



JACOBS®

Kyleakin Fish Feed Factory

Marine Harvest

Environmental Impact Assessment - Volume 2 of 4: Main Report

Chapter 16: Navigation

Final

May 2017



Contents

16. Navigation	16-1
16.1 Introduction	16-1
16.1.1 Structure of Chapter	16-1
16.2 Legislation, Policy and Guidance	16-1
16.2.1 Key Legislation	16-2
16.2.2 Key Policy	16-2
16.2.3 Key Guidance	16-2
16.3 Methodology	16-3
16.3.1 Risk Assessment	16-3
16.3.2 Safety Assessment.....	16-4
16.3.3 Sensitivity	16-4
16.3.4 Magnitude of Change	16-4
16.3.5 Significance	16-5
16.4 Baseline Conditions	16-6
16.5 Predicted Impacts.....	16-6
16.5.1 Construction Phase Impacts	16-7
16.5.2 Operational phase impacts.....	16-9
16.6 Mitigation Measures	16-10
16.6.1 Construction Phase	16-10
16.6.2 Operational Phase.....	16-11
16.7 Residual Impacts	16-12
16.8 Overview	16-19
16.9 References	16-20

Appendix 16.1: Navigational Risk Assessment for Kyleakin Feed Mill Pier, ABPmer 2016.

16. Navigation

16.1 Introduction

This chapter of the ES provides an assessment of the potential effects to navigation in the vicinity of the proposed Greenfield Salmon Feed Factory. Consideration is given to the construction of the marine works and operation of the new pier.

As part of this work, a Navigational Risk Assessment (NRA) was carried out by Associated British Ports Marine Environmental Research (ABPmer) to identify the existing vessel activity and navigational features in the Development Area. This NRA constitutes **Appendix 16.1** of this ES and should be referred to alongside this chapter.

Appendix 16.1 has acknowledged all vessels navigating within the waters adjacent to the Proposed Development, including recreational craft, commercial ferries, commercial traffic, commercial fishing vessels, marine dredging vessels, military vessels and emergency response activities.

This chapter begins by outlining the legislation, policy and guidance relevant to this topic before explaining the assessment methodology used. A summary is then provided of the baseline environment and the risk assessment process carried out within **Appendix 16.1**. The assessment is in line with guidance identified herein. Following the application of mitigation, an account of residual impacts is provided.

Although the content of this chapter, specifically the identification of potential impacts, is aligned with that detailed in **Appendix 16.1**, as relevant, there have been some minor modifications to the original construction methodology and design since the NRA was carried out in November 2016. It is now proposed that all dredged material be unloaded at a temporary jetty during the construction phase and, during the operation phase, that post-treatment process water be discharged directly into the marine environment through an outfall pipe. Details on these changes are provided in **Chapter 2: Project Description**.

Specifically in relation to navigation, the Northern Lighthouse Board (NLB) was notified of these changes in early March 2017. A formal letter was then sent out in March 2017 which detailed the changes and how they differed from those originally considered. As requested by NLB (Steven Driver, pers.comm) consideration of these minor changes is given within this chapter. Where there is a deviation and/or change from that previously considered within **Appendix 16.1** then this has been acknowledged (see **section 16.5**).

16.1.1 Structure of Chapter

The structure of this chapter follows the generalised approach of other marine technical chapters and covers:

- Legislation, Policy and Guidance;
- Methodology;
- Baseline Conditions;
- Predicted Impacts;
- Mitigation Measures;
- Residual Impacts; and
- Overview.

16.2 Legislation, Policy and Guidance

This section outlines the legislation, policy and guidance relevant to the assessment of the potential impacts on navigation. An overview of legislation, policy and guidance for the Proposed Development is provided in **Chapter 4: Planning Policy** of this ES.

16.2.1 Key Legislation

International protocols and conventions relating to safety, laws of the sea and pollution apply to shipping and ports. The UK Government has a responsibility to ensure that measures are implemented in order to honour its commitments to these protocols. Not least of these is the UK's responsibility under Article 60(7) of the United Nations Convention on the Law of the Sea (**Ref 16-1**). An NRA is one process by which the necessary considerations of developments can be evaluated.

The UK Marine Policy Statement identifies that: "*Marine plan authorities should take into account and seek to minimise any negative impact on shipping activity, freedom of navigation and navigational safety and ensure that their decisions are in compliance with international maritime law.*" (**Ref 16-2**)

The majority of port operations are administered by a Statutory Harbour Authority (SHA). Every SHA is self-governed, with specific legislation (normally Acts of Parliament) creating the SHA as an entity, with further powers and amendments made over time in response to the changing scope and remit of the SHA. Underpinning the powers of an SHA are a range of national legislations that place statutory responsibility on the Harbour Master to ensure navigation and safety within the harbour limits; these include the *Harbours, Docks and Piers Clauses Act 1847* (**Ref 16-3**) and the *British Transport Docks Act 1972* (**Ref 16-4**). Under such legislation, the Harbour Master may issue general or specific directions to control movements of vessels within their SHA in order to ensure safety.

The Proposed Development is located outwith an established SHA and therefore the competent authority with respect to navigation is the Maritime and Coastguard Agency (MCA).

