber to Cromer 12 Hrs RRC	*0% Coverage*
	S. North Sea to R. Tay 24 Hrs RRC	*93% coverage*	S. North Sea to R. Tay 24 Hrs RRC	*0% Coverage*
Comment	On this day with 7 vessels coverage in each individual area was achieved however two RRC areas were affected, thus the risk appetite threshold was compromised even at service speeds. Given the events and actual conditions of the day and the resulting speeds achievable as reported by the vessels the level of risk was further exposed across four areas, two area having no coverage. If only 6 vessels were available, analysis shows that although at service speeds no further deterioration was found, following the events and actual conditions on the day this showed that risk was further exposed with zero coverage in four areas.			

25th Sept 2017

Fleet No.	Coverage with 7 Vessels		Coverage with 6 Vessels	
Actual Plan, Service Speed	Land's End 12 Hrs RRC	*67 % Coverage*	Land's End 12 Hrs RRC	*54 % Coverage*
Actual Speed	Land's End 12 Hrs RRC	*67 % Coverage*	Land's End 12 Hrs RRC	*54 % Coverage*
Comment	On this day, Galatea was diverted east to attend a buoy casualty. This left Granuaile and MV Mair providing partial coverage of the Land's End Area. Following the events and actual conditions on the day and due to the distance of both vessels from Land's End, the area was exposed, the level of exposure increasing for a six vessel fleet.			

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8th October 2017

Fleet No.	Coverage with 7 Vessels		Coverage with 6 Vessels	
Actual plan, Service speed	All RRC Areas	*100% Coverage*	Liverpool Bay 24 Hrs RRC	*21% Coverage*
			Morecambe Bay 24 Hrs RRC	*98% Coverage*
			Dublin Bay & East Irish Coast 24 Hrs RRC	*85% Coverage*
Actual Speed	All RRC Areas	*100% Coverage*	Holyhead Bay	*0 % Coverage*
			Liverpool Bay	*0 % Coverage*
			Morecambe Bay	*18 % Coverage*
			Dublin Bay & East Irish Coast 24 Hrs RRC	*39 % Coverage*
Comment	There were no incidents on this day; with 7 vessels coverage in each individual area was achieved on the actual speeds on the day. However if only 6 vessels were available, analysis shows that there would potentially have been some exposure in the Irish Sea 24hour and 12 hour RRC area even at full service speeds.			

10th December 2017

Fleet No.	Coverage 7 Vessels		Coverage 6 Vessels	
Actual Plan, Service Speed	Portland to Beachy 12 Hrs RRC	*87 % Coverage*	Portland to Beachy 12 Hrs RRC	*87 % Coverage*
Actual Speed	Land's End 12 Hrs RRC	*0% Coverage*	Land's End 12 Hrs RRC	*0% Coverage*
	Portland to Beachy 12 Hrs RRC	*60% Coverage*	Portland to Beachy 12 Hrs RRC	*60% Coverage*
	Cromer to Dover 6 Hrs RRC	*99% Coverage*	Cromer to Dover 6 Hrs RRC	*99% Coverage*
Comment	With THV Patricia heading for shelter, THV Galatea's speed reduced due to the poor weather this created exposure on the South Coast even at normal service speeds. However, given the actual conditions and speeds achievable on the day the level of risk was further exposed across three areas, Land's End area having no coverage. Although there was no demonstrable difference between the 7 and 6 ship scenarios, the East Coast 24 Hrs RRC area as far north as Aberdeen is only being covered by THV Alert which would have had to abandon the 6hr area and is therefore unacceptable.			

7.4.5 Phase 4 – Final Post Project MOU (Operation of recommended fleet construct)

This MOU is required to set out permanent future arrangements. However, it was recognised during the project that this work is dependent upon the approved outcome from the project and therefore during PMWG meeting 18 (7th February 2018) this was removed from the project scope to be concluded following the Fleet Review Phase 2 project conclusion and approval.

7.5 WP2 Conclusion

7.5.1 Key Achievements

- The establishment of planning team processes and procedures.
- Project Memorandum of Understanding (MOU) agreed.
- The creation of a baseline plan optimised for Risk Response Coverage gave an apparent 100% cover whilst planning for all routine operational tasking to be completed with a 7-vessel fleet.
- During the period of the trial, the overall average risk coverage has improved measured against RAAC, most notably within the 12-hour area from 17% coverage pre-trial to 93% as of 31st December 2017 due to improvements within the overall fleet planning process and the primacy given to the Risk Response.

% risk covered	6 Hour	12 Hour	24 Hour
Before Trial	94.41	17.76	80.92
Thresholds	95.00	90.00	85.00
Following Trial	98.31	93.25	98.89

The testing has shown that the risk appetite must be based on actual conditions encountered. The baseline plan shows that a 7-vessel fleet covers the baseline RRC and organisational tasking. However, this is based on achieving service speed and meeting a single incident response. As a consequence of necessary baseline changes the fleet is no longer optimally positioned despite the best efforts of prioritisation. These changes and the varying capabilities of a layered fleet result in unacceptable risk exposure. Analysis of data when considering actual conditions demonstrates that in reality there are risks that are not apparent in a baseline plan. The trial period analysis shows that;

- 7 vessels is not always sufficient,
- 6 vessels significantly increases the risk and
- 8 vessels give the overall optimum coverage measured against RAAC.

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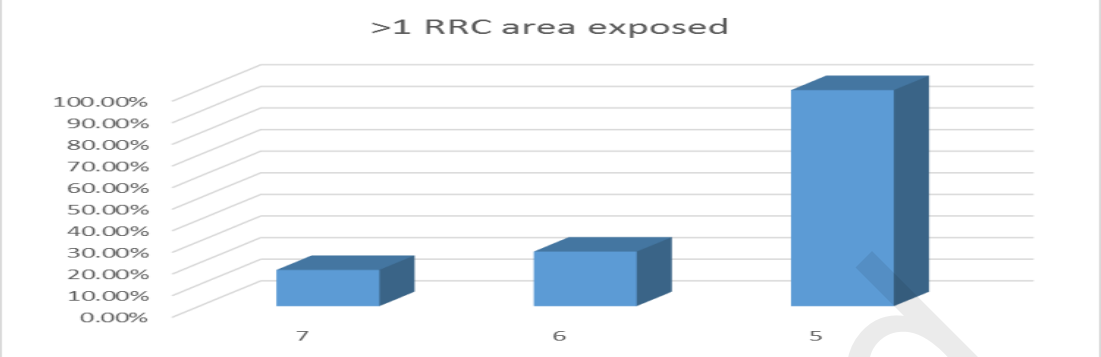
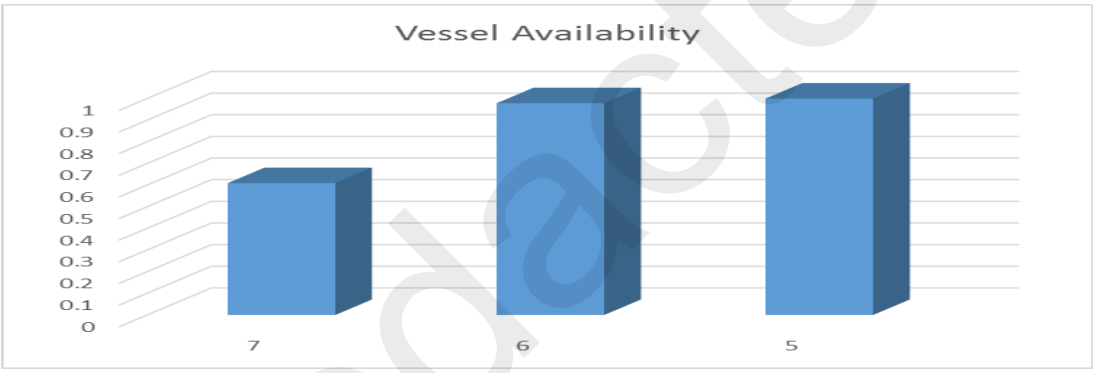
One view of expressing the scale of the level of exposure is by considering the percentage time that more than one risk area is exposed against the number of vessels available. In this case 7 vessels shows that more than 1 area is exposed 16.77% of the time, 6 hulls gives a figure of 25.24% and 5 hulls 100%. On all these occasions the fleet is failing to meet the GLA RAAC (Ref.: Section 7.4.4.4).



Whilst operating a 7-vessel fleet there will always be occasions when the fleet is operating with fewer vessels. During this period it can be seen that 7 vessels were only available for 60% of the time.



*Based on the 9 month trial period of live data – docking will vary year to year. Unplanned maintenance and breakdowns will likely increase with the age of the fleet.

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8 Work Package 3 (WP3) – Charter, Test and Evaluate

This summarises the key points of the work package from objectives through to conclusions. For a full detailed report of the work package including supporting data (where relevant) see the relevant section within GLA Fleet Review Phase 2_WP8_ Overall_Project_Plan_and_Implementation_Plan_Volume 2
WP3 was split into two phases of work to test the assumptions made by the Houlder report:

8.1 WP3 Objective

8.1.1 Phase 1 – Engage Technical Specialist and develop market test framework and consider independent report for WP3

Seek additional professional expertise (at cost to be determined) to report on variables associated with short term charter approach. Assist in developing approach to testing the market and building the Statement of Requirement for a potential Broker, to feed Phase 2

8.1.2 Phase 2 – Test Market with Contracted Broker

Implement test scenarios and response to real world events in accordance with methodology determined in Phase 1.

8.2 WP3 Deliverable

8.2.1 Phase 1 – Engage Technical Specialist and develop market test framework and consider independent report for WP3

- Charter test and evaluation – Develop requirements for Independent Technical Specialist
- Charter test and evaluation – Establish and report finance and budget arrangements for Phase 2 and future business
- Charter test and evaluation – Contract Independent Technical Specialist
- Charter test and evaluation – Develop approach to testing the Market
- Charter test and evaluation – Develop the vessel statement of requirement
- Charter test and evaluation – Develop test scenarios
- Charter test and evaluation – Develop report detailing long term costings, market viability, availability
- Charter test and evaluation – Agree and sign-off Evaluation report
- Charter test and evaluation – Consider requirement to proceed to phase 2
- Charter test and evaluation – Consider continued use of Technical Specialist for oversight of Phase 2

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8.2.2 Phase 2 – Test Market with Contracted Broker

- Charter test and evaluation – Develop requirements
- Charter test and evaluation – Agree and sign-off requirements
- Charter test and evaluation – Assign Contractor
- Charter test and evaluation – Implement test scenarios and response to real world events in accordance with methodology determined in Phase 1
- Charter test and evaluation – Evaluate performance against each test criteria and report
- Charter test and evaluation – Compile overall performance and test report
- Charter test and evaluation – Sign-off performance and test report

8.3 WP3 Acceptance Criteria

8.3.1 Phase 1 – Engage Technical Specialist and develop market test framework and consider independent report for WP3

Engage technical specialist, develop market test framework and consider independent report for WP3.
Successful ITT process, Delivery of Approach to Market test report. SoR developed and delivered. Risk report submitted.
Report agreed and signed detailing finance and budget arrangements for Phase 2 and future business.
Consider and decide whether to proceed to WP3 Phase 2 'Test Market with Contracted Broker.'

8.3.2 Phase 2 – Test Market with Contracted Broker

Provide live updates on success, against set criteria of capability and scenario, and Houlder report estimates; deliver 3 monthly reports and a final 12 month report of market testing.

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8.4 WP3 Analysis

8.4.1 Phase 1 – Engage Technical Specialist and develop market test framework and consider independent report for WP3

A technical expert was appointed to test the assumption that the short term / charter market can be relied on to support a reduced core fleet. The appointment of the technical expert resulted from a sealed-bid tender process compliant with all current U.K. and E.U. procurement legislation requiring the publishing of a Competitive Contract Notice (and a final Contract Award Notice) via the UK Government 'Contract Finder' service.

The expert analysis of the short term / spot charter market was undertaken by Braemar ACM Shipbroking Ltd. who provided an authoritative report on the short term / spot charter market.

