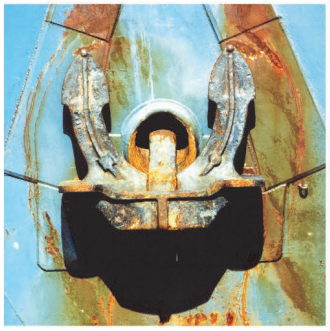
Associated British Ports

Immingham Eastern Ro-Ro Terminal

Scoping Report – Request for Scoping Opinion

September 2021

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Scoping Report

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Executive Summary

Associated British Ports (ABP), the owner and operator of the Port of Immingham is proposing to construct a new roll-on/roll-off (Ro-Ro) facility within the Port. The new Terminal will be designed to service the embarkation and disembarkation of principally commercial and automotive traffic, possibly with provision for a small element of passenger use during quiet periods. The proposed development will involve marine works within the Humber Estuary and landside works on the existing statutory port estate. The proposed development, which will be taken forward as a Nationally Significant Infrastructure Project (NSIP) will be known as the Immingham Eastern Ro-Ro Terminal.

The proposed development

The site for the proposed new Terminal, lies within the eastern sector of the Port. The landside works fall within the administrative boundary of North East Lincolnshire Council whilst that part of the Project which extends seaward and falls beyond the local authority's boundary will take place in the bed of the Humber Estuary which is owned by the Crown Estate and over which ABP in its capacity as the Humber Conservancy Commissioner has the benefit of a long lease.

It is anticipated that the marine works will comprise a number of distinct components, which in brief will comprise:

- An approach jetty from the shore;
- A linkspan with bankseat;
- Two floating pontoons with guide piles or articulated restraint arms;
- Two separate finger piers with two berths each, one either side with the stern ramps of the ships resting upon two floating pontoons;
- A capital dredge of the new berth pocket; and
- Disposal of dredged material at sea.

It is anticipated that the landside works will consist of the following:

- The utilisation of existing cargo storage areas within ABP's port estate immediately adjacent to where the finger pier is attached to the land. These areas will be required to accommodate the throughput of the Ro-Ro cargo as it is either waiting to be embarked or awaiting pick-up after being disembarked;
- A number of terminal buildings will be constructed to provide appropriate facilities for lorry drivers and passengers. A small office, workshop and gatehouse may also be required; and
- An internal bridge will need to be constructed within the port estate to cross over an adjacent access road and ABP managed rail track.

Key consents

The proposed development will require a number of consents, including:

- In view of the potential throughput capacity of 800,000 units per year , the Project will be promoted as an NSIP under the provisions of the Planning Act 2008. As such, ABP will be submitting to the Secretary of State for Transport an application for a Development Consent Order (DCO) for authority to develop the proposed development;
- ABP has statutory powers to dredge in the Humber Estuary under the Humber Conservancy Act 1905; but
- ABP will also be applying to the marine licensing authority (the Marine Management Organisation (MMO)) for a deemed marine licence, to be included as part of the DCO, under the provisions of the Marine and Coastal Access Act 2009, to undertake certain parts of the development which will fall below mean low water springs (MLWS).

Environmental assessment

It is the Applicant's view that the Immingham Eastern Ro-Ro Terminal Project will require an Environmental Impact Assessment (EIA) in compliance with the provisions of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended). An Environmental Statement (ES) will, therefore, be prepared to document all of the relevant EIA information.

This Scoping Report has been prepared to support the request for a Scoping Opinion as to the proposed approach to the information to be provided in the ES.

A comprehensive review of the likely significant effects of the Project has been undertaken so as to identify, for the purposes of this Scoping Request, the potential topics for assessment.

This has involved undertaking an initial review of the baseline environmental conditions, identifying the key potential impacts that might arise during the construction and operational phases of the Immingham Eastern Ro-Ro Terminal Project and outlining the further work that will be required to determine the significance of any potential impacts. An initial consideration of mitigation options has also been undertaken in advance of further assessment at this stage.

In summary, the following EIA topics are proposed to be scoped into the EIA for the Immingham Eastern Ro-Ro Terminal Project:

- Physical processes;
- Water and sediment quality;
- Nature conservation and marine ecology;
- Commercial and recreational navigation;
- Coast protection, flood defence and drainage;
- Ground conditions, including land quality;

- Air quality;
- Airborne noise and vibration;
- Marine archaeology;
- Socio-economic receptors;
- Traffic and transport;
- Land use planning and human health; and
- Climate change.

The topics that are proposed to be scoped out of the EIA are as follows:

- Terrestrial ecology; and
- Landscape/seascape and visual impact.

Contents

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1 Note on European Union Withdrawal

1.1.1 The United Kingdom (UK) is no longer a member of the European Union (EU). EU legislation, as it applied to the UK on 31 December 2020, is now a part of UK domestic legislation, under the control of the UK's Parliaments and Assemblies, and is published on legislation.gov.uk.

1.1.2 Some types of EU legislation such as Regulations and Decisions, are directly applicable as law in an EU Member State. This means that, as a Member State, these types of legislation applied automatically in the UK, under section 2(1) of the European Communities Act 1972 (c.68), without any further action required by the UK. These types of legislation are published by the Publications Office of the European Union on the EUR-Lex website. This legislation is now published on legislation.gov.uk as 'legislation originating from the EU'.

1.1.3 Other types of EU legislation, such as Directives, are indirectly applicable, which means they require a Member State to make domestic implementing legislation before becoming law in that State. In the UK this was often achieved by making Statutory Instruments rather than passing primary legislation. This implementing legislation has always been published on legislation.gov.uk.

1.1.4 EU legislation which applied directly or indirectly to the UK before 11.00 p.m. on 31 December 2020 has been retained in UK law as a form of domestic legislation known as 'retained EU legislation'. This is set out in sections 2 and 3 of the European Union (Withdrawal) Act 2018 (c. 16). Section 4 of the 2018 Act ensures that any remaining EU rights and obligations, including directly effective rights within EU treaties, continue to be recognised and available in domestic law after exit.

1.1.5 References to applicable EU Directives as well as relevant UK legislation are provided in each of the EIA topic chapters of this Scoping Report and will also be referred to in the ES.

2 Introduction

2.1 Project background

2.1.1 Associated British Ports (ABP), the owner and operator of the Port of Immingham is proposing to construct a new roll-on/roll-off (Ro-Ro) facility within the Port. It is designed to service the embarkation and disembarkation of principally commercial and automotive traffic, possibly with provision for a small element of passenger use during quiet periods. The proposed development will involve marine works within the Humber Estuary and landside works on the existing port estate.

2.1.2 On the marine side, the proposed development will comprise the construction of a new four-berth Ro-Ro jetty whilst on the landside, within the statutory port estate – all of which is within the freehold ownership of the applicant – ABP will make provision for an area of unit load/vehicle storage together with a number of terminal buildings and an internal site bridge which will cross over existing port infrastructure, including an ABP controlled railway track.

2.1.3 The proposed development, which will be taken forward as a Nationally Significant Infrastructure Project (NSIP) will be known as the Immingham Eastern Ro-Ro Terminal. The location of the proposed development is shown in Figure 1.

The proposed development

2.1.4 The site for the proposed Immingham Eastern Ro-Ro Terminal, lies within the eastern sector of the Port, as illustrated in Figure 1. The landside works fall within the administrative boundary of North East Lincolnshire Council whilst that part of the proposed development which extends seaward and falls beyond the local authority's boundary will take place in the bed of the Humber Estuary which is owned by the Crown Estate and over which ABP in its capacity as the Humber Conservancy Commissioner has the benefit of a long lease.

Figure 1. Location of Immingham Eastern Ro-Ro Terminal

Marine infrastructure works

2.1.5 It is anticipated that the marine works will comprise a number of distinct components (Figure 2), which in brief will comprise:

- An approach jetty from the shore;
- A linkspan with bankseat;
- Two floating pontoons with guide piles or articulated restraint arms;
- Two separate finger piers with two berths each, one either side with the stern ramps of the ships resting upon two floating pontoons;
- A capital dredge of the new berth pocket; and
- Disposal of dredged material at sea if no beneficial alternative can be identified.