16.2.2 Key Policy

16.2.2.1 Scottish National Marine Plan

Scotland's National Marine Plan (**Ref 16-5**) provides a comprehensive overarching framework for all marine activity in Scottish waters. Its intention is to enable sustainable development and use of Scotland's marine area in a way which will protect and enhance the marine environment whilst promoting both existing and emerging industries.

Chapter 13 of the Marine Plan identifies one of its objectives to be "safeguarded access to ports and harbours and navigational safety." It then sets out marine planning policies related to this objective:

- TRANSPORT 1 states, "*Navigational safety in relevant areas used by shipping now and in the future will be protected, adhering to the rights of innocent passage and freedom of navigation contained in UN Convention on the Law of the Sea (UNCLOS). The following factors will be taking into account when reaching decisions regarding development and use:*
 - *The extent to which the locational decision interfaces with existing or planned routes used by shipping, access to ports and harbours and navigational safety. This includes commercial anchorages and defined approaches to ports.*
 - *Where interference is likely, where reasonable alternatives can be identified.*
 - *Where there are no reasonable alternatives, whether mitigation through measures adopted in accordance with the principles and procedures established by the International Maritime Organization can be achieved at no significant cost to the shipping or ports sector.*"
- TRANSPORT 6 states, "*Marine planners and decision makers and developers should ensure displacement of shipping is avoided where possible to mitigate against potential increased journey lengths (and associated fuel costs, emissions and impact on journey frequency) and potential impacts on other users and ecologically sensitive areas.*"

16.2.3 Key Guidance

The assessment has been undertaken in line with a number of key technical guidance documents. These guidance documents are widely used across the UK and represent best practice for the assessment of various

consenting regimes. The documents summarised below provide information regarding the issues that should be taken into consideration when assessing the effect on navigational safety:

- International Maritime Organization (IMO) *Revised Guidelines for Formal Safety Assessment (FSA) for use in the IMO rule making process* (Ref 16-6);
- *Marine Guidance Note 543 (MGN 543 Merchant + Fishing) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response* (Ref 16-7);
- Department for Transport (DfT) and MCA: *Methodology for Assessing the Marine Navigational Safety and Emergency Response Risks of Offshore Renewable Energy Installations (OREI)* (Ref 16-8); and
- DfT *Port Marine Safety Code* (Ref 16-9).

16.3 Methodology

16.3.1 Risk Assessment

For navigation, this assessment uses a different approach from the manner adopted in other ES topic chapters. As required by maritime regulators, a risk-based assessment was carried out initially; this was managed through consultation with the relevant regulators and is detailed within **Appendix 16.1**. The outcomes of a navigational hazard identification workshop were then used to identify the level of risk for a number of hazard scenarios.

The aim of the workshop was to identify navigational safety concerns relative to the study's scope. A total of 14 hazard scenarios were identified for the construction phase and 15 hazard scenarios for the operational phase. From the 29 hazard scenarios identified, the attendees considered the possible hazard scenarios according to their 'Most Likely' and 'Worst Credible' outcomes. The assessment of risk is based on the descriptions of these outcomes to determine a likely frequency and outcome for each hazard occurring.

In making the assessment, the outcome of each hazard scenario on the receptors of 'people, environment, property, business' was evaluated to give a baseline risk with no mitigation measures in place. Each of the 29 hazard scenarios were then considered in light of embedded risk controls which are available at, or can be deployed at, Kyleakin pier in response to a marine emergency. It should be noted that embedded risk controls, in the context of marine safety, relate to processes, practices and available safety resources that are in existence irrespective of the project scheme. These might include (for example) International Regulations (such as the *International Regulations for Preventing Collisions at Sea 1972 (COLREGS)* (Ref 16-10)) or training of personnel (such as the *International Standards of Training, Certification and Watchkeeping for Seafarers* (Ref 16-11)).

After determining which risk controls were applicable to each hazard scenario, a risk score was calculated by determining the 'likelihood reduction' and 'consequence reduction' for each risk control.

Additional controls were then identified by the Stakeholders and documented to ensure that risk levels were maintained to 'As Low As reasonably Practicable'. These additional controls are safety recommendations, which were then assigned a likelihood and consequence reduction to allow the calculation of a final risk score.

The risk score associated with each of the 29 hazard scenarios were set on a numerical scale, as shown in **Table 16.1**. Following the risk assessment, those hazard scenarios identified as 'medium' risk or above, once the embedded risk controls were considered, were taken forward for a safety assessment.

Table 16.1 : Classification of Risks by Risk Score

Classification	Risk Score
High	6.00 – 8.99
Medium	4.00 – 5.99
Low	1.00 – 3.99
Negligible	0.01 – 0.99

16.3.2 Safety Assessment

This section outlines the methodologies developed to describe the baseline and to present and assess impacts of the Proposed Development on marine vessels and navigation receptors. It outlines the methods and criteria used to:

- define the study area and identify topic receptors;
- establish the environmental baseline for topic receptors;
- determine the risk of hazard scenarios; and
- identify the sensitivity of receptors, the magnitude of change and significance of impacts on safety.