The Braemar report has been received and the key conclusions are:

After fully considering the duties required of vessels working for the GLAs we have concluded that:

- *The GLA vessels are designed and built to carry out a multitude of tasks giving great flexibility with all the vessels able to carry out at least two out of handling Type 1 buoys in pods, Helicopter operations, have requisite sea keeping, having experience of and being capable of wreck surveying and marking all of which are necessary to deliver the various areas of GLA responsibility.*
- *There is currently a lack of suitable vessels from the GVCM able to perform the duties above especially considering the need to work in bad weather.*
- *The experience of the crews in handling the buoys, their specialised knowledge of the maintenance of the electronics as well as the Masters and crew's knowledge of local conditions is not something that can be delivered on a TPV from the GVCM.*
- *There are considerable commercial risks of relying on the GVCM for a short term/ spot market charter for a vessel capable of performing to GLA standards.*
- *There is a potential legal liability, insurance and increased premium and deductible issues with TPV Owners unfamiliar with GLA risks and operational procedures.*
- *Two recent market enquiries for a vessel from the GVCM did not produce a suitable vessel that could have worked within an acceptable time frame albeit for different reasons.*

8.4.2 Phase 2 – Test Market with Contracted Broker

Phase 2 of this work package was removed from the scope of the project following Project Board agreement with the recommendations outlined within the Braemar report.

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8.5 WP3 Conclusion

From Braemar report:
'Recognising the above, the GVCM cannot be relied on to be able to supply a suitable vessel to deliver the various areas of GLA obligation and responsibility on a spot charter basis on an all year around basis.'

Braemar also recommended that:

'The potential second part of the study involved potentially carrying out testing of the GVCM to be able to provide suitable vessels capable of carrying out the GLAs operations. Given the findings of this report, we do not believe that this exercise would produce suitable vessels and therefore we do not recommend proceeding with this second phase as it is very unlikely to produce satisfactory results.'

Therefore a decision was made by the Project Board and briefed to the Reference Group that the 2nd phase of WP3 'to test the spot market' was not required and therefore removed from the project scope. This allowed for subsequent re-baseline of the project and new timelines issued at the request of the DfT.

The conclusion presented by this work package was then used to re-assess the Houlder recommended fleet construct and is covered later within this report within section 12.4.

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9 Work Package 4 (WP4) - Commercial Impact and Future Balance

This summarises the key points of the work package from objectives through to conclusions. For a full detailed report of the work package including supporting data (where relevant) see the relevant section within GLA Fleet Review Phase 2_WP8_ Overall_Project_Plan_and_Implementation_Plan_Volume 2
WP4 was split into two phases:
Phase 1 looked at reviewing the current commercial commitments whilst Phase 2 was designed to look at the commercial impact and future balance impacted by new fleet constructs, identifying any reserve capacity whilst delivering optimum VFM.

9.1 WP4 Objective

9.1.1 Phase1 – Review current commitments

Compile report on existing commitments

9.1.2 Phase 2– Identify the financial benefits from the exploitation of reserve capacity within a coordinated operational plan

Assess post project potential reserve capacity together with exploitation and financial models.

9.2 WP4 Deliverable

9.2.1 Phase1 – Review current commitments

- Compile Report reviewing current commitments
- Define methodology to deliver Phase 2
- Sign-off Current commitments report

9.2.2 Phase 2– Identify the financial benefits from the exploitation of reserve capacity within a coordinated operational plan

- Commercial Impact and Future Balance – Assess potential reserve capacity together with exploitation and financial models
- Commercial Impact and Future Balance – Produce reserve capacity report
- Commercial Impact and Future Balance – Sign-off report that details fleet commercial work against operational profile to deliver optimum VFM

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9.3 WP4 Acceptance Criteria

9.3.1 Phase1 – Review current commitments

Signed off report

9.3.2 Phase 2 – Identify the financial benefits from the exploitation of reserve capacity within a coordinated operational plan

Signed off report

9.4 WP4 Analysis

9.4.1 Phase1 – Review current commitments

The project set out to incorporate existing contractual obligations within the baseline fleet plan. This was based partly on the contractual requirement and a desire to maintain the financial exploitation of the fleet's reserve capacity whilst completing risk response coverage. The GLAs were conscious of not losing valuable contracts during this period while being aware that the scope for commercial work in the future would be determined as an outcome of the fleet review. The majority of time allocated to commercial activity was in the form of buoy work. This work was for the most part programmed in and around statutory work while vessels are operating in or transiting through neighbouring areas.

The other main component of third party activity consists of support to Government departments in both the UK and Ireland. The aim of these agreements is to provide best value for Government and taxpayer for the wider benefit of the GLAs' respective countries.

A letter dated 27th February 2018 from the Chief Salvage Officer Ministry of Defence details one of these support arrangements and the importance of this work to that Department:

'Since 2013 there has been a Memorandum of Arrangement (MOA) between the Ministry of Defence (MOD) and The Northern Lighthouse Board (NLB). The MOA allows the MOD to charter the NLB vessels for use on MOD projects but contains a clause to allow the NLB to fulfil their statutory role as a Lighthouse Authority and respond to urgent repairs to navigational aids. For the NLB this arrangement allows them to minimise the costs of maintaining the response capability whilst the MOD gets a high-quality vessel at a known cost without exposure to market fluctuations. From a Government perspective, the arrangement is a model of how bodies can work together for best public advantage.
The service provided by the NLB to my team has considerable importance as my team supports several defence outputs. The NLV Pharos has proved herself to be an excellent platform for a variety of MOD work. The vessel is well maintained, reliable and the crew are highly professional. Much of the work with NLB is enabled by the fact that she has an all British crew and the senior officers have been security cleared; this is of importance as security clearing the ships' crews of commercially chartered from the spot market is impossible.
The arrangement is now in its fifth year and during that time a strong relationship has built up between the two organisations; one that could not happen with a commercial

vessel owner. We continue to use commercial chartered vessels for some tasks but these serve to highlight the simplicity of working with NLB.
MOD do not have a firm commitment to charter the vessel for a set number of weeks per year, an arrangement that allows both parties to flex their schedule to meet programs of work. For the foreseeable future, we hope to continue working with the NLB.'

9.4.2 Phase 2– Identify the financial benefits from the exploitation of reserve capacity within a coordinated operational plan

The existing seven vessel fleet configuration ensures that the current levels of commercial activity are sustainable. There may be scope for a modicum of growth although this will continue to be constrained by RRC and market forces.

Any move to a 6-vessel fleet would necessitate a withdrawal from all non-buoy related work. The loss to the GLF would be in the region of £2.4 million per annum averaged over period 2014-2018 (NLB - £873k, Trinity House - £677k, Irish Lights - £849k). In addition to the financial loss there would be a wider impact on our Government partners and their ability to conduct their marine activities.

A five vessel fleet would effectively cause the cessation of all third party commercial work involving GLA vessels. There would be a loss of income to the GLF equivalent to £ 3.6 million per year.

9.5 WP4 Conclusion

Following the principle of giving primacy to risk response coverage there exists a measured modicum of reserve capacity within the plan which gives flexibility for response to unplanned eventualities and scope for exploiting commercial opportunities for the benefit of the GLF. The ability to use this reserve capacity to generate third party income supports the General Lighthouse Fund and ensures each vessel provides maximum value for money in its operational capacity.

The current seven vessel model for the GLA fleet permits a certain limited level of reserve capacity which supports the ability to generate third party income while not compromising statutory work or RRC.

In his direction to the JSB the Minister stated that 'The fleet should be of the size and composition required to enable the GLA's to meet their statutory duties and liabilities, and that while any reserve capacity should be utilised to earn commercial income this is not the principal purpose for the fleet'.

Given the conclusion to maintain the 7-vessel fleet it can be reliably anticipated that subject to market conditions the commercial income earned by GLA vessels can be forecast to continue at current levels.

In the case of Irish Lights the funding arrangements agreed between the DfT and DTTAS take account of the potential to generate commercial income to contribute to funding the delivery of core services, based on the utilisation of reserve capacity. In the case of the Granuaile, Irish Lights has stated an annual reserve capacity of up to 100 days.

Redacted

10 Work Package 5 (WP5) – Supplementary Solutions Development

This summarises the key points of the work package from objectives through to conclusions. For a full detailed report of the work package including supporting data (where relevant) see the relevant section within GLA Fleet Review Phase 2_WP8_ Overall_Project_Plan_and_Implementation_Plan_Volume 2
The project set out to consider options for supplementary vessel solutions in 3 phases: Tri GLA zone/local boat arrangements; the results of trial chartering of vessels on the spot market and any alternative vessel funding and delivery mechanisms.

10.1 WP5 Objective

10.1.1 Phase 1 – Expand, Develop Tri-GLA 'Zone Boat' arrangements to support operations

Expand and develop Tri-GLA 'Zone Boat' arrangements to support operations as an element of a layered fleet model.

10.1.2 Phase 2 – Alternative Resource Solutions

To remain open to emerging opportunities, alternative delivery models and funding solutions. As charter test and evaluation develops, prepare to cost and evaluate alternative resource solutions should RRC, cost effectiveness and overall workload not be achievable.

10.1.3 Phase 3 – Alternative Vessel Funding and Delivery Mechanisms

To investigate alternative funding and delivery mechanisms to deliver required capability to assure a VfM solution.

10.2 WP5 Deliverables

10.2.1 Phase 1 – Expand, Develop Tri-GLA 'Zone Boat' arrangements to support operations

- Supplementary solutions – Report 'Zone Boat' arrangements
- Supplementary solutions – Sign-Off 'Zone Boat' arrangements

10.2.2 Phase 2 – Alternative Resource Solutions

- Supplementary solutions – Review the report on the Test and Evaluation from Charter
- Supplementary solutions – Review the report on Coordinated Planning

Redacted

- Supplementary solutions – Perform Gap analysis of requirements and cost effectiveness against report conclusions
- Supplementary solutions – Consider and Develop Alternative Resource Solutions / Options
- Supplementary solutions – Review Alternative Resource Solutions
- Supplementary solutions – Report on Alternative Resource Solutions
- Supplementary solutions – Sign-off report for Alternative Resource Solutions

10.2.3 Phase 3 – Alternative Vessel Funding and Delivery Mechanisms

- Analyse Phase 2 report - consider Alternative Resource Solutions
- Supplementary solutions – Report on Alternative vessel Funding and Delivery Mechanisms
- Supplementary solutions – Sign-Off Report for Alternative vessel funding and Delivery Mechanism

10.3 WP5 Acceptance Criteria

10.3.1 Phase 1 – Expand, Develop Tri-GLA 'Zone Boat' arrangements to support operations

Delivery of a directory of all GLA local (Zone) boats with standards understood and contractual basis for use agreed by Chief Exec.

10.3.2 Phase 2 – Alternative Resource Solutions

Signed off report detailing a range of costed solutions which mitigate risk to acceptable level.

10.3.3 Phase 3 – Alternative Vessel Funding and Delivery Mechanisms

Delivery of a costed and risk mitigated fleet model which includes identified alternative resource solutions if appropriate, agreed by Chief Executives'.

10.4 WP5 Analysis

10.4.1 Phase 1 – Expand, Develop Tri-GLA 'Zone Boat' arrangements to support operations

A tri GLA zone boat register was created by the Coordinated Planning Group. This live document is an up to date record of all GLA contracted or approved zone/local boats, which forms the first layer of the tri GLA response capability. The project recorded and reported vessel use in WP2 data.

Redacted

10.4.2 Phase 2 – Alternative Resource Solutions

It was intended to assess the anticipated trial of spot market vessels in support of the GLA fleet. The Braemar evaluation of the charter market found that the charter market could not be relied on to provide suitable vessels on a spot charter basis. They went on to recommend that trial testing was not going to deliver suitable vessels. Phase 2 of WP4 was therefore halted.

10.4.3 Phase 3 – Alternative Vessel Funding and Delivery Mechanisms

Alternative vessel funding and delivery mechanisms are considered as business solutions, separate to the statement of vessel requirement. This has drawn on wider experience of:-

- A former large oil major fleet operator experienced in chartering and operating both bare boat and time charter.
- A former public sector senior manager responsible for managing a large outsourced vessel based service contract.
- A former ship owner's senior manager responsible for delivering charter vessels to a public sector client.
- Informal discussions with Braemar during Phase 2 of this WP
- Houlder findings.