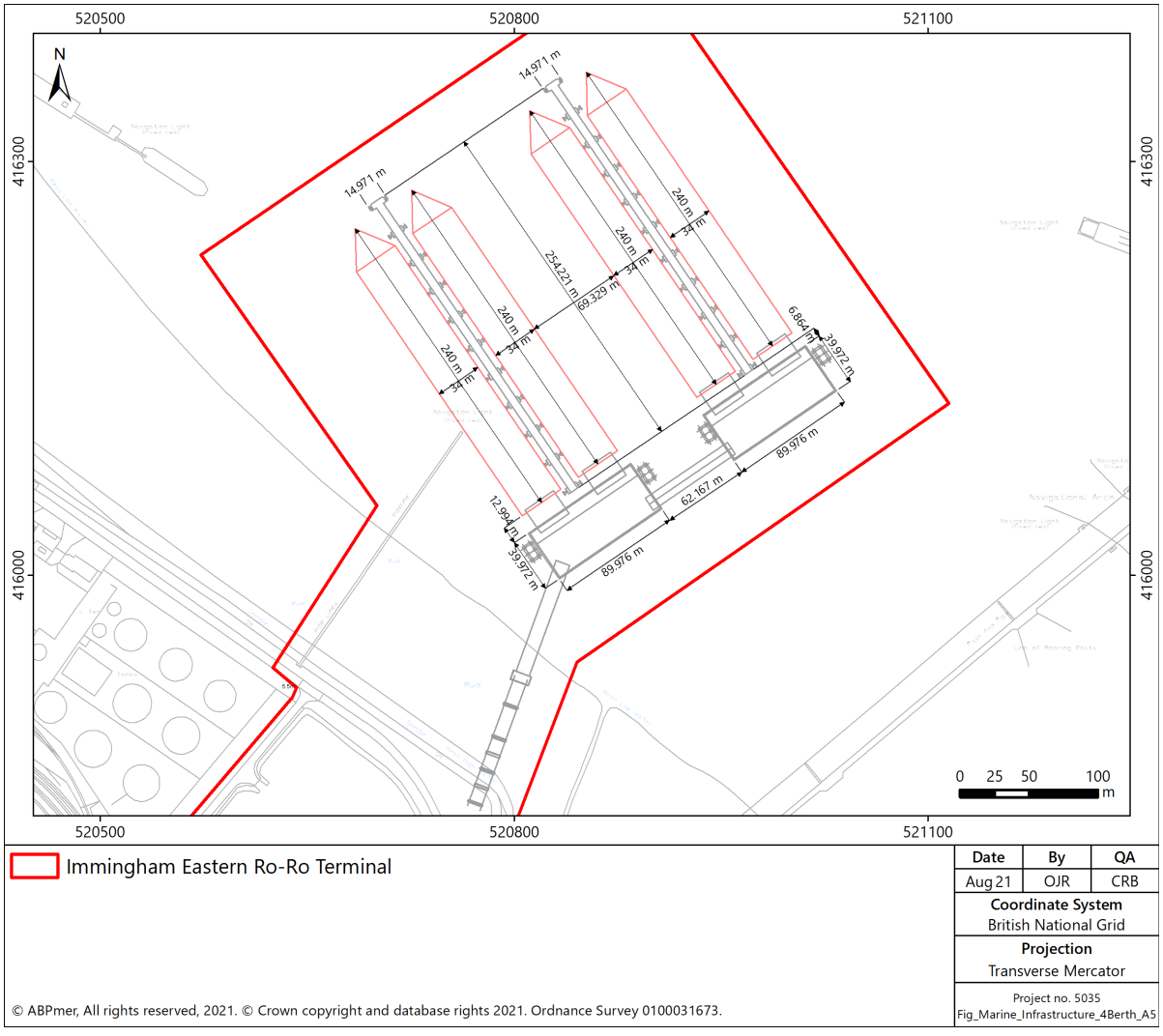


Figure 2. Layout of proposed marine works at Immingham Eastern Ro-Ro Terminal

Landside infrastructure works

2.1.6 It is anticipated that the landside works (Figure 3) will consist of the following:

- The utilisation of existing cargo storage areas within ABP's port estate immediately adjacent to where the finger pier is attached to the land as shown on Figure 3 – the areas coloured grey. These areas will be required to accommodate the throughput of the Ro-Ro cargo as it is either waiting to be embarked or awaiting pick-up after being disembarked;
- A number of terminal buildings will be constructed to provide appropriate facilities for lorry drivers and passengers. A small office, workshop and gatehouse may also be required; but
- An internal bridge will need to be constructed within the port estate to cross over an adjacent access road and ABP managed rail track.

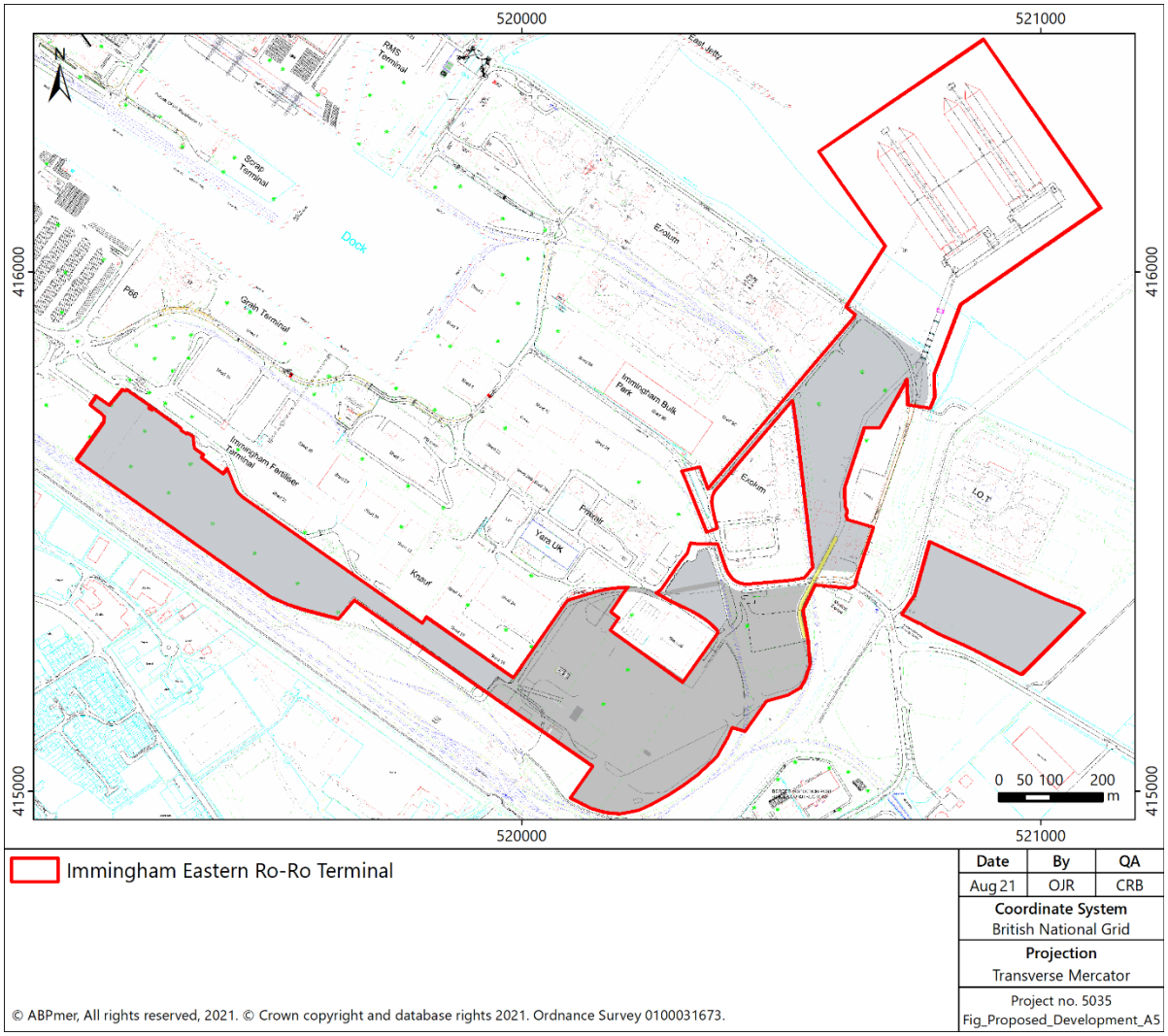


Figure 3. Layout of proposed landside works at Immingham Eastern Ro-Ro Terminal

Key consents

2.1.7 The proposed development will require a number of consents, including:

- In view of the potential throughput capacity, (see below Section 4.1), the Immingham Eastern Ro-Ro Terminal will be promoted as an NSIP under the provisions of the Planning Act 2008. As such, ABP will be submitting to the Secretary of State for Transport an application for a Development Consent Order (DCO) for authority to develop the proposed development;
- ABP has statutory powers to dredge in the Humber Estuary under the Humber Conservancy Act 1905; and
- ABP will also be applying to the marine licensing authority (the Marine Management Organisation (MMO)) for a deemed marine licence, to be included as part of the DCO, under the provisions of the Marine and Coastal Access Act 2009, to undertake certain parts of the development which will fall below mean low water springs (MLWS).