The level of significance of an impact is determined based on the sensitivity attributed to the navigational impact (**Table 16.2**) and the magnitude of change from the potential impact (**Table 16.3**) during either the construction or operation phase. Where appropriate, mitigation measures are then provided and an assessment of any residual impacts, following application of the measures, detailed.

16.3.3 Sensitivity

A vessel or navigation receptor can be sensitive only if there is a pathway through which an impact can be transmitted between the source activity and the receptor. When a receptor is exposed to an impact, the overall sensitivity of the receptor has been determined, guided by professional judgement.

The table below outlines the receptor sensitivity with their definitions and shows how these compare to those within **Appendix 16.1**. A safety impact is classified as any impact that may influence the navigational safety of the marine receptor.

Table 16.2 : Receptor Sensitivity

Sensitivity	General Criteria	Sensitivity (as assigned by ABPmer)
High	High to very high level of safety impact for vessels and navigation receptors. Limited ability to adapt to impact.	Very high / High
Medium	Medium level of safety impact for vessels and navigation receptors. Some ability to adapt to impact.	Medium
Low	Low level of safety impact for vessels and navigation receptors. Ability to adapt to majority of impact.	Low / Negligible

16.3.4 Magnitude of Change

The magnitude measures the scale or extent of the change from the baseline condition, irrespective of the

sensitivity of the receptor affected. When assessing the magnitude of an impact, the geographical extent, the duration and the frequency are considered. Determining the overall magnitude of navigational impacts also incorporates a degree of subjectivity, as decisions are based on professional judgement in combination with baseline data. **Table 16.3** defines the magnitude criteria and provides a comparison with those used within **Appendix 16.1**.

Table 16.3 : Magnitude of Change

Magnitude of change	General Criteria	Magnitude (as assigned by ABPmer)
Large	Impact geographical area beyond the extent of marine works / operational area. Impact present on a permanent basis throughout the operational phase. Impact occurs very frequently to constantly / permanently.	Large
Medium	Impact localised to geographical extent of marine works / operational area. Impact present on a permanent basis throughout the operational phase. Impact occurs frequently.	Medium
Small	Impact localised to geographical extent of marine works / operational area. Impact present on a temporary basis. Impact relatively infrequent.	Small
Negligible	No impact on vessels or navigational receptors.	Neutral

16.3.5 Significance

In general terms, the assessment of significance is carried out by first determining the baseline conditions and sensitivity of the receptor, followed by identifying the magnitude of change on the receptor; the significance is the combination of these variables. To understand how significance has been assigned against these criteria in this chapter a matrix is presented (see **Table 16.4**).

It should be acknowledged that the significance of an impact on navigational receptors has first considered the adoption of tertiary mitigation measures (see **Appendix 16.1**). Following adoption of these measures, additional mitigation is then proposed to reduce or maintain the significance assessed; consideration of this additional mitigation results in the residual effect.

The identified residual impacts are provided in **Section 16.7**.

Table 16.4 : Matrix for Determination of Significance

Magnitude \ Sensitivity	Negligible	Small	Medium	Large
High	Negligible	Minor/ Moderate	Moderate/ Major	Major
Medium	Negligible	Minor	Moderate	Moderate/ Major
Low	Negligible	Negligible	Minor	Moderate

Table 16.5 : Generic Impact Significance Definition

Impact	Definition
Major Adverse	Considerable detrimental or negative impact to an environmental resource or receptor impact (by extent, duration or magnitude) of more than local significance or in breach of recognised acceptability, legislation, policy or standards.
Moderate Adverse	Limited detrimental or negative impact to an environmental resource or receptor (by extent, duration or magnitude) which may be considered significant.
Minor Adverse	Slight, very short or highly localised detrimental or negative impacts to an environmental resource or receptor.
Negligible	No significant impacts to an environmental resource or receptor.
Minor Beneficial	Slight, very short or highly localised advantageous or positive impact to an environmental resource or receptor.
Moderate Beneficial	Limited advantageous or positive impact to an environmental resource or receptor (by extent, duration or magnitude) which may be considered significant.
Major Beneficial	Considerable advantageous or positive impact to an environmental resource or receptor (by extent, duration or magnitude) of more than local significance.

Although professional judgement is the principal factor in determining which effects would be significant, the assessment is guided by the methodology outlined above. Impacts described during the assessment should be considered adverse unless stated otherwise.

16.4 Baseline Conditions

The Proposed Development is located at a former sand and gravel quarry and there is an existing pier that was used as part of the quarry operation at the site. The Proposed Development is adjacent to the Kyleakin narrows and the Syke Bridge crossing from the Scottish mainland. For the purposes of this assessment, the study area includes Loch Alsh and Plockton at its eastern side, and extends to the Island of Scalpay at its western extent. This includes a sea area immediately to the north of the Proposed Development which is termed the 'Inner Sound'. Figures illustrating the study area are provided in **Appendix 16.1**.

The baseline condition for commercial shipping and recreational navigation within the study area was reviewed (see **Appendix 16.1**). The following elements were considered for the baseline:

- navigational environment;
- statutory responsibilities and management procedures;
- recreational facilities;
- aids to navigation;
- anchoring;
- emergency response;
- marine incidents; and
- metocean data.