Utilising the knowledge of this group the PMWG considered the delivery options which are:

i) Purchase a suitable new vessel
ii) Purchase used vessel and convert
iii) Bare boat charter (hire of a vessel without a crew) of suitable vessel or vessels to be crewed by GLA crews and operated as per an owned vessel by the GLAs
iv) Time charter (hire of a crewed vessel) or other charter of suitable vessel / vessels to carry out tasking under GLA instruction.

Redacted

10.5 WP5 Conclusion

10.5.1 Phase 1 – Expand, Develop Tri-GLA 'Zone Boat' arrangements to support operations:

The three General Lighthouse Authorities, each supplement their respective in-house AtoN tender fleets by making use of a network of known local contract boat services compliant with the MCA's workboat code or DTTAS equivalent. Each organisation has independently produced its own directory of Local Boat Services. Three documents have been produced that make up a Tri-GLA directory.

All three GLAs use their local contracted boat fleet for the transfer of personnel to and from offshore lighthouse stations. This can be for pre-planned routine maintenance visits or for AtoN casualty intervention. These vessels are not exclusive to the GLAs and their availability is subject to contracting around any prior commitments.

Local boats are at times used to attend AtoN casualties while in addition TH has the road-transportable Rigid Inflatable Boat (RIB) operated under the West Coast Launch contract, also proving survey capability for rivers and estuaries when conditions permit.

These vessels are operated by trusted crews with good local knowledge providing a cost effective supplement to the core fleet when the circumstances permit recognising that these are small craft and operations are highly weather dependant.
Across the GLAs the arrangements for local boats include contracts and informal arrangements on a short term / spot charter basis. Checks on certification and compliance are conducted across the GLAs.

Houlder assessed that the core GLA fleet could be supplemented by commercial arrangements that would significantly enhance the ability to respond to contingent requirements while reducing overall fleet cost and risk.

Example of Local / Zone boat use during Nab Tower Modernisation

During the trial 275 day period the zone boats have been used to good effect and have supplemented the core fleet by GLA=186, TH=92, IRISH LIGHTS=33, NLB=63 days and have made an important contribution to the layered fleet model ensuring

the task is matched to the most appropriate vessel and thereby providing a cost effective solution.

10.5.2 Phase 2 – Alternative Resource Solutions:

This work was removed from the project as discussed within section 10.4.2.

10.5.3 Phase 3 Alternative Vessel Funding and Delivery Mechanisms

The following gives a short summary of conclusions. For greater detail the WP5 full report can be found within Volume 2 of the Fleet Review Report.

i) Purchase a suitable new vessel

This option has mainly commercial risks associated with late delivery and cost overruns at the build stage, vessel performance issues and equipment supportability. These can be mitigated by using established vessel designs or separate design contract. Build costs and overruns can be mitigated by fixed cost contracts and liquidated damages along with pre contract verification of financial viability of the bid. Using recognized supportable equipment and warranties can also mitigate equipment concerns.

ii) Purchase used vessel and convert

This option may on the face of it provide a cost effective option purchasing a nearly new laid up vessel or used vessel for a reduced cost compared with building from new. However the specific requirements of a GLA vessel are likely to mean the supply of suitable hulls is limited, the vessel may be a compromise on design and equipment fit or no suitable vessel may be available. This can be mitigated for by exploring this option in conjunction with I &III. A used vessel means the vessel is closer to the replacement cycle and allows a shorter term return on investment.

iii) Bare boat charter (hire of a vessel without a crew) of suitable vessel or vessels to be operated as per an owned vessel by the GLAs

The current charter market would suggest a good commercial rate for a vessel could be obtained however the specialised features of the required vessel or pre charter alterations or build to meet the GLA requirements would suggest the full benefits of a depressed market would not be realised. The specific requirements of a GLA vessel are likely to mean the supply of suitable pre-existing hulls is limited, the vessel may be a compromise on design and equipment fit or no suitable vessel may be available. This can be mitigated by chartering a new build.

A bare boat charter tendered through OJEU processes may mean competition whilst keeping prices down may also end up with unrealistic bids that later prove to be not commercially viable and early withdrawal or renegotiation occurs.

The level of commercial risk in a bare boat charter are increased due to the third party relationship of ship owner and bank along with any exposure the ship owner has through other operations.

Rejected

iv) Time charter (hire of a crewed vessel) or other suitable contract in of suitable vessel or vessels to carry out tasking under GLA instruction.

The current charter market would suggest a good commercial rate for a vessel could be obtained however the specialised features of the required vessel or pre charter alterations or build to meet the GLA requirements would suggest the full benefits of a depressed market would not be realised. The specific requirements of a GLA vessel are likely to mean the supply of suitable pre-existing hulls is limited, the vessel may be a compromise or no suitable vessel is available. This can be mitigated by chartering a new build.

As with bare boat charter the level of commercial risk is increased due to the third party relationship of ship owner/service provider and bank along with any exposure the ship owner/service provider has through other operations.

A service based contract may (if not carefully constructed) provide an avenue for cost increases where additional operations or tasking are requested and not previously specified. This can be mitigated for by using specialized assistance to draw up any specification.

A Service based contract tendered through OJEU processes may mean competition whilst keeping prices down but may also end up with unrealistic bids that later prove to be not commercially viable and early withdrawal or renegotiation occurs. This can be mitigated by open book process, scoring matrix that does not give excessive weight to price and a detailed specification.

The impact of TUPE rules mean that this service based contract has additional reputational and business risks. There is a risk of low GLA staff morale, union action including strike, Political issues relating to off shore contracts (perceived tax avoidance). These are not easily mitigated.

Service based contract may also raise issues of control with the contracting GLA, and risk falling operational standards. These can be mitigated by having clear command and control processes and supervisory processes within the contract.

All four of the options explored provide a viable cost based option for the GLAs. All, within a margin for error, fall within similar cost range. All options have similar financial risks. Option IV has the most reputational and operational risks associated with it but could be achievable. Option I and III have similar risk profiles and have less reputational and operation risk associated with them. Option II may result in longer term difficulties caused by the operational compromise of a used vessel and would need to be approached with extreme caution.

This high level review will need further analysis and costing in a business case aligned to the Green Book prior to a final decision on approach and financing for vessel replacement.

Redacted

11 Work Package 6 (WP6) – Additional Recommendations Review

This summarises the key points of the work package from objectives through to conclusions. For a full detailed report of the work package including supporting data (where relevant) see the relevant section within GLA Fleet Review Phase 2_WP8_ Overall_Project_Plan_and_Implementation_Plan_Volume 2

11.1 WP6 Objective

To evaluate the additional recommendations made within the Houlder report and assess to feasibility, desirability and value for money. Establish plan for implementation of those taken forward.

11.2 WP6 Deliverable

- Additional Recommendation Review – Evaluate recommendations identified within table 12 of the Houlder Report
- Additional Recommendation Review – Develop implementation plan for recommendation's taken forward
- Additional Recommendations Review - Sign-Off Report Implementation plan

11.3 WP6 Acceptance Criteria

Delivery of consolidated document indicating intentions for each recommendation, agreed by Chief Executives.

Redacted

11.4 WP6 Analysis

Houlder table 12 detailed additional recommendations that have been reviewed during the fleet review project. The table is added within the report below for reference.

No.	Name	Detailed Recommendation
1/10	Combined Procurement	Progress options for combining purchase of the more expensive commodities (fuel and lube oil) as well as efficiencies in overall procurement staff effort
1/11	Contracted-in support	[redacted]
1/12	Hydrographic survey	Deepen the relationship with the MCA Civil Hydrography Programme with a view to bidding for MCA survey work
1/13	Crewing	Continually scrutinise Agency costs to ensure cost effectiveness when compared with FTE
1/14	Crewing	Review manning levels across the GLA fleet to understand apparent inconsistencies and identify any beneficial cross-sharing ideas
1/15	Seasonality	The option of augmenting staff to enable longer work periods during the summer months should be assessed
1/16	Wreck geo-location	Explore the scope and cost of adapting helicopter capabilities to enhance their use in wreck geo-location
1/17	'GLA Cruises'	Market test interest in conducting cruises on-board GLA vessels (emulating the 'Patricia Voyages')
1/18	Commercial contracts	Ensure that contractual relationships with local operators are appropriately constructed to ensure that GLAs are not exposed to litigation in the event a sub-contractor suffering an accident while servicing an AtoN
1/19	Communications suite	GLA vessels would benefit from their own standalone vessel maintenance system held on-board (for store requisitions etc.)
1/20	Pennant securing	All GLA vessels (and any chartered-in) should use the 'Happy Hooker' to de-risk deck operations
1/21	Stakeholder Interaction	The GLAs and NMIC should pursue a closer relationship
1/22	Hull form	If installed Moon Pools are not used for commercial activities then consideration should be given to installing plating to streamline the hull form
2/1	Winch	The selection of the type of winch (rope/chain capable) should be considered from a pan-GLA perspective taking into consideration all likely tasking (including commercial)
2/2	Chain handling	Retrospective installation of a hydraulic chain-stopping system on existing vessels should be considered

Houlder table 12: Schedule of additional recommendations

11.5 WP6 Conclusion

A table of additional recommendations were presented within the Houlder report. These recommendations were independent of the Houlder fleet optimisation recommendations and of less significance. The recommendations within Houlder table 12 were analysed within work package (WP6) and presented within the WP6 report detailed within Volume 2 of this report.

A summary of the conclusions to table 12 within section 12 11.4 is provided below:

11.5.1 Table reference 1/10 - Joint Procurement

Joint procurement or the use of existing government framework contracts are utilised where ever possible and suitable. Examples of joint procurements include charting, weather, buoy moorings, sat communications, helicopter and vessel procurement.

11.5.2 Table reference 1/11 – Contracted-in support

Section 7 of the Braemar report covers “Other providers of AtoN” where [redacted] were looked at as an option. The report advises that most moorings [redacted] attend are in sheltered waters and they use contracted in tonnage to perform their contractual obligations which in general is with smaller vessels unsuitable for the wide range of GLA work
Section 5 gives detail of potential liability issues where ship-owners are unlikely to encompass the risks and responsibilities that the GLA’s have

11.5.3 Table reference 1/12 – Hydrographic Survey

The MCA Civil Hydrography Programme is commercial let by tender in two to three large segments, all bidders are fully commercial, professional survey organisations with access to multiple dedicated survey vessels and survey teams. The GLA’s have neither the vessel availability nor the professional capability in terms of qualified hydrographers to commit to the scale of work involved. The GLA’s would only be able to supply a vessel/vessels for specific tasks also requiring a survey team. This would require tri GLA procurement.
TH are presently reviewing the requirement for a survey equipment upgrade. Upgrades for THV Alert.

11.5.4 Table reference 1/13 – Crewing

Agencies provides a cost effective short term staffing solution.

11.5.5 Table reference 1/14 – Crewing

Crew numbers on board GLA ships are generally similar with regards to size of ship and type of operation with a few differences in catering, cadets and ETO’s.

redacted

11.5.6 Table reference 1/15 – Seasonality

The GLAs already utilise the longer summer days to conduct buoy work, helicopter operations and other activities. Vessels are staffed for a 24 hour working of navigational watches however operation duties are limited to 12hours due to rest and CAA requirements.

11.5.7 Table reference 1/16 – Wreck geolocation

A search for civilian aircraft mounted systems to enable wreck geolocation was conducted however no hydrographic systems appear to be available for aircraft use.

11.5.8 Table reference 1/17 – GLA Cruises

This was considered non-viable due to the lack of cabins available (these being used for TH staff conducting core business), the nature of GLA statutory work make it difficult to enable advanced bookings and the additional crewing requirement.

11.5.9 Table reference 1/18 – Commercial Contracts

The GLAs use certified local boats and GLA agents and staff travelling within the local boats in performance of their duties is covered by the General Liability Insurance.

11.5.10 Table reference 1/19 – Communications suite

All GLA vessels have their own maintenance systems on board

11.5.11 Table reference 1/20 – Pennant securing

All GLA vessels use the “happy hooker” system. Could be provided to any chartered in vessels depending on their required operation.