Environmental assessment

2.1.8 The Immingham Eastern Ro-Ro Terminal constitutes Schedule 1 development (see Section 4.5) within the terms of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (the EIA Regulations). As a consequence, the project comprises "*EIA development*" as defined by the EIA Regulations.

2.1.9 Regulation 14(1) of the EIA Regulations provides that -

> *"An application for an order granting development consent for EIA development must be accompanied by an environmental statement".*

2.1.10 Regulation 10 of the EIA Regulations provides that –

> *"A person who proposes to make an application for an order granting development consent may ask the Secretary of State to state in writing their opinion as to the scope, and level of detail, of the information to be provided in the environmental statement".*

2.1.11 A formal request under the provisions of Regulation 10 asking the Secretary of State for a Scoping Opinion was given to the Planning Inspectorate (PINS) on Thursday 19 August 2021

2.2 Purpose of report

2.2.1 This report is being submitted to PINS under the provisions of Regulation 10 of the EIA Regulations to support the request for a Scoping Opinion. When issued, the Opinion will assist in informing the information that will be provided in the Environmental Statement (ES).

2.2.2 ABPmer has co-ordinated the preparation of this Scoping Report with the assistance of the specialist consultants (see Section 5.2).

2.2.3 In accordance with Regulation 10 of the EIA Regulations, the report includes the following:

- A plan which identifies the land that is the subject of the proposal (reg. 10(3)(a)) – see Figure 1 and Figure 2;
- A description of the proposed development, including its location and technical capacity (reg. 10(3)(b)) – see Section 3 of this Scoping Report;
- An explanation of the likely significant effects of the development on the environment (reg. 10(3)(c)) – see Section 6 and 7 of this Scoping Report; and
- Such other information or representations as the person making the request may wish to provide (reg. 10(3)(d)) – see the full report.

2.3 Report structure

2.3.1 The structure of this report is as follows:

- **Section 1**: **Note on European Union Withdrawal:** Provides information on the application of EU legislation in UK following the UK's withdrawal from the EU.
- **Section 2:** **Introduction:** Brief project background, purpose of report and report structure.
- **Section 3:** **Project Description:** Information on the site and its surroundings, the project need and consideration of alternatives, and description of the proposed development.
- **Section 4:** **Legislative and Consenting Framework:** Sets out the principal consents/approvals and studies that are likely to be required.
- **Section 5:** **Proposed EIA Methodology:** Presents the proposed content and structure of the ES and the impact assessment methodology.
- **Section 6:** **Scoping Review:** Reviews the scope of potential impacts and further assessment work required for each of the EIA topics.
- **Section 7:** **Summary:** Provides a summary of the EIA topics, receptors and impact pathways that require further assessment work.

3 Project Description

3.1 The proposed development site and surroundings

3.1.1 The Port of Immingham lies immediately adjacent to the main deep-water shipping channel which serves the Humber Estuary. This means that the Port is able to accommodate and service some of the largest vessels afloat today. The Port is also well located for onward/inward transport of goods by road throughout the UK. It is easily accessible for road haulage from the M180 Motorway, and from there to the M1 or the A1, via the M18 and has the added benefit of its own rail terminal – some 25 % of all rail freight in the UK originates from the Port of Immingham.

3.1.2 The Port comprises a number of discrete operational areas, with bulk commodities such as liquid fuels, solid fuels and ores, as well as Ro-Ro freight, being handled from in-river jetties. These include the Eastern and Western Jetties, the Immingham Oil Terminal (IOT), the Immingham Gas Terminal, Immingham Outer Harbour (IOH) and the Humber International Terminal (HIT). Many parts of the Port are regulated by the HSE under the Control of Major Accident Hazards (COMAH) Regulations (2015) because of the inventories of hazardous materials that may be present. Other traffic and commodities including lo-lo freight, animal feed and grain are handled mainly at berths within the Port's internal dock and are then discharged to an array of storage compounds for onward distribution.

3.2 Project need and alternatives

3.2.1 The ES will include a chapter which will explain the need for the Project. The chapter will also identify the reasonable alternatives that have been considered by ABP with an explanation as to why the Immingham Eastern Ro-Ro is the preferred option.

3.2.2 It is currently envisaged that the topics of need and alternatives will be dealt with in a single chapter, split into two parts. When finalising the ES, however, it may prove to be of benefit for the two topics to be divided into two separate chapters.

3.2.3 Consideration of the need for the Project will be set in the context of the Government's assessment of the need for new port infrastructure as detailed within the National Policy Statement for Ports (NPSfP). In particular, the chapter on need will explain the rationale for the demand for the type of capacity which will be provided by the Project, the reasons why the development is proposed in a location which the market considers is needed to meet operational requirements and how the proposed development will contribute to effective competition and resilience in port operations.

3.2.4 In summary, the rationale for the proposed development is based on the requirement to deliver additional port infrastructure at the Port of Immingham – a facility of recognised national importance – to provide needed capacity, competition and resilience for the North-Sea Ro-Ro trade.

3.2.5 The respective chapters in the final ES will identify the alternatives to the proposed development that have been considered by ABP, including the option of "doing nothing". In addition, they will set out the legislative and policy context against which the consideration of alternatives has taken place and in particular, how it has been guided by the principles contained within Section 4.9 of the NPSfP.

3.2.6 In this context, it is noted that paragraph 4.9.3 of the NPSfP provides that, where –

"there is a legal requirement to consider alternatives, the applicant should describe the alternatives considered in compliance with these requirements". It further makes clear that – "the decision-maker should, subject to any relevant legal requirements ……. which may indicate otherwise, be guided by the following principles when deciding what weight should be given to alternatives:

- The consideration of alternatives in order to comply with policy requirements should be carried out in a proportionate manner;
- Whether there is a realistic prospect of the alternative delivering the same infrastructure capacity (including energy security and climate change benefits) in the same timescale as the proposed development;
- The decision-maker should not reject an application for development on one site simply because fewer adverse impacts would result from developing similar infrastructure on another suitable site, and it should have regard as appropriate to the possibility that other suitable sites for port infrastructure of the type proposed may be needed for future proposals;
- Alternatives not among the main alternatives studied by the applicant (as reflected in the ES) should only be considered to the extent that the decision-maker thinks they are both important and relevant to its decision;
- If the Infrastructure Planning Commission (IPC), which must (subject to the exceptions set out in the 2008 Act) decide an application in accordance with the relevant National Policy Statement (NPS), concludes that a decision to grant consent to a hypothetical alternative proposal would not be in accordance with the policies set out in this NPS, the existence of that alternative is unlikely to be important and relevant to the IPC's decision;
- Suggested alternative proposals which mean the primary objectives of the application could not be achieved, for example because the alternative proposals are not commercially viable or alternative proposals for sites would not be physically suitable, can be excluded on the grounds that they are not important and relevant to the decision;

- It is intended that potential alternatives to a proposed development should, wherever possible, be identified before an application is made in respect of it (so as to allow appropriate consultation and the development of a suitable evidence base in relation to any alternatives which are particularly relevant). Where, therefore, an alternative is first put forward by a third party after an application has been made, the person considering that application may place the onus on the person proposing the alternative to provide the evidence for its suitability as such, and the applicant should not necessarily be expected to have assessed it."