For full details of baseline conditions, refer to **Appendix 16.1**.

16.5 Predicted Impacts

Following the establishment of baseline conditions and an understanding of the proposed development, it is possible to assess the potential impacts of the Proposed Development on navigation. The assessment of significance assumes that tertiary mitigation measures are in place. These tertiary mitigation measures include

actions that would be carried out to meet other existing legislative requirements, or actions that are considered to be standard practices used to manage navigational effects.

As previously mentioned, the impacts considered are based on those identified as 'medium' risk or above during the hazard identification workshop (see **Appendix 16.1**). The impacts are assessed for the construction of the marine facilities and the operational phase of the Proposed Development.

However, since the NRA was carried out minor modifications to the marine elements of the Proposed Development have resulted in some changes to that previously assessed. In the construction phase the requirement for backhoe dredging has removed the need for pumping ashore. Material will be taken from the backhoe to a temporary jetty by barge, before unloading (see **Figure 2.2, Chapter 2**). As a consequence, there will be a slight increase in vessel movements during the construction phase; however, these movements will occur in the immediate proximity of the Proposed Development and over a very short distance (~100m).

As there is no longer a requirement for the dredge pipeline and buoy during the construction phase the impact 'allision of recreational/fishing vessel with dredge pipeline/buoy' is no longer relevant. However, the requirement for a temporary jetty, albeit much shorter in length than the originally proposed pipe, presents a navigation risk. As advised by NLB, coordinates of the temporary jetty have been sent to the consultees and it is anticipated that lighting of the jetty will be requested during the consultation phase of the Marine Licence Application.

Towards the end of the construction phase a small diameter outfall pipe (<200mm) will be laid along the seabed from MHWS for a total length of approximately 380m seaward. As advised by NLB, coordinates of the outfall pipe have been sent to the consultees as it will be necessary to mark the pipe on navigation charts. It is also anticipated that an adequately lit marker buoy denoting the end of the outfall will be required.

Consideration of the above has resulted in the following changes to those potential impacts considered within **Appendix 16.1**:

- Removal of the potential impact 'allision of recreational/fishing vessel with dredge pipeline/buoy' in the construction phase.
- Addition of the potential impact 'allision of recreational/fishing vessel with temporary jetty' in the construction phase.
- Consideration of additional vessel movements in construction phase within the identified impact 'allision of dredge/construction plant with marine works'
- Addition of the potential impact 'allision with outfall marker buoy' in the operation phase.

Adopting a conservative approach all potential impacts not previously identified in **Appendix 16.1** have been assigned as 'medium risk'.

It is anticipated that, once operational, the following vessel movements will take place at the pier:

- bulk vessels delivering raw materials at the side berth: 2 per week;
- cargo carriers being loaded with fish feed at the outer berth: 2 per week;
- tankers delivering vegetable oils at the outer berth: 1 per week;
- LNG vessels delivering to the plant at the outer berth: 0.5 per week; and
- one landing craft visit to the slipway to collect fish feed: 1 per week.

During the operational phase, a total of 676 vessel movements are anticipated per year, as a direct consequence of the Propose Development.

16.5.1 Construction Phase Impacts

The following potential impacts were identified for the construction period of the marine facilities. Although the detail largely reflects that provided within **Appendix 16.1** several changes have been made to reflect the minor

modifications (see section 16.5). The significance assessed within **Appendix 16.1** may differ to match the generic assessment methodology used throughout this ES.

16.5.1.1 Allision - Recreational or fishing vessel allision with temporary jetty

This potential impact would have a medium level of sensitivity as vessels have some ability to adapt to the situation through the application of their engines to manoeuvre or use of anchors to avoid an allision. The potential impact from an allision will be localised to the immediate extent of the marine construction area. The impact has the potential to occur throughout the construction phase whilst the jetty is in place (during the dredging works) leading to a magnitude of medium and an overall ranking of '*moderate adverse*'.

16.5.1.2 Allision - Dredge/construction plant impact with marine works during construction phase

This potential impact would have a medium level of sensitivity as vessels have some ability to adapt to the situation through the application of their engines, anchors or adjusting moorings. In addition, it is likely that dredge and construction vessels would be moving at a slow speed whilst working making any allision a controlled outcome if avoidance action is taken. The potential impact from an allision will be localised to the immediate extent of the marine construction area. The impact has the potential to occur throughout the construction phase whilst vessels are manoeuvring leading to a magnitude of medium and an overall ranking of '*moderate adverse*'.

16.5.1.3 Collision - Caissons temporarily anchored in study area presenting a risk of collision

This potential impact will have a high level of impact due to the proximity to the main navigation channel, the temporary nature of the anchored caissons, meaning that the vessel Masters and navigators may not be aware of the collision risk, especially at times of reduced visibility or at night. During these times (night or reduced visibility) vessels will have limited time to react to the situation and take appropriate action to avoid collision. This impact could occur throughout the passage or whilst the caissons are at anchor. The impact is present on a temporary basis. This gives a magnitude of small resulting in an overall ranking of '*minor/moderate adverse*'.