11.5.12 Table reference 1/21 – Stakeholder interaction

Daily disposition reports are submitted for the GLAs to NMIC [redacted]

Any assistance available to the GLAs would only be on an opportunity basis and could not be built into GLA vessel disposition plans, nor be relied upon.

11.5.13 Table reference 1/22 – Hull form

All GLAs utilise the Moon Pools for commercial contracts.

Redacted

11.5.14 Table reference 2/1 – Winch

Currently there are no requirements outside of the MET office contract which require a different type of winch from which the vessels have at present.

11.5.15 Table reference 1/22 – Chain handling

Vessels currently are equipped with chain-stopping apart from Pharos and Patricia. Any modifications should be driven by requirements at the time of docking and replacement.

Redacted

12 Work Package 7 (WP7) – Fleet Structure Report

This summarises the key points of the work package from objectives through to conclusions. For a full detailed report of the work package including supporting data (where relevant) see the relevant section within GLA Fleet Review Phase 2_WP8_ Overall_Project_Plan_and_Implementation_Plan_Volume 2

12.1 WP7 Objective

With reference to the reports generated within WP2, WP3, WP4, WP5 evaluate a weighting for risk reduction against cost and develop a fleet construct proposal

12.2 WP7 Deliverables

- Review report from WP2, WP3, WP4, WP5
- Evaluate weighting for risk reduction against cost
- Develop fleet construct proposal
- Evaluate Commercial balance and reserve capacity following fleet structure experience
- Sign-off fleet construct proposal

12.3 WP7 Acceptance Criteria

Signed off report by CEC.

Redacted

12.4 WP7 Analysis

Having analysed WP2, 3, 4, 5 and further analysis of Houlder Outcomes the following section draws these work packages to a conclusion.

12.4.1 Analysis of Houlder Options

The fleet construct recommended by the Houlder report is set out in fleet outcome 2 from Houlder's table 10 below.

	Do Nothing	Maintain Existing Construct	Minimise Fleet Spend		Cautious	
Fleet Outcome	-	1	2	3 A & B	4	~~5~~
MFTs	4	4	3	3	3	~~3~~
MANTs	1	1	1	1	2	1
Charter/ SANTs	2	2	1	2	1	1
Main Features	Fleet construct and management remains unchanged	Fleet numbers unchanged Patricia replaced in 2020/21	Early disposal Patricia Sell Alert once broker option provided (by end 2017)	Retain Alert **or** sell Alert and replace with time-charter	Early Sell Alert Patricia replaced in 2020/21	Dispose of Patricia by end 2018
Benefits	No new vessel procurement	Greatest risk reduction	Lowest fleet spend	Greater RRC area coverage	Greater Type 2 capability	Risk of change mitigated
Issues to address	High risk of additional cost or breakdown of Patricia	High CAPEX for replacement vessel	Testing commercial support viability	Testing commercial support viability	High CAPEX for replacement vessel	Testing commercial support viability
10 Year Fleet Spend	£186.3m	£196.9m	£142.0m	£153.6m	£176.1m	£147.5m
% Saving from Fleet Outcome 1	5.4%	-	27.90%	22.00%	10.50%	25.10%
Avg. responses outside RRC pa	1.78	0.23	0.67	0.42	0.44	0.67
% change from current situation	-	-86.70%	-62.20%	-76.30%	-75.10%	-62.20%

Table 10 from Houlder's report of potential outcomes and fleet constructs

Houlder recommended the thorough testing of the underlying assumption that the short term / spot charter market can be relied on to support operations as identified in the 'Issues to address' row within the table 10 above. WP3 set to test this assumption by contracting a Technical Specialist.
The Braemar Report and deliverable from WP3 that was submitted to and agreed by the Fleet Review Phase 2 Project Board concluded that:

'The General Vessel Charter Market (GVCM) cannot be relied upon to supply suitable vessels to deliver the various areas of GLA obligation and responsibility on a short term / spot charter basis on an all year around basis'.

Therefore based on this new information from WP3 of the Fleet Review Phase 2 project the Houlder options can be re-appraised:

Redacted

12.4.1.1 'Fleet Outcome' 2, 3, 5 (Not feasible)

Analysis of Houlder Fleet construct outcomes 2, 3 and 5 has categorised these as 'Not Feasible' leaving the 'Do Nothing' outcome, Outcome 4 and Outcome 1

12.4.1.2 Do Nothing 'Fleet Outcome' (Not feasible)

The 'Do Nothing' outcome was not considered viable by Houlder due to the increased risk posed by continuing with the current fleet but no change to vessel management. Vessel management changes have been implemented through coordinated planning however the advanced ages of the GLA vessels make the 'Do Nothing' an unfeasible outcome and does not require any further consideration.

12.4.1.3 'Fleet Outcome' 4 (Not feasible)

In considering outcome 4 which is a 6-vessel solution, the data collected from the trial period shows that the residual risk from a six vessel fleet would expose the GLAs beyond their risk appetite. In addition the loss of the Rapid Intervention Vessel (RIV) would significantly reduce the risk response capability of the fleet and is contrary to the justification for procuring of the RIV and is therefore an unfeasible outcome that does not require further consideration.

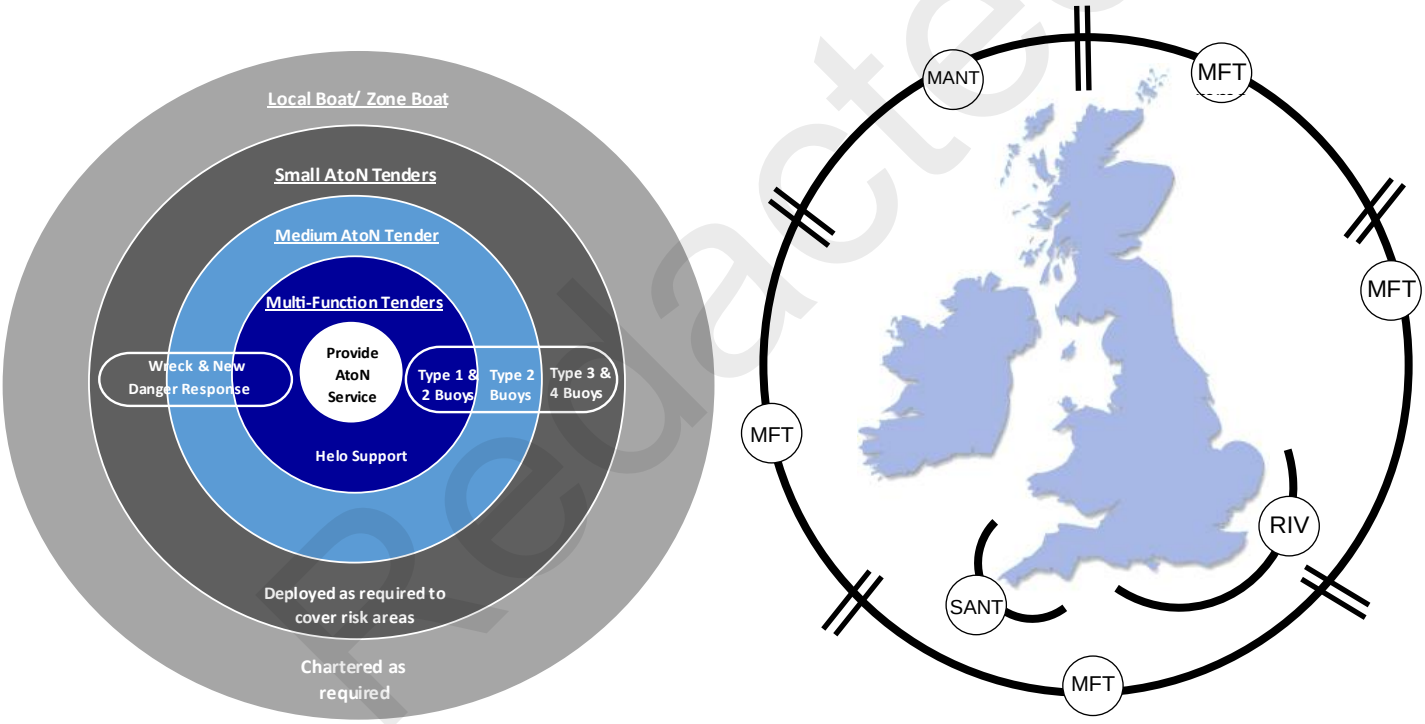
12.4.1.4 'Fleet Outcome' 1 (Feasible)

The data collected throughout the trial period very much aligns with outcome 1 (the 7-vessel fleet construct) from the Houlder model which does carry some risk as outlined by Houlder, however it is the lowest risk of the Houlder outcomes considered. The project data does show that in some circumstances the risk appetite is exposed when using a 7-vessel fleet.

Redacted

12.4.2 WP7 Houlder Format of a Layered fleet model

Taking ‘outcome’ 1 forward, the combined requirements of individual GLAs can be described in the Houlder format of a layered fleet model. Introduced within the Houlder Report and has been broadly validated by the Fleet Review Phase Two analysis. The layered fleet model is shown below modified to give a more accurate match of GLA layered fleet requirement following the analysis of live data recorded throughout the trial period and the conclusions presented by the Braemar work. The resultant layered fleet model shows that the GLAs use of charter vessels in its network of local / zone boat used to best effect by delivering the low level planned and some responsive unplanned tasking. The core fleet of 7-vessels delivers the risk response coverage, planned and unplanned tasking, keeping the smaller Rapid Intervention Vessel (RIV) and 1 Small Aids to Navigation Tender (SANT) routinely but not exclusively within the areas of higher risk. The 5 larger vessels (4 Multi-Function Tenders (MFT) and 1 Medium Aids to Navigation Tender (MANT)) are shown on the figure as a diagrammatic indication of the baseline risk response layout. It is essential to the operational requirement that the vessels are able to independently move to meet the required tasking.



Layered fleet model from Houlder modified to take into account the information gained from Phase 2.

Redacted

12.4.3 WP7 Vessel Capabilities and Limitations

With the exception of speed, all vessels are considered equal with respect to measuring their ability to respond to risk. In reality the layered fleet includes a mix of capabilities and limitations which is desirable in many respects but comes with associated compromises in other respects.

The tables below give an indication of the type of employment and compromises associated with each vessel.

WORKLOAD TABLE
Sum of each Category (per Ship & GLA) - Days

FR Task category	IRISH LIGHTS	IRISH LIGHTS Total	NLB		NLB Total	TH				TH Total	Grand Total
	Granuaile		Pharos	Pole Star		Alert	Galatea	Mair	Patricia		
Non Operational Statutory *1	24	24	6	35	41		2	10	32	44	109
Operational Statutory *2	151	151	196	151	347	224	211	175	181	791	1289
Third Party *3	69	69	48	47	94	14	41	28	36	119	283
Weather-bound *4	30	30	25	43	68	37	20	62	25	145	243
1st April to 31st Dec 2017	**275**	**275**	**275**	**275**	**550**	**275**	**275**	**275**	**275**	**1099**	**1924**

*1: Non-Operational Statutory tasks – includes docking, survey, audits, training and breakdowns
*2: Operational Statutory – all AtoN based work, wrecks, new dangers AtoN Casualties and Hydrographic surveys
*3: Third Party - Commercial contract work or other Government Department support
*4: Weather-bound – Periods when the vessel is unable to conduct planned or un-planned work due to weather constraints

Redacted

The use of the Houlder terminology of MFT, MANT and SANT as broad capability types aims to categorise the requirements of each GLA into these broad types. The trial period has shown that due to weather constraints and location of the task whilst trying to maintain the risk response cover within the risk appetite it has not always been possible to maintain RRC coverage and complete all operational tasking.