3.3 Proposed development

Marine works

Marine infrastructure

3.3.1 In brief, the proposed marine works will consist of:

- An open piled approach jetty which will extend from the river frontage in a northerly direction and which will terminate at a bankseat;
- The bankseat will be designed to act as a strong fixed point within the entire structure held in place by a nest of piles which will act as a foundation for a hinged linkspan (link bridge);
- The linkspan will be a single structure which will span the distance between the bankseat and first floating pontoon. Its free end will rest upon the edge of the floating pontoon and its length will be optimised to ensure that vehicular accessibility from and to the berthed ro-ro vessels to the pontoon deck can be maintained at all states of the tide;
- The most southerly floating pontoon will provide a horizontal resting point for the stern ramps of the berthed ships which will moor by the stern. The pontoon will be secured in place via a guide pile and collar arrangement or articulated restraint arm infrastructure to ensure that it can freely range up and down with the tide;
- Positioned roughly centrally to the floating pontoon and extending away from it in a north westerly direction will be an open piled finger pier. This will be lined with fender panels and equipped with mooring infrastructure so that vessels can be secured either side by standard bollards or quick release hooks which will hold the vessel mooring lines;
- The pontoon and finger pier arrangement described above will be directly replicated to the north in order to provide berthing infrastructure for two additional vessels;
- The two floating pontoons will be linked with another linkspan which will hinge on one of the pontoons with the free end resting on the other;
- A capital dredge will be required to ensure accessibility and safe mooring for vessels at all states of the tide. It is currently envisaged, (see below), that the required depth will be 9 m -CD; and
- The dredge berth pocket will be optimised to include side slopes so as to ensure its stability and it is envisaged that the dredged arisings,

comprising of alluvial and glacial materials, will be disposed at licensed sites within the estuary.

Capital dredge

3.3.2 The proposed development will require a capital dredge of the new berthing area. The maximum spatial extent of the dredge is approximately 90,000 m², dredged into existing bathymetry which varies across the area between 4.6 m above chart datum (CD) to 9 m below CD. The berthing area with side slopes will be dredged to a maximum of 9 m below CD, including allowance for overdredge. The area beneath the floating pontoon will be dredged to 5 m below CD. In real terms this represents a maximum deepening of 11.5 m over a small area, with an average lowering of 4 m. The location of the dredge area is shown on Figure 4.

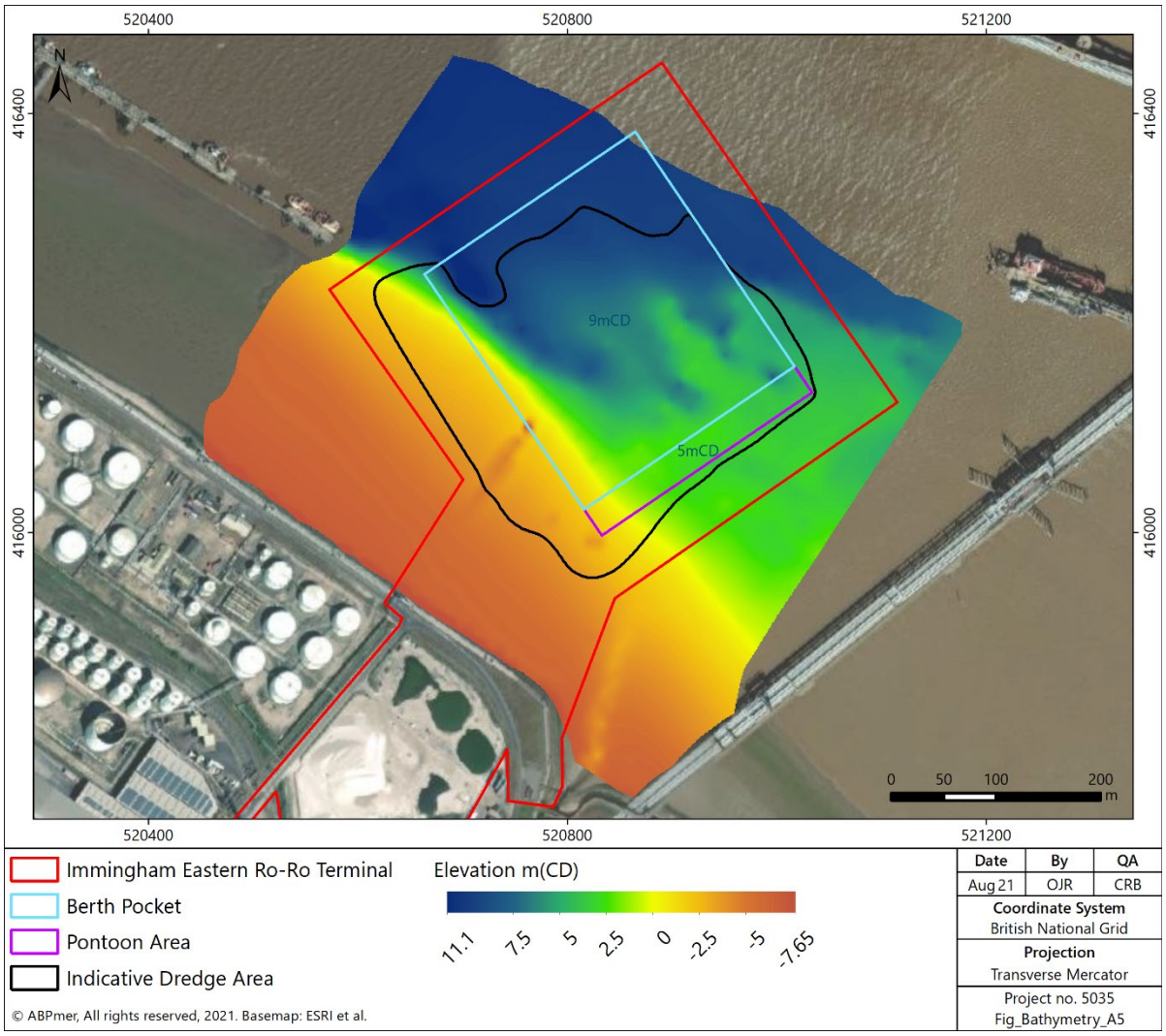


Figure 4. Indicative area of capital dredge

3.3.3 It is estimated that about 330,000 m³ of material in total will be removed. This constitutes approximately 20,000 m³ of boulder clay, alongside 310,000 m³ of sand/silt (alluvium) *in situ*. This is a preliminary estimate that will be confirmed from further geotechnical data.

Disposal of dredge material

3.3.4 At this stage in the process, it is not considered that the dredge material (being predominantly silt and clay) will be of a quality suitable for alternative beneficial use, such as for the purpose of construction/reclamation infill by reason of its low potential bearing capacity either on land or within the marine environment. In addition, no material will be required for infill for the project nor, as far as the applicant is currently aware, for any other project in the locality. The only possible use might be for habitat enhancement in the estuary (i.e. recharge), should such a scheme become available. Even then, the dredge material would have to be of a quality suitable for such use whilst also being consistent with the conservation objectives of the estuary. As far as the applicant is aware, no such scheme exists at present, although the position with regard to all options will be carefully monitored as the project evolves.

3.3.5 In light of the above, at present disposal within the estuary would appear to be the only available option subject to the dredge material being deemed suitable for disposal at sea by the MMO and the Centre for Environment, Fisheries and Aquaculture Science (Cefas).

3.3.6 It is estimated that about 20,000 m³ of boulder clay, alongside 310,000 m³ of sand/silt (alluvium) *in situ* is likely to require disposal in the estuary. At present, it is envisaged that the disposal site HU056 (Holme Channel) will be used to dispose of inerodible clay material, and HU060 (Clay Huts) will be used to dispose of sand/silt (alluvium) material. This is based on the proximity of those sites to the proposed development, and their suitability and capacity to receive the dredge material. The identified sites, and indeed any other disposal options, will be fully assessed as part of the consenting process.

Landside works

3.3.7 On the landside, ABP will be making provision, within the port estate and immediately adjacent and to the south of the location of the landed linkspan, for an area to accommodate trailer and container parking and storage. Being part of the statutory port estate, the vast majority of the site will only require a simple upgrade, relocating existing port infrastructure, to provide open parking/storage space, although some peripheral areas of softer ground may require additional ground works in terms of hard surfacing.

3.3.8 The terminal area will be fully fenced to comply with International Ship and Port Facility (ISPF) criteria and will also require adequate lighting, which again in most areas will simply represent a replication of lighting and infrastructure already present within the port estate.

3.3.9 A number of small terminal buildings will be provided as noted above. These will rest upon either piled foundations (precast concrete piles) or ring-beam foundations as it is anticipated that the ground conditions will not be suitable for a simple floating raft foundation. The buildings themselves will not exceed two storeys in height and will probably resemble the style of buildings prevalent on the port estate in that they will comprise steel portal frames with steel cladding. Additional high masts will also be required in some areas of the proposed development.

3.3.10 It is envisaged that a bridge or a flyover structure will be required to ensure contiguous terminal operations between the currently separate northern and southern storage areas. The flyover is likely to be constructed from steel sections and at its highest point, spanning Robinson Road and some in dock railway sidings, will be designed to normal highway standards.