16.5.1.4 Fire/Explosion - Dredge/construction plant on-board fire

This potential impact would have a medium level of sensitivity due to the type of work being carried out by construction craft (such as hot works) and the range of vessels engaged with the marine works. The potential impacts will be localised to the extent of the marine construction area and will be present for the construction phase only. A fire or explosion has the potential to occur throughout the construction phase, but is an infrequent risk, which leads to an assessed magnitude of small and an overall ranking of '*minor adverse*'.

16.5.1.5 Grounding - Dredger grounding whilst engaged in operations

The potential impact would have a high level of sensitivity due to the limited time and ability for the vessel crew to react to the situation. The potential impact will be localised to the extent of the marine construction area and will be present for the construction phase only. The impact has the potential to occur throughout the construction phase, and has the potential to occur frequently which leads to an assessed magnitude of medium and an overall ranking of '*moderate/major adverse*'.

16.5.1.6 Hazardous substance accidents - Accidental spill during marine works

Depending on the weather conditions, the potential impact will be either spread into the Inner Sound if the wind direction is easterly or under the Skye Bridge and into Loch Alsh if the wind direction is westerly leading to a high level of sensitivity. The impact has the potential to occur infrequently throughout the period; however, the volume of a spill is likely to be small scale due to the volume which could be spilled at any one time through construction activity. This leads to an assessed magnitude of small and an overall ranking of '*minor/moderate adverse*'.

16.5.1.7 Machinery related accidents - Heavy lift failure, or failure of lifting gear

The potential impact would have a high level of safety impact for vessels and crew, with limited ability to adapt to a quickly developing incident. The sensitivity is therefore assessed as high. The potential impact would be localised to the extent of the study area and will be present for the construction phase only. However, the impact has the potential to occur infrequently throughout the period of the construction, which leads to an assessed magnitude of small and an overall ranking of '*minor/moderate adverse*'.

16.5.1.8 Other - Vessel damage due to weather conditions

This potential impact will have a medium sensitivity due to the ability to react to building swell condition and the time available to move to a more sheltered location. The potential impact will be localised to the extent of the study area and will be present for the construction phase only. However, the impact has the potential to occur frequently throughout the period of the construction, which leads to an assessed magnitude of medium and an overall ranking of '*moderate adverse*'.

16.5.2 Operational phase impacts

The following impacts were identified for the operational phase of the Proposed Development.

16.5.2.1 Allision – with pier structure

Any allision has the potential to cause damage to a vessel which may lead to a pollution event and injuries to personnel. This risk will diminish with time as crew become familiar with the new berthing locations and the effects of wind and tidal flow at this location. This potential impact would have a medium level of sensitivity due to the strong tidal flow and shallow water. However, the low speed at which an approach to the berth is made means that there is adequate time to react to an allision situation by use of the vessel's engines, rudder and bow thruster. In addition, the potential impact is localised to the area of the marine facilities and will occur throughout the operational phase leading to a magnitude of medium and an overall ranking of '*moderate adverse*'.

16.5.2.2 Allision – with navigational buoy

This potential impact would have a medium level of sensitivity due to the strong tidal flow in the area meaning vessels have reduced ability to adapt to the situation. In addition, the potential impact is localised to the approaches to the pier and will occur throughout the operational phase leading to a magnitude of medium and an overall ranking of '*moderate adverse*'.

16.5.2.3 Allision – with outfall marker buoy

This potential impact would have a medium level of sensitivity due to the strong tidal flow in the area meaning vessels have reduced ability to adapt to the situation. In addition, the potential impact is localised to the approaches to the pier and will occur throughout the operational phase leading to a magnitude of medium and an overall ranking of '*moderate adverse*'.

16.5.2.4 Allision – with Skye Bridge

This potential impact would have a high level of sensitivity due to the strong tidal flow in this area and the limited time available to correct any manoeuvre by use of the vessel's engines, rudder and bow thruster. In addition, the potential impact is localised to the area of the marine facilities and will occur throughout the operational phase leading to a magnitude of medium and an overall ranking of '*moderate/major adverse*'.

16.5.2.5 Grounding – Vessel on approaches

This potential impact will have a high level of sensitivity due to the safety implications of hull damage and injury associated with a grounding event. A vessel approaching the Side Berth will have limited ability to adapt to the situation as the slow speed required for berthing means that the vessel will quickly drift as the result of a

miscalculation of wind and tide. The potential impact is localised to the area of the marine facilities and will occur throughout the operational phase leading to a magnitude of medium and an overall ranking of ‘*moderate/major adverse*’.

16.5.2.6 Ranging – Adverse weather conditions affecting moored vessels

This potential impact will have a high sensitivity due to the limited ability to react to adverse weather conditions; a vessel has limited ability to reduce the risk of mooring failure. The potential impact will be localised to the harbour area and will be present on a permanent basis. The impact also has the potential to occur frequently throughout the operational phase, which leads to an assessed magnitude of medium and an overall ranking of ‘*moderate/major adverse*’.

16.6 Mitigation Measures

The following section summarises additional mitigation measures identified during the hazard identification workshop. The NRA process (see **Appendix 16.1**) recognised both existing industry standard risk controls (tertiary mitigation) and additional mitigation. The latter has been summarised against the two phases of the proposed development.