MATCHING TASK to VESSEL CAPABILITY			
Task Group	**Trinity House**	**Northern Lighthouse Board**	**Irish Lights**
Type 1	MFT	None	MFT
Type 2	MFT / MANT	MFT/MANT	MFT/MANT
Type 3 & 4 Buoys	MFT/MANT/SANT	MFT/MANT	MFT
Helicopter	MFT	MFT	MFT
High Speed Requirement	RIV[*1] (1 - 6Hr)	MFT/MANT (1 - 24hr)	MFT (1 - 24Hr)
Shallow water capability	SANT	None	None
Survey Capability	MFT, SANT	MFT, MANT	MFT
Sea keeping[*2]	MFT	MFT	MFT
MFA - Towing	MFT, SANT	None	None

[*1] – RIV non shallow water
[*2] – The data shows that weather downtime is reduced with a larger vessel therefore it would be beneficial in all vessels however taking a necessary and pragmatic approach higher speed and shallow water capability is also required which cannot be delivered with a larger more seaworthy vessel

It can be seen that the larger vessels have broader utility and greater scope for third party tasking and are less susceptible to weather. Conversely, smaller vessels are ideally suited for shallow water operations which cannot be achieved with a larger vessel and can utilise their higher speed to cover significant areas of risk in moderate conditions at reduced cost compared with an MFT vessel. Therefore a blend of capabilities is required within the overall fleet which provides coverage in adverse weather conditions, is capable of operating in shallow water, provides rapid high speed intervention and together combine to meet the operational requirements of the GLAs whilst continuing to meet the RAAC.

A number of capabilities exist within the same vessel type and therefore it can be concluded that the requirement is:

- MFT/MANT to meet the combined Helicopter / Buoy Type 1, Buoy Type 2 requirement and good seakeeping capability
- SANT / RIV capable of shallow water operation and high speed capability
- Vessels capable of towing and repositioning MFA's
- All vessels to have multi-beam Survey capability

Redacted

12.4.4 WP7 Inter GLA working

The Houlder report recommended that a pre-requisite to achieving an efficient, integrated GLA Fleet is the adoption of centralised fleet planning via a dedicated fleet planning team and a suitable management and communication structure should be established.

Following discussion and debate it was concluded that a centralised model which implies control being ceded within a single authority was not appropriate for the 3 independent GLAs operating under different legal systems. Whilst the interests of the three GLAs are aligned, their operational and legal accountabilities are not collective and are non-delegable.

A coordinated approach was therefore adopted where no GLA is, or will be, dependent on the other for delivery of core requirements but will synchronise for operations such as to be mutually supportive in an operational context.

This has been implemented and monitored over the trial period. A planning team based on the Coordinated Fleet Management Group (CFMG) has been identified across the GLAs. While routinely conducting routine GLA business they have taken on the role of coordinated planning and execution at an operational level with the lead planner based in Harwich. The team have prepared and managed the application of the coordinated fleet plan. Centralised monitoring located in Harwich available to the GLA CFM planner was initiated on the 1st April 2016.

The baseline plan created from the 3 GLAs' operational plans were overlaid and then adjusted to provide a combined GLA operation plan giving the Risk Response Criteria (RRC) primacy. The baseline plan was created to deliver optimum coverage of the RRC areas and to complete all planned operation tasking.

Throughout the trial period from 1st April 2017 until 31st December 2017 (as recorded in the incident register) occasions have been logged when the plan has deviated from the baseline. During these occasions the planning team have been required to re-direct the vessels to higher priority tasks and good cooperation between GLAs has been required to limit the degree of exposure of the RRC.

Tri-GLA vessel tasking has been included within the baseline plan and gives the benefit of using the capability of the different vessel types to accommodate tasking particular suited to those vessels whilst covering the RRC. Examples of this included THV Galatea moving to Scotland to conduct helicopter operation replaced by NLV Polestar in the southern North Sea.

Redacted

12.4.5 WP7 Risk analysis

Risk Response Criteria (RRC) set the context against which preparedness for contingent requirements is set. This factor is endorsed by both DfT and DTTAS. An independent audit by Price Waterhouse Cooper considered the measure to be entirely appropriate and Houlder endorsed this stating that they, 'see no reason that judgements drawn and the timescales proposed for response to contingent requirements in the area identified should not be used as a basis for assessing the risks managed by the GLAs'.

The Houlder report concluded that 'having a defined metric against which to judge or define the acceptable level of risk would be of assistance to the GLA's and would also help them to determine the impact on overall risk profile of any intended change in fleet construct'.

The GLAs approach to risk appetite is aligned with UK Treasury guidance in terms of adopting the five point 'averse', 'minimalist', 'cautious', 'open', 'hungry' descriptors. HM Treasury (2006)

Classification	Description
Averse	Avoidance of risk and uncertainty is a key Organisational objective.
Minimalist	Preference for ultra-safe business delivery options that have a low degree of inherent risk and only have a potential for limited reward.
Cautious	Preference for safe delivery options that have a low degree of residual risk and may only have limited potential for reward.
Open	Willing to consider all potential delivery options and choose the one that is most likely to result in successful delivery while also providing an acceptable level of reward (and value for money etc.).
Hungry	Eager to be innovative and to choose options offering potentially higher business rewards, despite greater inherent risk.

(HM Treasury 2006)

The GLAs' Government accepted risk appetite remains 'averse' in terms of AtoN provision and for hazard risks such as health & safety, the environment and regulatory compliance. In the case of risks associated with operational and policy delivery, a more 'cautious' or 'open' approach is adopted. Also, in respect of the pursuance of commercial opportunities, the GLAs' risk appetite has broadly continued to reflect a 'cautious' approach within a robust framework of loss control. In terms of financial / value for money aspects, the GLAs' risk appetite is assessed as being between 'minimalist' and 'cautious'. This reflects that the GLAs are prepared, where appropriate, to consider value for money and a willingness to consider broader benefits in terms of their overall delivery profile.

Taking this into account and given that the 6 and 12 hour response areas are determined to be areas of unacceptable risk, failure to meet the coverage is unacceptable. The risk appetite for not providing coverage is therefore averse.

The 24 hour response areas are determined to be acceptable with caution. The risk appetite for not providing coverage can therefore be described as 'cautious'.

12.4.6 Risk Appetite

Taking into account the Houlder recommendation and the associated Board approved level of Risk Acceptance, the 6, 12 and 24 hour areas have differing minimum acceptable coverage requirements. These are defined as:

Area	Acceptable Number of areas and percentage of area not covered*	Additional Time to respond in area*
6 hrs	1 @ 5%	20 mins
12 hrs	1@ 10%	1 hr
24hrs	1@ 15%	2 hrs

*All other areas to be 100% covered both in area and time to respond

Throughout the trial period the key metric of risk response and risk response coverage have been logged on a daily basis. This has allowed the GLAs to fully understand the risk cover presented by the current fleet and the impact to this risk cover of increasing the fleet numbers to 8 vessels and reducing the fleet numbers to 6 vessels.

Vessels	Average Risk Coverage (Taking into account weather, multiple incidents and other restrictions)			
Risk Appetite (RA)	6Hr RA = 95	12Hr RA = 90	24Hr RA = 85	>1 area exposed% RA = 0
8	99.78	99.35	99.85	0
7	98.68	96.06	99.07	17
6	97.79	89.99	99.07	26

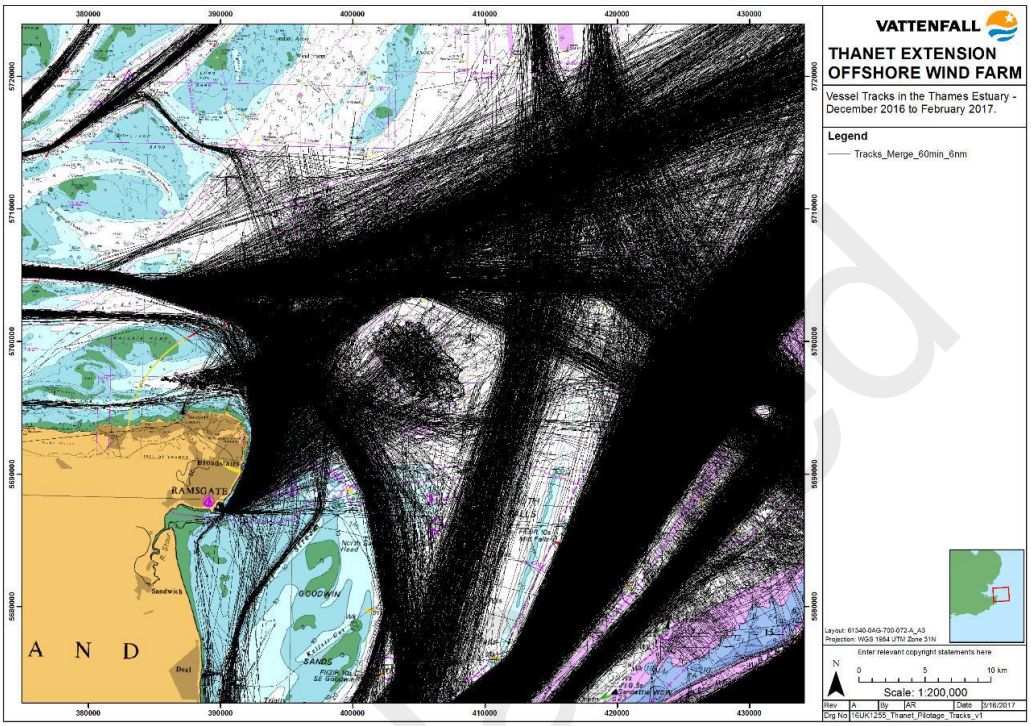
The percentage risk coverage given by this table provides an overall average over the trial period. As shown earlier by the detailed analysis unacceptable levels of risk are presented that are hidden in the overall percentages above.
To enable the GLAs to mitigate the exposed risk, the following measures can be employed:

- Increase fleet to 8 vessels
- Continuous improvement in operational management of the fleet
- Enhance vessel capabilities of the fleet e.g. speed, handling and manpower capabilities
- Operation of a more modern fleet to reduced unplanned vessel downtime
- Greater use of Zone / Local Boats

Redacted

12.4.7 Likelihood and consequence

It is acknowledged that the likelihood of a major event is difficult to determine however, evidence shows that the increasing density of traffic and restrictions on sea-room from obstructions, (such as offshore wind farms), have the result of funnelling traffic into more concentrated areas.



Should an incident occur, either due to an AtoN casualty not being rectified or due to one vessel striking another foundered or foundering vessel, the potential for escalation in much of the waters around the British Isles is considerable, resulting in further loss of life and pollution and damage to fish stocks, sea birds, marine mammals and tourist beaches. A potential worst case scenario in the Sandettie deep water route could severely restrict the flow of trade to the major North Sea ports of the UK and continental Europe.

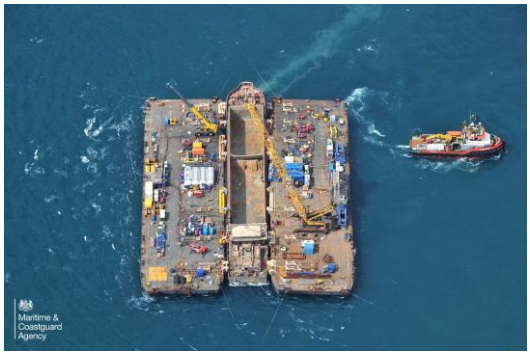
Redacted

The 50,000 tonne TRICOLOR sinking in 2002; 17NM off Dunkirk on passage from Zeebrugge to Southampton, which resulted from a collision in an overtaking incident with the KARIBA presented a significant hazard to shipping. Two vessels hitting the wreck and a reported 100 further vessels passing through the exclusion zone. Guard vessels were progressively increased to 6 over the period to keep both passing shipping and the salvage vessels safe for the year that it took until the danger was removed.

TRICOLOR 2002

Even a small vessel in shallow waters can represent a significant hazard, such as in the case of the tug ELLA off Lowestoft in 2017. Similarly, the 90m FLUVIUS TAMAR in the Southern North Sea Traffic Separation Scheme (TSS) SW lane, also in 2017 which although relatively small in itself, presented a significant threat to the deep draft vessels using that lane.

Tug ELLA ashore, sank July 2017



FLUVIUS TAMAR sank Jan 2017, lifted between two barges.

12.4.8 Risk Management

From the GLA Risk Response Criteria Document:

The GLAs use IALA risk management techniques when identifying the AtoN requirement (type location etc.). Risk Management is a term applied to a structured (logical and systematic) process for:

- identifying, analysing, assessing, treating, monitoring and communicating risks for any activity, and;
- achieving an acceptable balance between the costs of an incident, and the costs of implementing measures to reduce the risk of the incident happening.