3.3.11 Access to and from the proposed development will be achieved via remotely operated barriers. Rather than operate a gatehouse system, it is envisaged that when drivers report in, they will park in a safe area and walk on foot to a gatehouse with paperwork to be processed rather than cause congestion at the main entrance.

Construction methodology

Marine works

3.3.12 In the marine environment the static structures will rest upon an open piled network of steel tubular piles. In driving these piles a four step process is envisaged involving vibro- and percussive piling techniques. The floating pontoons and linkspan structures will be fabricated off site and floated and/or craned into position respectively. The exact construction methodology for the marine works is being developed.

3.3.13 The exact capital dredge methodology has not yet been determined for this project and a comprehensive programme of optioneering will be undertaken in order to determine the best method for this dredge. The majority of the material *in situ* is likely to be firm with an average density of *circa* 1,350 kg/m³ at the surface with the density increasing with depth. One of the options being considered is that material will be removed via backhoe. Some material may also be removed by trailer suction hopper dredger (TSHD) where possible.

Landside works

3.3.14 On the landside, it will be necessary to establish the new terminal surface. Whilst this does, in the main, simply represent an upgrade to existing infrastructure some ground works are likely to be required (as described above). The exact construction methodology for the landside works is being developed.

Construction programme

3.3.15 It is envisaged that construction works will start in Summer 2023 and will have been largely completed by mid-2025.

4 Legislative and Consenting Framework

4.1 The Planning Act 2008

4.1.1 As explained in Section 1 of this Scoping Request, the Immingham Eastern Ro-Ro Terminal comprises on the marine side, the construction of an approach jetty with two separate finger piers offering the capability of two berths each, and t on the land side, the provision of waiting areas to accommodate the Ro-Ro cargo together with a number of Terminal buildings.

4.1.2 The new Terminal, which will support principally the embarkation and disembarkation of commercial and automotive traffic, will be capable of handling, with four berths, some 800,000 units per year. As such, the Project constitutes an NSIP under the provisions of the Planning Act 2008 (the "PA 2008").

4.1.3 Section 14 of the PA 2008 identifies the "*construction or alteration of harbour facilities*" as an NSIP if, as provided by section 24 of the PA 2008, the Project comprises –

a) The "alteration of harbour facilities" – (section 24 (2));

b) "*wholly …… in England"* – (section 24 (a)); and

c) "the effect of the alteration is expected to be to increase by at least the relevant quantity per year the quantity of material the embarkation or disembarkation of which the facilities are capable of handling" – (section 24(2)(b)); where

d) "the relevant quantity is … in the case of ro-ro ships, 250,000 units" – (section 24(3)(b)).

4.1.4 In light of the above, the proposed development constitutes an NSIP the development of which can only be authorised by the granting of a DCO under section 37 of the PA 2008.

4.1.5 Section 104 of the PA 2008 provides that determining an application for a DCO, the Secretary of State must have regard to, amongst other things, any relevant national policy statement and decide the application in accordance with any such national policy statement. For the purpose of this Project, the relevant national policy statement is the National Policy Statement for Ports (NPSfP) (Department for Transport (DfT), 2012) as noted in Section 4.6 below. A detailed discussion, placing the Project in the context of the NPSfP will be provided within the ES.

4.1.6 The Project will require a range of consents and approvals under different enabling and authorising legislative provisions, supported by comprehensive technical and environmental investigations to inform the necessary environmental assessment work. The principal consents/approvals and studies that are likely to be required, along with key policies and documents that are relevant to the principle of the proposed development, are summarised in the following sections. A full explanation of relevant policy and legislation will be provided in the ES. In addition, each specialist chapter of the ES will reference such legislation and policy as is relevant to the given topic areas being assessed.

4.2 Marine licence

4.2.1 The Marine and Coastal Access Act 2009 (MCAA) is the principal legislation which regulates, through the regulator, the Marine Management Organisation (MMO), the requirement to obtain marine licences for works undertaken below mean high water springs (MHWS), including removals and deposits at sea.

4.2.2 Section 149A of the PA 2008 provides that a DCO may include provisions which enable a marine licence to be deemed to be issued under Part 4 of the MCAA.

4.2.3 The applicant will, therefore, be seeking a deemed marine licence, in consultation with the MMO, which will cover those works that impact upon the marine environment, specifically the:

- Construction of two jetties and associated fixed structures to the seabed;
- New berthing for Ro-Ro cargo (i.e. cars and vehicles), including the berth pocket;
- Capital dredge works; and
- Disposal of capital dredge material at HU056 (Holme Channel) and HU060 (Clay Huts).

4.2.4 The additional maintenance dredge and disposal requirements that will result from the capital dredge works for the Immingham Eastern Ro-Ro Terminal (see Section 3.2) will require a variation to the existing marine licence for the disposal of maintenance dredge material from the Port of Immingham (L/2014/00429/2). The potential environmental impacts associated with the additional maintenance dredge and disposal requirements from the Immingham Eastern Ro-Ro Terminal will be assessed in the ES.

4.2.5 Section 58(1) of the Marine and Coastal Access Act makes clear that, “A public authority must take any authorisation or enforcement decision in accordance with the appropriate marine policy documents, unless relevant considerations indicate otherwise.”

4.2.6 An outline of relevant aspects of appropriate current marine policy documents will be provided and issues addressed as necessary in the ES.

Local Act Powers

4.2.7 In this context, it should also be noted that ABP has statutory powers to dredge in the Humber Estuary under the Humber Conservancy Act 1905. At this stage, consideration is being given to the requisite consenting and approval process to be included within the DCO, with Protective Provisions being provided as appropriate.

4.3 Flood risk

4.3.1 Flood risk activities are regulated under the Environmental Permitting (England and Wales) Regulations 2016. Flood risk activity permits are required for works in, over, under or near a main river or flood defence (including a sea defence), or within a flood plain.

4.3.2 Exclusions for a flood risk activity permit include circumstances when an application has been made for a marine licence. The exclusion must be agreed in writing by the regulator and the requirements of an environmental permit for a flood risk activity must be fulfilled by, in the case of this Project, the deemed marine licence.

4.3.3 A flood risk assessment (FRA) will be prepared to accompany the DCO application. This assessment will consider both the flood risk to the proposed development and the implications of the development for flooding elsewhere. The FRA will be provided as an appendix to the submitted ES. The outputs of the FRA will inform the Project ES chapter for the coastal defence, flood risk and drainage topic.

4.4 Protected species licence

4.4.1 Various species of marine animal are protected from being killed, injured or disturbed under provisions in the Conservation of Habitats and Species Regulations 2017 (as amended) (commonly referred to as the Habitats Regulations)[1] and Section 9(4) and Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). Regulation 43 of the Habitats Regulations makes it an offence deliberately to disturb wild animals of any species that are subject to European protection in such a way as to be likely to impair their ability:

- "To survive, to breed or reproduce, or to rear or nurture their young; or
- In the case of animals of a hibernating or migratory species, to hibernate or migrate; or

[1] These have been modified by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019. Available at: https://www.legislation.gov.uk/uksi/2019/579/contents/made (accessed July 2021).

- To affect significantly the local distribution or abundance of the species to which they belong".

4.4.2 Section 9(4) of the Wildlife and Countryside Act 1981 (as amended) makes it an offence intentionally or recklessly to disturb dolphins, whales or basking sharks subject to prescribed statutory defences.

4.4.3 As part of this Scoping Request, ABP seeks the advice of the regulator as to the need for any protected species licences.

4.5 Assessment requirements

4.5.1 The following sections summarise the assessments and documentation that it is considered will be required to support the DCO application.

Environmental Impact Assessment

4.5.2 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the "EIA Regulations") set out the procedure that must be followed before approval is granted for a range of plans and projects.

4.5.3 An EIA is mandatory for Schedule 1 projects. The Immingham Eastern Ro-Ro Terminal is considered to be a Schedule 1 project given that it falls within Schedule 1 paragraph 8(2), namely –

"Trading ports, piers for loading and unloading connected to land and outside ports (excluding ferry piers) which can take vessels of over 1,350 tonnes".

4.5.4 The ES which will accompany the application for a DCO will document all of the relevant EIA information as prescribed by the EIA Regulations.

Marine Plan and Planning Policy Conformance Assessment

4.5.5 The UK Marine Policy Statement (HM Government, 2011) contributes to the achievement of sustainable development in the UK marine area. Prepared under Section 44 of the MCAA, it provides the framework for the preparation of Marine Plans and informing decisions affecting the marine environment. It ensures that marine resources are used in a sustainable way in line with marine objectives thereby:

- Promoting sustainable economic development;
- Enabling the UK's move towards a low-carbon economy, in order to mitigate the causes of climate change and ocean acidification and adapt to their effects;
- Ensuring a sustainable marine environment which promotes healthy, functioning marine ecosystems and protects marine habitats, species and our heritage assets; and

- Contributing to the societal benefits of the marine area, including the sustainable use of marine resources to address local social and economic issues.