16.6.1 Construction Phase

Table 16.6 : Proposed Mitigation Measures during Construction Phase

Proposed Mitigation Measure	Description
Marine liaison officer	Provides a point of contact for the marine works. Will provide safety information to vessels navigating in the area and coordinate with local authorities during emergency situations.
Automatic Identification System (AIS) coverage	All dredge/construction vessels, including barges to carry AIS.
Marine safety management system (Marine-SMS)	Prior to commencement of marine operations, consideration and creation of a Marine-SMS which details the marine side operations and how these will be managed. Detailed Safety Operating Instructions (SOPs) may also be established to compliment the Marine-SMS.
Port Marine Safety Code (PMSC) compliance	The application of a Marine-SMS, which recognises the need for contractors’ RAMS to be agreed in advance of marine works.
Oil spill contingency plan	The MCA require an oil spill contingency plan to be in place before the commencement of marine works. As part of this plan training and exercise of personnel will be required.
Dedicated Very High Frequency (VHF) channel	For use by dredge/construction vessels working on the project. This will require a licence from the Office of Communications (OFCOM).
Notices to mariners	Issued by Kyle of Lochalsh Harbour Authority to inform vessels of the towage activities.
Navigational lights	Caissons to be lit as per COLREGS, anchored caissons to display lighting agreed with Northern Lighthouse Board (NLB).
Weather forecasting	Use of a predictive model for metocean conditions to plan marine works.
Contractor risk assessment method statement (RAMS)	Reviewed and agreed prior to use.

16.6.2 Operational Phase

Table 16.7 : Proposed Mitigation Measures for Operational Phase

Proposed Mitigation Measure	Description
Availability of latest hydrographic information	Results of the hydrographic surveys should be provided to the UK Hydrographic Office (UKHO) so that navigational charts for the area can be updated.
Dedicated VHF channel	To prevent over use of the main navigational channels, will require a licence from OFCOM.
Dredging programme	The approaches to the berths will be dredged as part of the construction phase. Surveying completed during the operational phase will determine the need for maintenance dredging
Hydrographic surveying	Scheduled surveys should be completed in line with PMSC requirements.
Marine liaison officer / pier master	Will promulgate safety information to vessels navigating in the area. They will be the Kyleakin Pier point of contact during an emergency situation.
Marine safety management system	The MSMS should detail the procedures for promulgating weather information and requirements of marine personnel.
Oil spill contingency plans	To detail the response to any marine pollution event.
PMSC compliance	Ensures all risk is reduced to as low as reasonably practicable by risk assessment and subsequent mitigation.
Port emergency plan	Will detail responses to emergency situations, along with contact details for local authorities.
Sectorised light	This should be used for vessels approaching the side berth. A sectorised light consists of at least 2 lights, red and white. When the vessel is in the white sector of the light the navigator can be confident that they are in safe water. If the vessel is in the red sector of the light, it indicates that the vessel should change its course and is outside of the dredged approach area to the berth. Any Aid to Navigation lighting is subject to approval of the NLB prior to installation.
Tidal flow atlas	Provision of a tidal atlas for use on-board vessels, which provides tidal flow speed and direction through each hour of the tidal cycle.

16.7 Residual Impacts

Table 16.8 summarises those impacts what were initially ranked as having a ‘medium’ risk or above during the hazard identification workshop. An assessment is provided of the impacts, once tertiary mitigation has been applied. Subsequent to the application of tertiary mitigation, consideration is then given to ‘additional mitigation’ before providing an assessment of the residual effect.

Table 16.8: Summary of Residual Impacts

Impact	Tertiary mitigation	Sensitivity	Magnitude	Significance of impact	Additional mitigation	Sensitivity	Magnitude	Significance of residual impact
CONSTRUCTION PHASE								
Recreational / fishing vessel allision with temporary jetty	Visual observation (clear line of sight)	Medium	Medium	Moderate adverse	Oil spill contingency plans Marine SMS PMSC compliance Marine liaison officer AIS coverage Dedicated VHF channel	Low	Medium	Minor adverse
Dredge / construction plant allision with marine works	Communications equipment Safe systems of work (HSE) Standing Orders/SOPs Visual observation (clear line of sight) Standards of Training, Certification and Watchkeeping for Seafarers (STCW)	Medium	Medium	Moderate adverse	Oil spill contingency plans Marine SMS PMSC compliance Marine liaison officer Dedicated VHF channel AIS coverage	Low	Medium	Minor adverse
Collision as a result of caissons temporarily	Passage planning Weather forecasting	High	Small	Minor / moderate adverse	AIS coverage Notices to mariners	Low	Small	Negligible