The Risk Management process comprises six steps that follow a standardised management or systems analysis approach:

1. *Identify risks/hazards;*
2. *Assess risks;*
3. *Specify risk control options;*
4. *Make a decision;*
5. *Take action;*
6. *Monitor and review.*

The GLAs ensure that the appropriate balance between the requirement for a quantitative assessment is combined with a qualitative approach using the principles of 6 steps to Risk Management.

The response to a Wreck, New Danger or AtoN casualty is considered on the basis of the degree of risk posed. This can be assessed, modelled or calculated and may be described in terms of impact and likelihood explained in work package 7.

12.4.9 WP7 Costs analysis

The table below is extracted from the Houlder report and for consistency is used for assessing the running costs of the fleet. The figures for each vessel incorporates the lease costs where noted.

Vessel	Average Annual Cost (GBP Millions) 2010 Figures	Existing Lease Finance
Patricia	3.2	
Galatea	4.1	£1.5m pa to 2022
Pharos	4.3	£1.5m pa to 2023
Granuaile	2.3	
Pole Star	2.8	£0.6m pa to 2020
Alert	1.2	£0.4m pa to 2021
Mair	0.6	
[1]Replacement MFT	4.6	
[1]Replacement MANT	3.5	
[1]Replacement MANT (with helideck)	3.6	

Houlder table 8: Annual cost of each vessel in the GLA fleet and potential replacement vessels

[1] derived from Houlder Report

12.5 WP7 Conclusion – Fleet Construct and Recommendation

WP7 aimed to deliver the 'Fleet Structure' report consisting of inputs from WP2, 3 4 and 5 and the evaluation of risk against cost. It would present a fleet structure proposal and consider the commercial opportunities from any residual capacity within the structure.

The proposal consists of vessel numbers against risk coverage and within those vessel numbers the ability to conduct all planned work and vessel downtime with an allowance for unplanned work.

Houlder previously identified areas of over and under capacity on a Tri-GLA basis. The data has been collected to demonstrate the requirement of the fleet starting initially from a baseline plan and to capture additional unplanned activity. The data can be analysed to demonstrate the capability necessary within the fleet to deliver the requirement needed taking into account the disposition of the vessels to cover the Risk Response Criteria (RRC) along with the disposition of the AtoN for both routine maintenance and unplanned AtoN casualty response.

Data shows that due to the geographic locations of both the AtoN and the risk response areas and taking into account weather constraints, coverage of the risk response areas whilst delivering a cost effective AtoN service requires between 7 and 8 vessels with a varying degree of capabilities to service the disparate AtoN requirements of the GLAs' waters. Any fleet construct with less than 7 vessels exposes the GLAs to unacceptable levels of risk.

Therefore, the fleet construct can take the approach of increasing the fleet to 8 vessels or by remaining with no less than 7 vessels with additional mitigation measures. For this exercise the indicative cost of the 8th vessel is linked to a THV Alert (RIV) type equivalent although thorough analysis through a business case would be required to determine the precise type of vessel required.
The proposal is for a 7-vessel fleet of mixed (layered) capability with the additional mitigation.

Vessels	Risk Coverage (Taking into account weather, multiple incidents and other restrictions)				Cost Deviation (year)£M 2015 Costs
Risk Appetite (RA)	6Hr RA = 95	12Hr RA = 90	24Hr RA = 85	>1 area exposed% RA = 0	
8	99.78	99.35	99.85	0	+1.2
7	98.68	96.06	99.07	17	0
6	97.79	89.99	99.07	26	-0.6

Cost figures based on table 8 Houlder assumptions:
8 ships by adding 1 x Alert equivalent.
7 ships as per current fleet.
6 ships minus 1 x Mair.

12.5.1 Mitigation and future design considerations

12.5.1.1 Mitigation measures:

The proposal for the 7-vessel fleet of mixed (layered) capability with the following mitigation:

- Continuous improvement in operational management of the fleet through consideration of lessons identified.
- Greater use of local boats where appropriate included the RIB that is included in within the 'Mair' contract.
- Operation of a more modern fleet to reduce unplanned vessel downtime and reduce running costs
- Enhanced vessel capabilities of the fleet e.g. speed, handling and manpower capabilities.

12.5.1.2 Factors for consideration in vessel design:

- Better able to maintain speed in adverse weather – *improves coverage and reduces risk.*
- Incorporating the capability to be able to respond effectively to the AtoN casualty or incident – *Minimises AtoN casualty time and improves wreck or new danger response.*
- Commonality of capability to reduce planning constraints – *reduce passage time and fuel consumption while minimising AtoN casualty time.*
- Manpower and endurance – *optimised for best availability and performance of capital asset.*
- A high speed requirement for specific circumstances with acceptance of compromise on endurance and capability in other respects – *routinely deployed to the higher risk areas with ability to utilise a single vessel for 6 hour area.*
- A shallow water requirement for specific circumstances with acceptance of compromise on endurance and capability in other respects – *cost effective smaller vessel better suited to servicing buoys and beacons in shallow and sometimes rocky water including survey work where larger vessels would be unsuitable.*
- Environmental considerations including fuel – *modern machinery matched to requirement and consider emerging technology in propulsion and power systems where suitable to minimise fuel consumption and emissions.*
- Opportunities to align capability with cross government agencies – *as recommended by the Reference Group for mutual cross department support.*
- Consider Houlder additional recommendations section for any future procurement

Redacted

12.5.2 GLA Fleet capability Implementation

The existing fleet is currently broadly matched to the baseline requirement with no justification for urgent and major change across the fleet as a whole at this time. Looking forward one approach could be to develop a detailed, long term view of the future Fleet, mapping out over time the capabilities necessary and matching requirements to planned vessel out of service dates. However, the reality is that given the relatively long service life of vessels and constantly evolving technology, it would be counterproductive to be too rigid. Instead, the opportunity to offer best value is to consider the available market options, technology and ship design at the point when individual vessels are replaced and therefore benefit can be realised from inclusion into design of the risk reductions factors that have been identified. It is the intention therefore that detailed capability assessment is not incorporated within this report but should be subject to individual business cases as vessels are replaced over time.

Redacted

12.5.3 WP7 Fleet Construct Recommendation

The recommendation is for a layered capability 7-vessel fleet of mixed capability, acknowledging the likely continuation of exposed risk in actual conditions, but with additional mitigation measures aimed at closing the risk gap in a cost effective manner.

The existing fleet is currently broadly matched to the baseline requirement with no justification for urgent and major change across the fleet as a whole at this time. Vessels should be replaced however in line with this recommendation when considered justifiable by the GLA Operator, submitted through an individual business case to the Department in a timely manner to ensure continuity of cost effective cover at risk levels no higher than identified through the 7 ship model. Business cases will consider all aspects of capability requirement, risk mitigation, identified design considerations and business delivery options.

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13 Overall Fleet Review Conclusions

The 2015 review of the fleet requirements of the General Lighthouse Authorities was established with the aim of identifying the optimum number of ships, the capability of those ships and their appropriate ownership and operational management through to 2025 to enable the GLAs to fulfil their statutory duty to maintain marine aids to navigation and respond to AtoN casualties, wrecks and new dangers in an efficient and cost effective manner.
The Fleet Review phase 1 was undertaken by a project board chaired by DfT who procured a specialist Maritime consultant (Houlder Ltd.). The Project board submitted the Houlder report to the Minister with a number of recommendations. The Minister responded in letter dated 15th March 2016 to the Chair of the JSB as described in section 2 (Background) above:

'I would like you, working with each GLA, to develop and then implement a full project plan for this next phase, which should include:

- *In relation to centralised fleet planning, draw up a proposal for implementation that is fully compliant with existing UK and Irish legislation and present these arrangements by 31st October 2016;*
- *Be ambitious in the aim of securing the most efficient and effective fleet construct, which maintains appropriate levels of navigation safety and, overall, reduces risk compared to current arrangements;*
- *Maintain the existing momentum, working at pace to develop and implement responses to the recommendations, in particular with a view to securing quick wins by October 2016, while remaining alive to emerging opportunities, delivery models and funding mechanisms;*
- *Involve external partners closely throughout, in particular the Lights Advisory Committee and the UK and Irish governments to ensure and effective sharing of ideas, challenge and information about progress; and,*
- *Evaluate the financial impacts on each individual GLA at each stage of implementation, seeking approvals from the UK and Irish governments as necessary before proceeding to implementation.'*

The Fleet Review conclusions are therefore presented in relation to these statements as follows:

13.1 Fleet planning

In relation to coordinated fleet planning a comprehensive proposal was drawn up and implemented with the benefits being captured as follows:

- The establishment of planning team processes and procedures
- Project Memorandum of Understanding (MOU) agreed
- The creation of a baseline plan optimised for Risk Response Coverage gave an apparent 100% cover whilst planning for all routine operational tasking to be completed with a 7-vessel fleet.

Redacted

13.2 Risk reduction

In terms of Risk reduction compared with current arrangements:

- During the period of the trial, the overall average risk coverage has improved measured against Risk Appetite in Actual Conditions (RAAC), most notably within the 12-hour area from pre-Houlder report 17% coverage to 93% as of 31st December 2017 due to improvements within the overall fleet planning process and the primacy given to the Risk Response.

WP7 aimed to deliver the 'Fleet Structure' report consisting of inputs from WP2, 3, 4 and 5 and the evaluation of risk against cost. It would present a fleet structure proposal and consider the commercial opportunities from any residual capacity within the structure.

The proposal consists of vessel numbers against risk coverage and within those vessels numbers the ability to conduct all planned work and vessel downtime with an allowance for unplanned work.

Houlder previously identified areas of over and under capacity on a Tri-GLA basis. The data has been collected to demonstrate the requirement of the fleet starting initially from a baseline plan and subsequently capturing additional unplanned activity. The data can be analysed to demonstrate the capability necessary within the fleet to deliver the requirement needed, taking into account the positioning of the vessels to cover the Risk Response Criteria (RRC), along with the disposition of the AtoN for both routine maintenance and unplanned AtoN casualty response.

Data shows that due to the geographic locations of both the AtoN and the risk response areas and taking into account weather constraints, coverage of the risk response areas whilst delivering a cost effective AtoN service requires between 7 and 8 vessels with a varying degree of capabilities to service the disparate AtoN requirements of the GLAs' waters. Any fleet construct with less than 7 vessels exposes the GLAs to unacceptable levels of risk.

Therefore to manage the risk the fleet construct proposal could take the approach of increasing the fleet to 8 vessels or by remaining with no less than 7 vessels with additional mitigation measures.

Redacted

13.3 Efficient and effective fleet

The GLAs recommend a 7-vessel fleet with additional mitigation measures because although risk remains exposed, the mitigation measures once fully implemented are expected to progressively reduce risk exposure while avoiding the cost of an additional vessel.

With the GLA revised monitoring processes it will be possible to clearly identify and track trends in Risk Response in Actual Conditions as well as operational work completed to assess the effectiveness of the mitigation measures.

The table below outlines the level of risk against cost for the 8, 7 and 6 fleet scenarios.

Vessels	Risk Coverage (Taking into account weather, multiple incidents and other restrictions)				Cost Deviation (year)£M 2015 Costs
Risk Appetite (RA)	6Hr RA = 95	12Hr RA = 90	24Hr RA = 85	>1 area exposed% RA = 0	
8	99.78	99.35	99.85	0	+1.2
7	98.68	96.06	99.07	17	0
6	97.79	89.99	99.07	26	-0.6

Highlight red shows failure to meet the risk response criteria
Cost figures based on table 8 Houlder assumptions:
8 ships by adding 1 x Alert equivalent.
7 ships as per current fleet.
6 ships minus 1 x Mair.

Mitigation measures:

- Continuous improvement in operational management of the fleet through consideration of lessons identified
- Greater use of local boats where appropriate included the RIB that is included in within the 'Mair' contract.
- Operation of a more modern fleet to reduce unplanned vessel downtime and reduce running costs
- Enhanced vessel capabilities of the fleet e.g. speed, handling and manpower capabilities

Cost of Mitigation:

- Process change however may involve some software enhancements with cost absorbed within business as usual.
- Greater use of local boat would likely reduce steaming time from the larger vessels therefore the cost would likely be offset by fuel reductions
- New fleet would be covered in the longer term and be included within future business cases
- Enhanced vessel capabilities would be incorporated within the annual corporate planning processes

Redacted

13.4 Houlder assumption testing.

In response to the recommendations from Fleet review phase 1 the recommendations have been tested and evaluated.