4.5.6 The Immingham Eastern Ro-Ro Terminal lies within the area covered by the East Inshore Marine Plan, published in April 2014 by the Department for Environment, Food and Rural Affairs (Defra, 2014).

4.5.7 A marine plan conformance assessment will be produced to support the deemed marine licence application for the Project. This will provide a review of the proposed development against the vision, objectives and policies of the East Inshore Marine Plan. This marine plan conformance assessment will be informed by the information provided in the ES.

Habitats Regulations Assessment

4.5.8 Part 6 of the Habitats Regulations requires the Competent Authority to determine whether the proposed development has the potential for a likely significant effect (LSE) on a European Site and, if so, to undertake an Appropriate Assessment (AA) of the implications of the proposals in light of the site's conservation objectives. The AA takes account of the in-combination effects of the proposal on the protected areas in association with other relevant projects and plans.

4.5.9 The entire Humber Estuary is designated as a Special Area of Conservation (SAC) and a Special Protection Area (SPA) under the Habitats and Birds Directive. It is also classified as a 'Ramsar site' under the Ramsar Convention due to the presence of internationally important wetlands. These designations form the Humber Estuary European Marine Site (EMS). Given that the Immingham Eastern Ro-Ro Terminal falls within these designated sites, ABP is of the view that the it will trigger the requirement for a Habitats Regulations Assessment (HRA).

4.5.10 The legal process that needs to be followed for an HRA is very clearly laid out. In simple terms, it will be pursued in three key stages. The first stage (Stage 1: Screening) will determine if the proposed development is either directly connected with or necessary to the management of a European/Ramsar site. The second stage (Stage 2: Test of Likely Significant Effect (LSE)) will confirm if the Project has the potential to result in an LSE on a European/Ramsar site and, therefore, there is a need to progress to the next stage of the HRA. Stage 3 (Appropriate Assessment) will provide the evidence required on whether the proposed development has the potential to result in an adverse effect on integrity (AEOI) on any European/Ramsar site either alone or in-combination with other plans and projects.

4.5.11 In accordance with the latest available guidance for undertaking HRAs, information will be provided to enable the competent authority to undertake an AA, assessing the effects of the proposed development on the features

for which the sites are designated. This will be provided as an appendix to the submitted ES.

Water Framework Directive assessment

4.5.12 The Water Framework Directive (WFD) (2000/60/EEC) establishes a framework for the management and protection of Europe's water resources. It is implemented in England and Wales through the Water Environment (WFD) (England and Wales) Regulations 2017, known as the Water Framework Regulations[2].

4.5.13 The overall objectives of the WFD as implemented by the Water Framework Regulations is to achieve "good ecological and good chemical status" in all inland and coastal waters by 2021 unless alternative objectives are set or there are grounds for time limited derogation.

4.5.14 To support the DCO application, a WFD assessment will be required to determine whether the proposed development complies with the objectives of the WFD. This will be undertaken in two stages; an initial screening/scoping stage to review the potential for the proposed development to cause a 'deterioration' or failure of the water body to meet its WFD objectives, followed by a full assessment if required. A full WFD assessment will consider the potential implications of the proposed development on the achievement of 'good' status within adjacent WFD water bodies. This information will be provided as an appendix to the ES following the format specified in the latest Environment Agency 'Clearing the Waters for All' guidance.

Waste Hierarchy Assessment

4.5.15 Waste policy and, consequently, the Waste Hierarchy Assessment (WHA) are strongly governed by the waste hierarchy set out in Article 4 of the Waste Framework Directive (2008/98/EC). The waste hierarchy ranks waste management options according to what is best for the environment and comprises the following in order of most to least favoured (top to bottom):

- Prevention;
- Re-use;
- Recycle;
- Other recovery; and
- Disposal.

4.5.16 The waste hierarchy places emphasis on waste prevention or minimisation of waste, followed where possible by re-use of the material.

[2] Following the UK leaving the EU, the main provisions of the WFD have been retained in English law through the Floods and Water (Amendment etc.) (EU Exit) Regulations 2019. Available at: https://www.legislation.gov.uk/uksi/2019/558/contents/made (accessed January 2021).

4.5.17 A WHA will be prepared to determine the Best Practical Environmental Option (BPEO) for dealing with the dredge arisings. As noted above, this assessment will involve an evaluation of the dredge and disposal methods likely to be available.

4.5.18 The impacts of any waste generated by the landside works will also be fully evaluated as part of the EIA.

Navigational Risk Assessment

4.5.19 A Navigational Risk Assessment (NRA) will be provided to support the DCO application for the Project Navigational risk will require consideration by the Harbour Authority in its role as the Statutory Harbour Authority (SHA). A hazard observation workshop will be held to bring together relevant navigational stakeholders for the area to discuss the potential impacts on navigational safety associated with the proposed development. The NRA will establish how the phases of the project are managed to a point where risk is reduced and considered to be 'as low as reasonably practicable' (ALARP). This is a requirement of the Port Marine Safety Code (PMSC), which is the UK standard for port marine safety. The NRA will be provided as an appendix to the ES. The outputs will inform the Project's ES chapter for the commercial and recreational navigation topic.

4.6 Policy context

National Policy Statement for Ports (NPSfP)

4.6.1 As already noted in this section, the NPSfP provides the framework for decisions on new port development NSIP proposals.

4.6.2 The NPSfP makes it clear that ports play an essential role in the UK economy, and that the UK ports sector is the largest in Europe. The application for the DCO will set the proposed development within the context of the NPSfP.

4.6.3 Section 4 of the NPSfP sets out a series of 'Assessment principles' with which decision makers should take account when considering port developments, whilst Section 5 sets out a series of 'Generic impacts' to assist applicants and decision makers in assessing and determining port developments. Regard will be had to this advice as necessary in the assessment of the project

UK Marine Policy Statement (2011)

4.6.4 The UK Marine Policy Statement provides the framework for preparing marine plans and is also key in respect of decisions affecting the marine environment.

4.6.5 The UK vision for the marine environment is set out in this policy statement as being “clean, healthy, safe, productive and biologically diverse oceans and seas” (paragraph 2.1.1).

4.6.6 Chapter 3 of the Marine Policy Statement sets out policy objectives for the key activities that take place in the marine environment, emphasising that these will be delivered through marine planning and decision making.

4.6.7 The Statement will be taken fully into account as part of the formulation of the Project application.

National Planning Policy Framework (2021)

4.6.8 The National Planning Policy Framework (NPPF), whilst not containing specific policies for NSIPs, may contain policies of relevance for a number of the topic assessment chapters that will be included in the submitted ES. Those NPPF policies will as a consequence be taken into account in the ES as appropriate.

North East Lincolnshire Local Plan 2013 to 2032

4.6.9 The site of the project is located largely within the administrative area of North East Lincolnshire, although elements of the marine infrastructure fall beyond the local Council’s administrative boundary.

4.6.10 As far as the Local Planning Authority is concerned, the North East Lincolnshire Local Plan was adopted in 2018 and covers the period 2013 to 2032.

4.6.11 Within its Spatial Portrait, the Local Plan highlights the importance of the ‘Estuary Zone’ of the local authority area, which includes the ‘nationally important port’ of Immingham. When considering the detail of how the economy of the area will be developed, the Plan specifically identifies at the outset that there are good expectations of growth within the ports and logistics sector.

4.6.12 On the policies map which accompanies the Local Plan, the site of the proposed project is shown as being located within an area identified as ‘Employment – Operational Port’. Policy 7 of the plan makes clear that:

> *“Operational Port areas*
>
> *3. Within the operational port areas identified on the Policies Map development proposals for port related use will be supported and, where appropriate, approved by the Council if the submitted scheme accords with the development plan as a whole and subject to the ability to satisfy the requirements of the Habitats Regulations.”*

East Inshore and East Offshore Marine Plans

4.6.13 The marine elements of the project are located within the East Inshore Marine Plan Area. The East Inshore Marine Plan (adopted in April 2014) sets out the approach to managing the East Inshore area, its resources and the activities and interactions that occur within the area.

4.6.14 The Plan identifies that the area contains the Humber estuary, which it describes as hosting the UK's busiest port cluster (paragraph 24 and paragraph 342).