Impact	Tertiary mitigation	Sensitivity	Magnitude	Significance of impact	Additional mitigation	Sensitivity	Magnitude	Significance of residual impact
anchored in study area	International COLREGS 1972 (as amended) Emergency services equipment - shore side Standing Orders/SOPs Places of refuge Notices to mariners				Marine liaison officer Navigational lights			
Dredge / construction plant on-board fire	Safe systems of work (HSE) Standing Orders/SOPs Standards of Training, Certification and Watchkeeping for Seafarers (STCW)	Medium	Small	Minor adverse	Oil spill contingency plans Marine SMS PMSC compliance Marine liaison officer	Low	Small	Negligible
Dredger grounding whilst engaged in operations	Draught, Accurate, declared and within max limits Communications equipment Accurate tidal measurements Availability of latest hydrographic information Notices to mariners Training of pollution response personnel Standing Orders/SOPs Visual observation (clear line of sight) Requirement for notification of vessel	High	Medium	Moderate / major adverse	Oil spill contingency plans PMSC compliance Tidal flow atlas Marine liaison officer	Low	Medium	Minor adverse

Impact	Tertiary mitigation	Sensitivity	Magnitude	Significance of impact	Additional mitigation	Sensitivity	Magnitude	Significance of residual impact
	defects Standards of Training, Certification and Watchkeeping for Seafarers (STCW)							
Accidental spillage of hazardous substance	Oil spill contingency plans Contingency plan exercises Availability of pollution response equipment Training of pollution response personnel Standards of Training, Certification and Watchkeeping for Seafarers (STCW)	High	Small	Minor / moderate adverse	Oil spill contingency plans Marine liaison officer	Low	Small	Negligible
Heavy lift failure, or failure of lifting gear	Communications equipment Safe systems of work (HSE) Emergency services equipment - shore side Standing Orders/SOPs Weather forecasting	High	Small	Minor / moderate adverse	Oil spill contingency plans Marine liaison officer Weather forecasting Contractor RAMS	Low	Negligible	Negligible
Vessel damage due to weather conditions	Weather forecasting	Medium	Medium	Moderate adverse	Marine SMS PMSC compliance Oil spill contingency plans Marine liaison officer	Medium	Small	Minor adverse

Impact	Tertiary mitigation	Sensitivity	Magnitude	Significance of impact	Additional mitigation	Sensitivity	Magnitude	Significance of residual impact
					Weather forecasting Contractor RAMS			
OPERATIONAL PHASE								
Allision with pier structure	Passage planning Arrival/Departure, advance notice of Communications equipment Accurate tidal measurements Emergency services equipment - shore side Visual observation (clear line of sight) Requirement for notification of vessel defects Weather forecasting Standards of Training, Certification and Watchkeeping for Seafarers (STCW)	Medium	Medium	Moderate adverse	Port Emergency Plan Oil spill contingency plans Marine liaison officer/pier master Dedicated VHF channel Tidal flow atlas	Medium	Small	Minor adverse
Allision with navigational buoy	Passage planning Arrival/Departure, advance notice of Communications equipment Accurate tidal measurements Emergency services equipment - shore side	Medium	Medium	Moderate adverse	Marine liaison officer/pier master Dedicated VHF channel Tidal flow atlas	Medium	Small	Minor adverse

Impact	Tertiary mitigation	Sensitivity	Magnitude	Significance of impact	Additional mitigation	Sensitivity	Magnitude	Significance of residual impact
	Visual observation (clear line of sight) Requirement for notification of vessel defects Weather forecasting Standards of Training, Certification and Watchkeeping for Seafarers (STCW)							
Allision with outfall marker buoy	Passage planning Arrival/Departure, advance notice of Communications equipment Accurate tidal measurements Emergency services equipment - shore side Visual observation (clear line of sight) Requirement for notification of vessel defects Weather forecasting Standards of Training, Certification and Watchkeeping for Seafarers (STCW)	Medium	Medium	Moderate adverse	Marine liaison officer/pier master Dedicated VHF channel Tidal flow atlas	Medium	Small	Minor adverse
Allision with Skye Bridge	Passage planning Arrival/Departure, advance notice of Communications equipment	High	Medium	Moderate / major adverse	Marine liaison officer/pier master Dedicated VHF channel Tidal flow atlas	High	Small	Minor / moderate adverse

Impact	Tertiary mitigation	Sensitivity	Magnitude	Significance of impact	Additional mitigation	Sensitivity	Magnitude	Significance of residual impact
	<p>Accurate tidal measurements</p> <p>Emergency services equipment - shore side</p> <p>Visual observation (clear line of sight)</p> <p>Requirement for notification of vessel defects</p> <p>Weather forecasting</p> <p>Standards of Training, Certification and Watchkeeping for Seafarers (STCW)</p>							
Grounding of vessel on approaches	<p>Passage planning</p> <p>Draught, Accurate, declared and within max limits</p> <p>Arrival/Departure, advance notice of</p> <p>Accurate tidal measurements</p> <p>Standing Orders/SOPs</p> <p>Requirement for notification of vessel defects</p>	High	Medium	Moderate / major adverse	<p>Dredging programme</p> <p>Hydrographic surveying program</p> <p>Port Emergency Plan</p> <p>Oil spill contingency plans</p> <p>Availability of latest hydrographic information</p> <p>Marine SMS</p> <p>PMSC compliance</p> <p>Marine liaison officer/pier master</p> <p>Sectored light</p> <p>Tidal flow atlas</p>	Low	Medium	Minor adverse
Adverse weather conditions causing moored vessel	<p>Passage planning</p> <p>Arrival/Departure, advance notice of</p>	High	Medium	Moderate / major adverse	<p>Marine SMS</p> <p>PMSC compliance</p>	Low	Small	Negligible



Impact	Tertiary mitigation	Sensitivity	Magnitude	Significance of impact	Additional mitigation	Sensitivity	Magnitude	Significance of residual impact
ranging	Weather forecasting				Marine liaison officer/pier master			

16.8 Overview

This chapter has assessed the potential effects of the Proposed Development on navigation in the study area. The navigation baseline was established through desk-based research and consultation with relevant Stakeholders.