The Houlder report identified key underlying assumptions that required testing:

a) *The viability of fulfilling the type 2 buoy maintenance and support requirements with only one MANT*

b) *The availability of suitable commercial vessels for short term time charter to support maintenance of type 3 and 4 buoys working in conjunction with a single SANT to support operations around the South coast of England*

c) *The ability to work with the commercial charter market to work with contingent requirements*

Houlder also identified and prioritised a number of additional detailed recommendations which have been addressed within WP6 and implemented where feasible

Addressing assumption a) - the data shows that completing the type 2 buoy maintenance and support requirements which includes the ability to respond to casualties requires 4 of MANT or MANT+ across the 3 GLAs.

The type 2 requirement cannot be singled out and the need for 4 vessels is based on a combination of Risk Response, the volume of routine buoy servicing work, geographic location, timely AtoN casualty response and incorporated within the range of tasks conducted by vessels which service the type 2 buoy fleet.

Addressing assumption b) and c) - the Braemar report addressed both short term charter and contingent requirements around the British Isles

The Braemar report in WP3 concluded that:

'the GVCM cannot be relied on to be able to supply a suitable vessel to deliver the various areas of GLA obligation and responsibility on a spot charter basis on an all year around basis.'

13.5 Emerging opportunities

In response to the Minister's point to remaining alive to emerging opportunities, quick wins, delivery models and funding mechanisms:

Tri-GLA 24/7 monitoring and development and implementation of coordinated planning represent the immediate quick wins which were developed and implemented by October 2016.

The data has identified some emerging opportunities for operational improvements which have been captured in the 7-vessel fleet mitigation measures and lessons identified while alternative delivery models and funding mechanisms for vessel procurement will be evaluated in subsequent business cases.

Redacted

13.6 Partner engagement

In reference to engagement with external partners the Reference Group was established consisting of a wide range of external stakeholders. Meetings have been held frequently with updates and briefings provided and in addition separate briefing on dedicated topics were undertaken to encourage feedback and understanding of the project progress.

An external GIAA audit concluded that:

> *The Reference Group provided an effective forum for challenge and advice from a range of stakeholders. Members were provided with in-depth updates on the progress of the Review and had opportunities to challenge the method and conclusions of the work performed.*
>
> *A Communications Strategy was developed and implemented to ensure information needs of stakeholders internal and external to the Fleet Review process were identified and met. Suggestions and questions from stakeholders were addressed by project management to provide confidence in the outcome of the Review.*

13.7 Financial impact

The recommendation for a 7-vessel fleet reflects a continuation of the current arrangement from a financial perspective with procurement programmes for subsequent vessels being addressed directly between the individual GLA and the appropriate government department, any change to funding will be captured and endorsed within that process.

Redacted

13.8 Ownership and management

It was concluded that a centralised model which implies control being ceded within a single authority was not appropriate for the 3 independent GLAs operating under different legal systems. Whilst the interests of the three GLAs are aligned, their operational and legal accountabilities are not collective or delegable. Operational management of vessels is vested in the GLAs as noted in the table below, where no GLA is, or will be, dependent on another for delivery of core requirements but will synchronise for operations so as to be mutually supportive in an operational context. The table below represents the operational management of the current fleet and it is concluded that this arrangement should be retained.

	TH	Irish Lights	NLB
MFT	Galatea Patricia	Granuaile	Pharos
MANT			Polestar
SANT	Mair*		
RIV	Alert		
**Zone Boats	As required	As required	As required

*Contracted as time charter

** Owner by local operators and contracted either on framework or case by case basis.

With the exception of Granuaile none of the vessels are owned by the GLAs being operated under ongoing lease arrangements as detailed in the costing table 12.4.9

Redacted

13.9 Capability

The existing fleet is currently broadly matched to the baseline requirement with no justification for urgent and major change across the fleet as a whole at this time. Vessels should be replaced however in line with this recommendation when considered justifiable by the GLA operator, submitted through an individual business case to the DfT, and DTTAS in the case of Irish Lights, in a timely manner to ensure continuity of cost effective cover at risk levels no higher than identified through the 7 ship model. Business cases will consider all aspects of capability requirement, risk mitigation, identified design considerations and business delivery options.

MATCHING TASK to VESSEL CAPABILITY			
Task Group	**Trinity House**	**Northern Lighthouse Board**	**Irish Lights**
Type 1	MFT	None	MFT
Type 2	MFT / MANT	MFT/MANT	MFT/MANT
Type 3 & 4 Buoys	MFT/MANT/SANT	MFT/MANT	MFT
Helicopter	MFT	MFT	MFT
High Speed Requirement	RIV[*1] (1 - 6Hr)	MFT/MANT (1 - 24hr)	MFT (1 - 24Hr)
Shallow water capability	SANT	None	None
Survey Capability	MFT, SANT	MFT, MANT	MFT
Sea keeping[*2]	MFT	MFT	MFT
MFA - Towing	MFT, SANT	None	None

[*1] – RIV non shallow water

[*2] – The data shows that weather downtime is reduced with a larger vessel therefore it would be beneficial in all vessels however taking a necessary and pragmatic approach higher speed and shallow water capability is also required which cannot be delivered with a larger more seaworthy vessel

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13.10 Future Fleet Operating Context

This section considers the question of the future operating environment and whether influencing factors lead towards changes to risk in order to inform decision making. Two key factors are considered; shipping density and climate change.

13.10.1 Shipping Density

Trends in shipping traffic indicate increased use of the sea for offshore energy, coupled with increased trade by sea and in some cases, an over reliance on electronic aids and a reduction in safety margins. The UK Government's commitment to offshore wind to provide low-carbon, affordable electricity supplies results in more sea area utilised for wind-farms and which often results in a narrowing of the shipping lanes with greater concentrations of shipping focussed into reduced areas.

Quoting from UK GOV 'Office for Science' document 'Trends in the Transport of Goods by Sea' August 2017

'*Maritime transport is a key enabler of a country's ability to trade internationally, especially in the case of an open, trading economy such as the UK. Globally, maritime trade represents over 80 per cent of total world merchandise trade, with UK ports handling some 5 per cent of total world maritime trade.*

In our just-in-time world characterised by lean and near-zero inventory holding, disruptions to the maritime freight transport network can have rapid and wide-ranging effects on economies and societies.'

Therefore, with shipping traffic likely to increase while the space for shipping to operate decreases, the likelihood of an incident continues to rise. The consequence also becomes all the more apparent in terms of trade and the UK's just-in-time philosophy along with potential for pollution and loss of life. This makes it all the more important that the GLAs are properly resourced to both maintain the AtoN estate ashore and at sea as well respond effectively to wrecks, new dangers and AtoN casualties.

13.10.2 Climate Change

The effects of climate are generally accepted to result in rising sea levels, increasing coastal erosion and more frequent and extreme weather events. All these factors will have an impact on the maritime environment and are likely to increase the number and frequency of AtoN casualties, wrecks and new dangers.

Quoting GOV.UK/guidance/Climate-change-explained published 23rd October 2014:
'***More Extreme weather events***
More damaging extreme weather events are being seen around the world. Heat waves have become more frequent and are lasting longer. The height of extreme sea levels caused by storms has increased. Warming is expected to cause more intense heavy rainfall events. In North America and Europe where long term rainfall measurements exist, this change has already been observed.'

Therefore, the likelihood of AtoN casualties due to adverse weather along with potential marine casualties leading to wrecks and new dangers is increasing and as for shipping density, the consequence is significant. The ability of GLA vessels to respond is also likely to be influenced by weather and therefore the requirements of

Retained

the fleet need to take this into account in future ship design in order to maximise the benefit from the investment.

13.10.3 Technology

The technology available to ships to enhance the safety of navigation has improved significantly however there are indications that in some cases this leads to an overreliance and a level of overconfidence which leads to a reduction of safety margins. The trend is also for larger ships, both in the container and cruise market in particular which operate in the shallow waters and shifting sandbanks of the southern North Sea with reduced under keel clearance. Although the number of larger newer ships is increasing, it is not apparent that there is a converse trend of reducing the number of smaller and older vessels. The breadth of our customer base is therefore widening and not decreasing and the GLAs must accommodate the needs of everything from the most high tech, high speed, deep draught containership to the single manned fishing or pleasure vessel.

There is a constant drive for innovation within the GLA AtoN to deliver enhanced reliability and cost effectiveness but while the requirement for buoys and lighthouses is continuously reviewed, no significant change in numbers is envisaged, particularly in view of broadening requirement of our customers.

13.10.4 Impact on GLA Fleet

Taking increasing shipping density and more frequent and extreme weather events together, the risk is further compounded, while the breadth of the GLA AtoN remit continues to broaden as the demands of a technologically more diverse customer base are met. These combined trends all suggest that the demands upon the GLAs will increase over the coming years and therefore the presence of a properly resourced fleet, matched to the requirement and updated over time will remain an essential element for the provision of the safety of navigation and the flow of trade to and from the UK and Ireland and through those waters.

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14 Recommendation

The recommendation is for a layered 7-vessel fleet of mixed capability, acknowledging the likely continuation of exposed risk in actual conditions, but with additional mitigation measures aimed at closing the risk gap in a cost effective manner.

The existing fleet is currently broadly matched to the baseline requirement with no justification for urgent and major change across the fleet as a whole at this time. Vessels should be replaced however in line with this recommendation when considered justifiable by the GLA operator, submitted through an individual business case to the Department in a timely manner to ensure continuity of cost effective cover at risk levels no higher than identified through the 7 ship model. Business cases will consider all aspects of capability requirement, risk mitigation, identified design considerations and business delivery options and this case-by-case approach will not prohibit consideration of multi-ship or cross GLA opportunities.

Risk coverage has improved significantly through tighter coordination of activity with a focus on risk response coverage. With priority always given to the 6 hour Dover Strait area and the 24 hour areas often covered purely by speed and distance, it is the 12 hour areas which have seen the most significant improvement, though it is acknowledged that risk coverage in actual conditions frequently falls below the GLA risk appetite threshold.

The addition of an 8th vessel would close the risk gap at additional cost, though this is likely to be offset by further commercial income, but at this stage it is considered pragmatic to continue with 7 vessels along with the mitigation measures. The enhanced data collection capability now in place will allow for consistency of measurement of risk coverage, which will inform future decisions and allow risk mitigation measures to be tracked to demonstrate the degree of success and levels of efficiency of the fleet. The data collected post project and KPIs used for future reporting will be reviewed.

Operation of a fleet of this nature is expected to deliver similar levels of commercial income as of today (circa £3m) which is an essential element of offsetting costs using reserve capacity. The operational management will be retained on the principle that whilst the interests of the three GLAs are aligned, their operational and legal accountabilities are not collective. Operational management of vessels is vested in the GLAs, where no GLA is, or will be, dependent on the other for delivery of core requirements but will synchronise for operations so as to be mutually supportive in an operational context such as in the GLA peripheral areas (West coast Ireland, Farne Islands, Isle of Man), dry dockings, commercial work, unexpected multiple events where this support becomes necessary. This mutual cooperation extends beyond vessel operations into areas of procurement, knowledge transfer and many other areas of common activities. Coordinated planning will therefore be retained and further developed, embracing lessons learnt.

Use of the charter market remains an integral part of delivery with 'Mair' on a time charter for Trinity House and numerous zone or local boats frequently in use for suitable lower level work. Charter vessels have also been used for significant projects where the capability required matches market availability, which in turn allows GLA vessels to be deployed and utilised to best effect.

The unique nature of the 'Mair' contract, being a 3rd generation family business operating solely for Trinity House is significant in both cost and delivery, which is considered unlikely to be replicated through another provider but will be considered at each contract renewal. Operation of 'Mair' for any GLA could be considered up to the limits of her certification. Further consideration of charter vessels will be considered within the overall business delivery model when vessels are subsequently replaced, along with funding mechanisms to deliver a cost effective and efficient fleet.