4.6.15 It is recognised that the ports within the East Inshore area rely heavily on trade with Europe, servicing vessels that ply 'short-sea' routes (paragraph 343). The Plan further reiterates the position set out in the Marine Policy Statement that marine plan authorities and decision makers should take into account and seek to minimise any negative impact on shipping activity (paragraph 353), and in this regard the level of shipping levels within the East marine plan areas is identified as being nationally significant (paragraph 358).

4.6.16 To reflect this, Policy PS3 of the Plan makes clear that current activities and future opportunity for expansion of ports and harbours should not be interfered with, or that appropriate mitigation should be put in place to minimise such interference.

5 Proposed EIA Methodology

5.1 Further assessment content and structure

5.1.1 The ES which will accompany the DCO application will in addition include the requirements outlined in the EIA Regulations (Table 1).

Table 1. ES requirements according to the Infrastructure Planning (EIA) Regulations (Schedule 4)

Schedule Reference	Requirements for ES
1	A description of the project, including in particular:
	a) A description of the location of the development.
	b) A description of the physical characteristics of the whole development, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases.
	c) A description of the main characteristics of the operational phase of the development (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity).
	d) An estimate, by type and quantity, of expected residues and emissions such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities and types of waste produced during the construction and operation phases.
2	A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.
3	A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.
4	a) A description of the factors specified in regulation 5(2) likely to be significantly affected by the development: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.

Schedule Reference	Requirements for ES
5	A description of the likely significant effects of the development on the environment resulting from, inter alia:
	a) The construction and existence of the development, including, where relevant, demolition works;
	b) The use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources;
	c) The emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste;
	d) The risks to human health, cultural heritage or the environment (for example due to accidents or disasters);
	e) The cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;
	f) The impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change;
	g) The technologies and the substances used.
5	The description of the likely significant effects should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development.
6	A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.
7	A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.
8	A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned.
9	A non-technical summary of the information provided under paragraphs 1 to 8.
10	A reference list detailing the sources used for the descriptions and assessments included in the environmental statement.

5.2 Impact assessment methodology

5.2.1 To facilitate the impact assessment process and ensure consistency in the terminology of significance, a standard assessment methodology will be applied where possible. This methodology has been developed from a range of sources, including the EIA Regulations, the EIA Directive (2014/52/EU), statutory guidance, consultations and ABPmer's previous (extensive) EIA project experience and is explained in the following sections. ABPmer has an IEMA Quality Mark (as does AECOM and Adams Hendry Consulting Ltd), demonstrating their commitment to excellence in leading the co-ordination of statutory EIAs in the UK. The Preliminary Environmental Information Report (PEIR) and ES will also follow the principles of relevant guidance, including:

- Advice notes published by PINS relating to EIA (e.g. Advice Note Seven: Environmental Impact Assessment: Preliminary Environmental Information, Screening and Scoping (Planning Inspectorate, 2020)) and topic-specific advice (e.g. Advice Note Seventeen: Cumulative effects assessment (Planning Inspectorate, 2019));
- Chartered Institute of Ecology and Environmental Management (CIEEM) guidelines for ecological impact assessment in the UK and Ireland (which consolidate advice for terrestrial, freshwater and coastal environments) (CIEEM, 2018);
- Institute of Environmental Management and Assessment (IEMA) Environmental Impact Assessment Guide to: Delivering Quality Development (IEMA, 2016);
- IEMA Guidelines for Environmental Noise Impact Assessment (IEMA, 2014);
- Institute of Air Quality Management (IAQM) guidance on the assessment of dust from demolition and construction (IAQM, 2014);
- Chartered Institute for Archaeologists' (CIfA) Standard and Guidance for Historic Environment Desk-Based Assessment (CIfA, 2014, updated 2020);
- Institute of Environmental Assessment (IEA) Guidance Note No 1 "Guidelines for the Environmental Assessment of Road Traffic" (IEA, 1993);
- IEMA Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA, 2017); and
- IEMA Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (IEMA, 2020).

5.2.2 It should be noted that certain EIA topics have a specific impact assessment methodology that follows recognised best-practice procedures. In these instances, topic-specific methodologies will be applied and these have been described where relevant in Section 5.

5.2.3 The effect of the proposed development on each of the environmental receptors will be assessed by describing in turn: the baseline environmental conditions of each receiving environment; the 'impact pathways' by which the receptors could be affected; the significance of the impacts occurring; and the measures to mitigate for significant adverse impacts where these are predicted.

5.2.4 This impact assessment methodology, which is presented in the following sections, is designed to incorporate the key criteria and considerations without being overly prescriptive.

EIA team

5.2.5 The EIA team consists of ABPmer, Clyde & Co LLP, Adams Hendry Consulting Ltd, AECOM, Wessex Archaeology, David Tucker Associates (DTA) and Kent PLC. Table 2 details the consultancies that are responsible for each topic

Table 2. EIA team and topic leads

Topic	Lead
EIA coordination	ABPmer
Legislation, policy and guidance	ABPmer/Adams Hendry/ Clyde & Co LLP
Needs/alternatives	ABPmer/Adams Hendry
Physical processes	ABPmer
Water and sediment quality	ABPmer
Nature conservation and marine ecology	ABPmer
Terrestrial ecology	AECOM
Commercial and recreational navigation	ABPmer
Coast protection, flood defence, and drainage	AECOM
Ground conditions, including land quality	AECOM
Air quality	AECOM
Airborne noise and vibration	AECOM
Marine archaeology	Wessex Archaeology
Socio-economics	AECOM
Traffic	DTA
Landscape/seascape	AECOM
Climate change and sustainability	AECOM
Landuse planning and human health	Kent PLC
Cumulative and In-combination	All

Stage 1 – Identify receptors and changes

5.2.6 The first stage identifies the potential environmental changes resulting from the proposed activity and the features of interest (receptors) that are likely to be affected (which are together referred to as the impact pathway). The potential impact pathways which are considered relevant to this EIA will be set out within each topic-specific assessment chapter.

Stage 2 – Understand change and sensitivity

5.2.7 The second stage involves understanding the nature of the environmental changes to provide a benchmark against which the changes and levels of exposure can be compared. The scale of the impacts via the impact pathways depends upon a range of factors, including the following:

- Magnitude (local/strategic):
  - Spatial extent (small/large scale);
  - Duration (temporary/short/intermediate/long-term);
  - Frequency (routine/intermittent/occasional/rare);
  - Reversibility;
- Probability of occurrence;
- The margins by which set values are exceeded (e.g. water quality standards);
- The baseline conditions of the system;
- Existing long-term trends and natural variability;
- The sensitivity of the receptor (resistance/adaptability/recoverability);
- The importance of the receptor (e.g. designated habitats and protected species); and
- Confidence, or certainty, in the impact prediction.

Stage 3 – Impact assessment

5.2.8 To assess the significance of effects, the magnitude of the impact pathway and the probability of it occurring is evaluated to understand the exposure to change, and this is assessed against the sensitivity of a receptor/feature to understand its vulnerability. Finally, this is compared against the importance of a receptor/feature to generate a level of significance for effects resulting from each impact pathway. This is summarised in the following sections.

5.2.9 The key significance levels for either beneficial or adverse impacts are described as follows:

- Insignificant: Change not having a discernible effect;
- Minor: Change is discernible but tolerable and not significant;
- Moderate: Change is significant and if adverse, is likely to require mitigation; and
- Major: Change is highest in magnitude, and the receptor has a high vulnerability and importance. Change is significant and if adverse, will require mitigation.

5.2.10 To ensure transparency in the impact assessment, it is important to make clear the evidence-based or value-based judgments used at each stage of the assessment and how they have been attributed to a level of significance. This will be presented in the impact assessment for each impact pathway.

Impact assessment guidance tables

5.2.11 The matrices in Table 3 to Table 5 will be used to help assess significance (see below).

5.2.12 Table 3 will be used as a means of generating an estimate of exposure to change for each impact pathway. Magnitude of change needs to be considered in spatial and temporal terms (including duration, frequency and seasonality), and against the background environmental conditions in a study area. Once a magnitude has been assessed, this should be combined with the probability of occurrence to arrive at an exposure score which can then be used for the next step of the assessment, which is detailed in Table 4. For example, an impact pathway with a medium magnitude of change and a high probability of occurrence would result in a medium exposure to change.