During the construction phase of the project, a number of residual impacts have been identified as having a minor adverse impact, following implementation of tertiary and additional mitigation measures. These were:

- allision of recreational/fishing vessel with dredge pipeline/buoy;
- allision of dredge/construction plant with marine works;
- dredger grounding whilst engaged in operations; and
- vessel damage due to weather conditions.

No impacts were identified as moderate or major adverse after implementation of additional mitigation.

During the operational phase of the project, the potential minor adverse residual impacts are likely to include the following:

- allision with pier structure;
- allision with navigational buoy;
- allision with Skye Bridge; and
- grounding of vessel on approaches.

Potential allision with Skye Bridge was identified as minor to moderate adverse impact on navigation, following the implementation of additional mitigation.

Following consultation with NLB in early March 2017, consideration has also been given to the minor modifications to the Proposed Development which have occurred since the NRA (**Appendix 16.1**) was carried out.

16.9 References

- Ref 16-1 United Nations, 1982. *United Nations Convention on the Law of the Sea*. [Accessed 21.11.16]
Available from: http://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf
- Ref 16-2: HM Government, 2011. *UK Marine Policy Statement (MPS)*. London: The Stationery Office.
- Ref 16-3: UK Government, 1847. *Harbours, Docks and Piers Clauses Act 1847*. [Accessed 21.11.2016]
Available from: http://www.legislation.gov.uk/ukpga/1847/27/pdfs/ukpga_18470027_en.pdf
- Ref 16-4: UK Government, 1972. *British Transport Docks Act 1972*.
- Ref 16-5: The Scottish Government, 2015. *Scotland's National Marine Plan*. Edinburgh: The Scottish Government. 99-99.
- Ref 16-6: International Maritime Organization, 2013. *Revised Guidelines for Formal Safety Assessment (FSA) for use in the IMO rule making process*. [Accessed 21.11.16], Available from:
http://research.dnv.com/skj/IMO/MSC-MEPC%202_Circ%2012%20FSA%20Guidelines%20Rev%20III.pdf
- Ref 16-7: Maritime and Coastguard Agency, 2016. *Marine Guidance Note 543 (MGN 543 Merchant + Fishing) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response*. [Accessed 21.11.16] Available from:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/502021/MGN_543.pdf
- Ref 16-8: Department for Transport (DfT) and MCA. 2013. *Methodology for Assessing the Marine Navigational Safety and Emergency Response Risks of Offshore Renewable Energy Installations (OREI)*. London: The Stationery Office.
- Ref 16-9: Department for Transport (DfT). 2016. *Port Marine Safety Code, November 2016*. London: The Stationery Office.
- Ref 16-10: International Maritime Organization, 1972. *COLREGS – International Regulations for Preventing Collisions at Sea*. [Accessed 21.11.16] Available from: [http://www.mar.ist.utl.pt/mventura/Projecto-Navios-I/IMO-Conventions%20\(copies\)/COLREG-1972.pdf](http://www.mar.ist.utl.pt/mventura/Projecto-Navios-I/IMO-Conventions%20(copies)/COLREG-1972.pdf)
- Ref 16-11: International Maritime Organization, 1978. *International Convention on Standards of Training, Certification and Watchkeeping for Seafarers*. [Accessed: 21.11.16] Available from:
[http://www.imo.org/en/About/conventions/listofconventions/pages/international-convention-on-standards-of-training,-certification-and-watchkeeping-for-seafarers-\(stcw\).aspx](http://www.imo.org/en/About/conventions/listofconventions/pages/international-convention-on-standards-of-training,-certification-and-watchkeeping-for-seafarers-(stcw).aspx)

Glossary of Technical Terms

Abbreviation	Term
ABPmer	Associated British Ports Marine Environmental Research
AIS	Automatic Identification System
COLREGS	International Regulations for Preventing Collisions at Sea
DfT	Department for Transport
EIA	Environmental Impact Assessment
ES	Environmental Statement
HSE	Health and Safety Executive
IMO	International Maritime Organization
LPS	Local Port Services
Marine-SMS	Marine Safety Management System
MCA	Maritime and Coastguard Agency
NLB	Northern Lighthouse Board
NRA	Navigational Risk Assessment
OFCOM	Office of Communications
OREI	Offshore Renewable Energy Installations
PMSC	Port Marine Safety Code
RAMS	Risk Assessment Method Statement
SHA	Statutory Harbour Authority
SOP	Standard Operating Procedure
UKHO	United Kingdom Hydrographic Office
UNCLOS	United Nations Convention on the Law of the Sea
VHF	Very High Frequency