The fleet review project has allowed a data driven process to be implemented allowing a continuous process of data capture that demonstrates fleet effectiveness. Reviews of the fleet utility against the requirement can be continually assessed through the annual reporting process therefore eliminating the need for one-off reviews of this type.

14.1 Mitigation and future design considerations

Taking account of the recommendation for a 7-vessel fleet as outlined above a number of mitigation measures are proposed to improve Risk Response in Actual Conditions (RAAC) and the ability to carry out operational tasking.

14.1.1 Mitigation measures:

The proposal for the 7 vessel fleet of mixed capability with the following mitigation:

- Continuous improvement in operational management of the fleet through consideration of lessons identified
- Enhance vessel capabilities of the fleet e.g. speed, handling and manpower capabilities
- Operation of a more modern fleet to reduce unplanned vessel downtime and reduce running costs
- Greater use of local boats where appropriate including the RIB that is included in within the 'Mair' contract.

14.1.2 Factors for consideration in vessel design:

- Better able to maintain speed in adverse weather – improves coverage and reduces risk.
- Incorporating the capability to be able to respond effectively to the AtoN casualty or incident – minimises AtoN casualty time and improves wreck or new danger response.
- Commonality of capability to reduce planning constraints – reduce passage time and fuel consumption while minimising AtoN casualty time.
- Manpower and endurance – optimised for best availability and performance of capital asset.
- A high speed requirement for specific circumstances with acceptance of compromise on endurance and capability in other respects – routinely

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deployed to the higher risk areas with ability to utilise a single vessel for 6 hour area.

- A shallow water requirement for specific circumstances with acceptance of compromise on endurance and capability in other respects – cost effective smaller vessel better suited to servicing buoys and beacons in shallow and sometimes rocky water including survey work where larger vessels would be unsuitable.
- Environmental considerations including fuel – modern machinery matched to requirement and consider emerging technology in propulsion and power systems where suitable to minimise fuel consumption and emissions.
- Opportunities to align capability with cross government agencies – as recommended by the Reference Group for mutual cross department support.

One approach could be to develop a detailed, long term view of the future Fleet, mapping out over time the capabilities necessary and matching requirements to planned vessel out-of-service dates. However, the reality is that given the relatively long service life of vessels and constantly evolving technology, it would be counterproductive to be too rigid. Instead, the opportunity to offer best value is to consider the available market options, technology and ship design at the point when individual vessels are replaced and therefore benefit can be realised from inclusion into design of the risk reduction factors that have been identified. It is the intention therefore that detailed capability assessment is not incorporated within this report but should be subject to individual business cases as vessels are replaced over time.

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15 Project Financial Performance

DFT approval for sanction received 0n the 5th August 2016

Budget Breakdown

Material description	Sanction	Actual spend
Technical Specialist - Braemar	[redacted]	[redacted]
Total	[redacted]	[redacted]

Redacted

16 Implementation Plan

16.1 Future Work

As a result of the Phase 2 project a number of tasks are required following on from the project closure, these being listed below:

- Post Project MOU
- Refine data capture requirement and KPI's
- Implement short term mitigation measures
- Continue to monitor data to assess effectiveness and validate mitigations
- Consider table 13 from the Houlder additional recommendations section for any future procurement
- Develop and cost the mitigation measures

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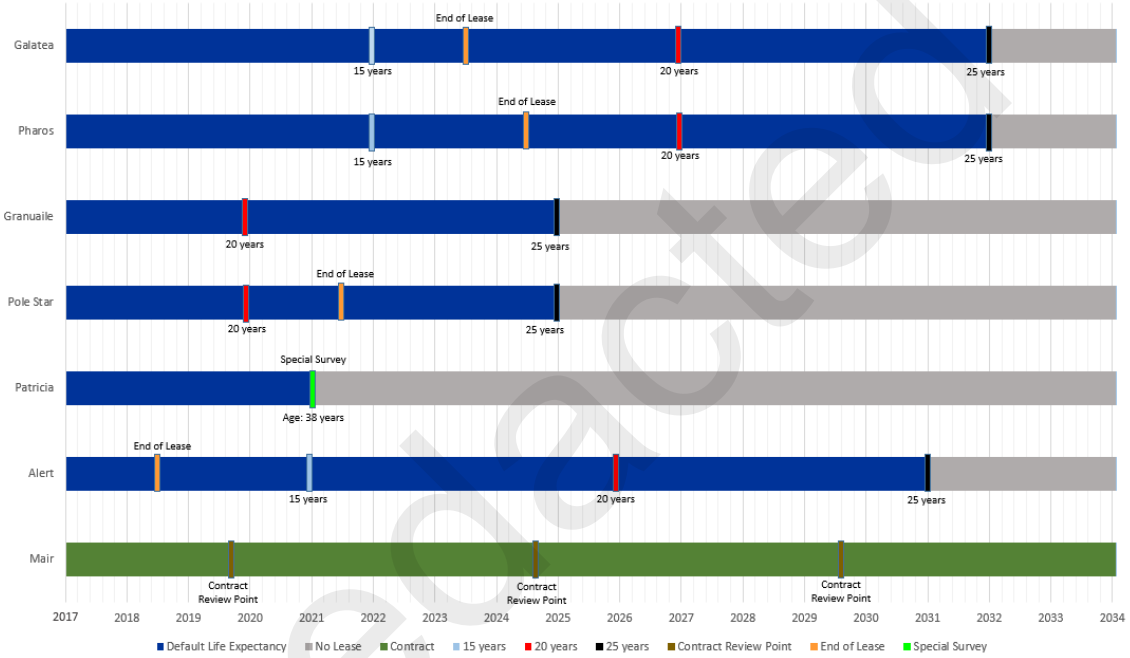
16.2 GLA Vessel Life Assumptions

The following sections aim to give an indication of the lifespan of the vessels detailing the significant survey points within the vessel life, the lease expiry points and the point in time when the vessel reaches its default life expectancy as defined by Braemar. The section also details how availability and cost are related over time and as one could expect that the longer the vessel is operated the larger the cost through repair and refit which then has a direct impact on reducing the availability of the vessel.

16.2.1 Vessel Review

The following graph details the GLAs' current assumptions for consideration of the service life of the vessels:



Assumptions on vessel life and lease expiry, reviews at significant dry docking and contract renewal periods.

This represents the GLA position of today but as indicated within the graph the GLAs will regularly review the condition and suitability of the vessel to meet the requirement.

In valuing the GLA vessels Braemar advised that: '*For European built vessels we assume a default life expectancy of 25Years however as a vessel approaches and passes this age we have to rely instead on its projected economic viability which, provided there is continued commercial demand usually takes into account increments based on the dry docking schedule.'*

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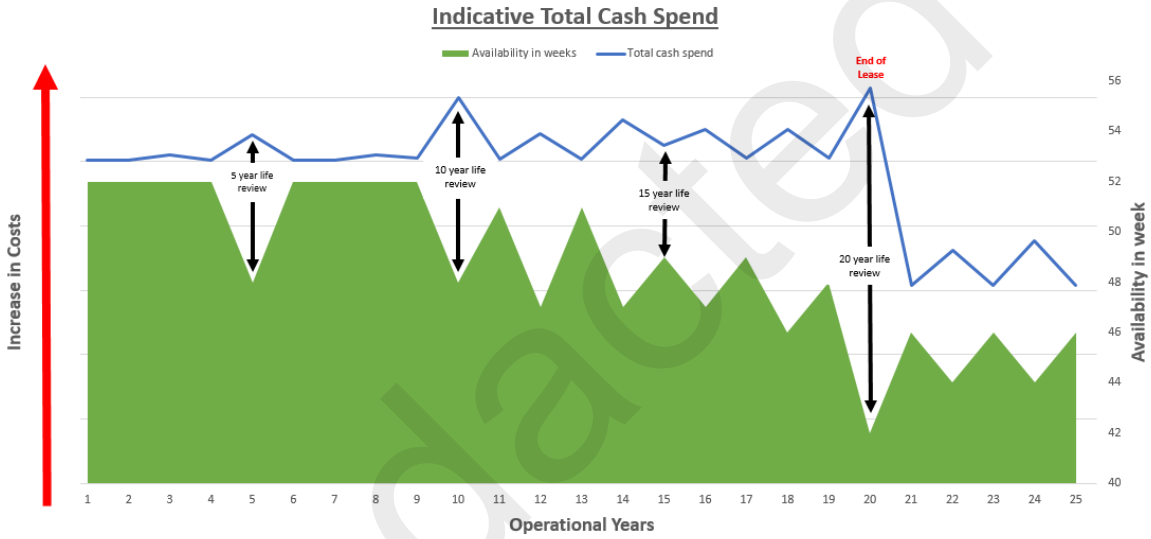
16.2.2 Vessel Availability through Life

The Graph below shows an indicative account of the vessel availability throughout its life. As the vessel ages it can be seen that the overall availability of the vessel reduces whilst spend remains high and the refits, equipment replacement and docking have more limited impact on the availability whilst the cost is increasing due to the frequency of the equipment replacements, refits and docking. The gap between high cost and low availability continues to widen until the vessel becomes economically unviable to operate and therefore reviews from 15 years should consider the operational viability of the vessel at that point.



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17 Lessons Learned

During the project, the process has allowed the GLAs to test the newly established processes and embedded assumptions. These are not intended to be project lessons but represent opportunities for improvement that have been identified during this time which will enhance the operation of the GLAs.
The key lessons identified to date are captured below and are considered within the future work. Part of the future work will be to capture all lessons identified throughout the project process.

No.	Lesson	Improvement
1	The adverse impact of weather on risk coverage and the relationship between vessel size and ability to respond	Take into account during planning phase and incorporate learning and judgement within planning and future vessel design
2	TUDS data alone no longer meets the needs of the GLAs	Review and set new KPI's
3	Data handling overhead is unsustainable within the current resource	Streamline and consider new software and data collection methods
4	Commercial income can be generated while covering Risk Response to a greater extent than previously achieved	Continue to actively seek commercial activity within reserve capacity
5	Whilst the interests of the three GLAs are aligned, their operational (different risk profiles / geographical areas e.g. shallow vs deep waters) and legal accountabilities are not collective	Ensure that each GLA has sufficient resources to cover its operational requirements whilst maintaining and enhancing coordinated planning to be mutually supportive in an operational context.
6	The recognition over the trial period of the importance of Zone Boats across all GLAs that contribute toward a layered fleet delivering low level tasking in a cost effective manner	Maintain local boat directory as a live document and consider greater utilisation of local boats were appropriate which allows GLA assets to concentrate on core tasking
7	Planning has routinely considered all vessels as equal for their ability to respond to wrecks and new dangers. It has been seen that the smaller vessels have a valuable niche within the fleet, however they have realistic limitations of endurance in terms of distance, sea-state and manpower.	Whilst maintaining the small vessel valuable contribution and cost effectiveness within the layered fleet, review planning assumptions and other means of maximising the utility of the vessels. Incorporate these considerations in future vessel design / contracts
8	The data collected demonstrates that risk coverage in actual conditions is notably less than the planned baseline coverage using service speeds.	Using data collected over the trial period gives a better appreciation of actual vessel response and that plans should be developed that take this data into account

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9	The project has delivered a data driven approach to the way that the GLAs conduct fleet operations which coupled with applying primacy in planning to risk coverage has allowed improvement in average risk coverage from 17% to 96% within the 12 hour areas	Continue approach and fine tune the planning process and seek continuous improvement in planning, execution and data collection to support improvements in fleet operations and inform future decision making
10	The fleet review project has allowed a data driven process to be implemented allowing a continuous process of data capture that demonstrates fleet effectiveness	Reviews of the fleet utility against the requirement can be continually assessed through the annual reporting process therefore eliminating the need for one off reviews of this type.
11	Given the long service life of vessels and constantly evolving technology it would be counter productive and too rigid to detail the long term view of the fleet, instead the opportunity to offer best value is to consider the available market options, technology and ship design at the point when individual vessels are replaced.	Taking the baseline fleet requirement from the project reported through the annual reports provides the basis over time for the vessel numbers and therefore the procurement of vessels can focus specifically upon the detailed capability required as assessed at that time.
12	The data through the trial period has demonstrated a significant amount of time when 7 vessels are not available predominantly due to docking periods and breakdowns	Explore ways of increasing vessel availability

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