Table 3. Exposure to change, combining magnitude and probability of change

Probability of Occurrence	Magnitude of Change			
	Large	Medium	Small	Negligible
High	High	Medium	Low	Negligible
Medium	Medium	Medium/Low	Low /Negligible	Negligible
Low	Low	Low /Negligible	Negligible	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

5.2.13 Table 4 will then be used to score the vulnerability of the features/receptors of interest based on the sensitivity of those features and their exposure to a given change. Where the exposure and sensitivity characteristics overlap then vulnerability exists, and an adverse effect may occur. For example, if the impact pathway previously assessed with a medium exposure to change acted on a receptor which had a high sensitivity, this would result in an assessment of high vulnerability.

5.2.14 Sensitivity can be described as the intolerance of a habitat, community or individual of a species to an environmental change and essentially considers the response characteristic of the feature. Thus, if a single or combination of environmental changes is likely to elicit a response then the feature under assessment can be considered to be sensitive. Where an exposure or change occurs for which the receptor is not sensitive, then no vulnerability can occur. Similarly, vulnerability will always be ‘none’ no matter how sensitive the feature is, if the exposure to change had been assessed as ‘negligible’.

Table 4. Estimation of vulnerability based on sensitivity and exposure to change

Sensitivity of Feature	Exposure to Change			
	High	Medium	Low	Negligible
High	High	High	Moderate	None
Moderate	High	Moderate	Low	None
Low	Moderate	Low	Low	None
None	None	None	None	None

5.2.15 The vulnerability will then be combined with the importance of the feature of interest using Table 5 to generate an initial level of significance. The importance of a feature is based on its value and rarity (e.g. to either ecosystem or economy), such as the levels of protection, whilst recognising that importance should be determined having regard to geographic context (i.e. international/European, national, regional, and local). For an example of estimating significance, if a high vulnerability was previously given to a feature of low importance, an initial level of significance of minor would be given.

Table 5. Estimation of significance based on vulnerability and importance

Importance of Feature	Vulnerability of Feature to Impact			
	High	Moderate	Low	None
High	Major	Moderate	Minor	Insignificant
Moderate	Moderate	Moderate/Minor	Minor/Insignificant	Insignificant
Low	Minor	Minor/Insignificant	Insignificant	Insignificant
None	Insignificant	Insignificant	Insignificant	Insignificant

Stage 4 – Impact management (mitigation)

5.2.16 The final stage is to identify any impacts that are found to be significant (i.e. moderate and/or major adverse) and require mitigation measures to reduce residual impacts, as far as possible, to environmentally acceptable levels. Mitigation measures considered throughout the EIA process can take three forms (IEMA, 2016):

- **Primary (inherent)** – modifications to the location or design of the development made during the pre-application phase that are an inherent (or embedded) part of the project. These are captured and taken account of in the initial impact assessment;
- **Secondary (foreseeable)** – actions that will require further activity in order to achieve the anticipated outcome (identified as necessary through the assessment process). Within the impact assessment process, the use of secondary mitigation measures will alter the risk of exposure and, hence, will require significance to be re-assessed and thus the residual impact (i.e. with mitigation) identified; and

- **Tertiary (inexorable)** – actions that would occur with or without input from an environmental impact assessment process, including actions that will be undertaken to meet other existing legislative requirements, or actions considered to be standard practices to manage commonly occurring environmental effects. These are captured and taken account of in the initial impact assessment.

5.2.17 In addition, it is appropriate to adopt a mitigation hierarchy which, from the CIEEM (2018) guidance[3] on ecological impact assessment specifically, can be summarised as follows:

- Seek to adopt options that **avoid** harm in the first instance;
- Identify ways to **minimise** adverse effects that cannot be completely avoided;
- Undertake **compensation** where there are significant residual adverse effects despite the mitigation proposed; and
- Provide **net benefits** (for biodiversity) above requirements for avoidance, mitigation or compensation.

5.2.18 In instances, a decision may need to be taken despite residual uncertainty about the effects. In such cases, adaptive management, linked to a bespoke monitoring programme, is a well-established and recommended way of ensuring that any negative impacts or effects are addressed in the course of the development and during the subsequent operational phase.

Confidence assessment

5.2.19 Following the significance assessment, a confidence assessment will be undertaken which recognises the degree of interpretation and expert judgement applied. This will be presented in the summary table contained within the conclusions section of each impact assessment section. Confidence will be assessed on a scale incorporating three values: low, medium and high.

Cumulative impact and in-combination assessment

5.2.20 In accordance with the EIA Regulations, it will be necessary to assess the potential cumulative impacts of a proposed activity on all environmental receptors together with other existing or consented developments in the area. Under the Habitats Regulations, it is also necessary to consider the in-combination effects of a development proposal specifically on the interest features of European/Ramsar sites.

5.2.21 The cumulative (and in-combination) assessment will consider the effects of the Immingham Eastern Ro-Ro Terminal alongside those arising from other plans, projects and activities. Cumulative impacts result from the combined impacts of multiple developments or from the combined effect of individual

[3] Adapted from Royal Town Planning Institute (RTPI) (2000) *Planning for Biodiversity* (out of print) as used in the emerging CIEEM guidance

impacts (e.g. where different project elements in different locations have a cumulative impact on a particular feature). The impacts resulting from a single scheme may not be significant on their own but when combined with impacts resulting from other schemes, these could become significant.

5.2.22 The cumulative and in-combination assessment will be presented in a separate chapter of the ES. At this stage, other known projects comprise:

- Able Marine Energy Park;
- Adaptation to Humber International Berth 2 to accommodate car carriers;
- Existing maintenance dredge and disposal practices;
- Cherry Cobbs Sands Regulated Tidal Exchange Project;
- Skeffling Managed Realignment Site;
- Keadby 3 – Low Carbon Gas Power Station Project; and
- The North Lincolnshire Green Energy Park Scheme at Flixborough Wharf.

5.2.23 The assessment of cumulative impacts will involve a desk-based review of relevant planning applications and marine licence applications within 2 km of the proposed development. Further consultation with PINS, local planning authorities, and the MMO will also be undertaken to understand any other plans, projects or activities which may have the potential for cumulative effects with the proposed development.

5.3 Consultation

5.3.1 Consultation is a crucial part of the assessment process. As part of the scoping process, PINS will seek the views of statutory consultees and any other non-statutory consultees that PINS consider may be impacted by the proposed development. These consultees are expected to include the following parties:

- ABP as Statutory Harbour Authority;
- Cefas as the MMO's technical advisor on applications and associated issues;
- Environment Agency;
- National Highways;
- Historic England;
- North East Lincolnshire Council;
- North Lincolnshire Council;
- Hull City Council;
- East Riding of Yorkshire Council;
- Network Rail;
- MMO;
- Natural England;
- Health and Safety Executive (HSE); and
- North East Lincolnshire Council and North Lincolnshire Council in their capacity as the local highway authorities.

5.3.2 In addition, stakeholders with a navigational interest will need to be consulted as part of the NRA (Section 4.5). This will include authorities such as the Maritime and Coastguard Agency (MCA) and Trinity House.

5.3.3 As the exercise of assessment proceeds, formal consultation with statutory consultees and interested parties will be carried out to obtain baseline information and further advice on the environmental assessments which will be included in the ES.

5.4 Study area

5.4.1 The scope of the study area to be considered will be defined on the basis of the preferred design for the proposed development. It will also take into account the spatial and temporal extent (zone of influence) of the likely significant effects and their importance in a geographical context that could arise from the proposed development and the sensitivities of the relevant topics/receptors on an individual basis. Areas outside the range of any potential impacts are representative of the wider natural environment and form part of the wider study area.

5.4.2 An initial study area has been identified in this Scoping Report as part of the baseline review that has been undertaken for each EIA topic (Section 5). The study area for each EIA topic will be refined in the PEIR and ES, within the topic-specific chapters.

6 Scoping Review

6.1 Key issues and approach to scoping

6.1.1 To develop the scope of the further assessment that will be required, relevant environmental topics are reviewed in the sections below. These EIA topics are as follows:

- Physical processes;
- Water and sediment quality;
- Nature conservation and marine ecology;
- Terrestrial ecology;
- Commercial and recreational navigation;
- Coast protection, flood defence and drainage;
- Ground conditions, including land quality;
- Air quality;
- Airborne noise and vibration;
- Marine archaeology;
- Socio-economic receptors;
- Traffic and transport;
- Landscape/seascape and visual impact;
- Land use planning and human health; and
- Climate change.

6.1.2 Each of the EIA topic sections below initially presents the relevant legislation, policy and guidance position for that specific topic, followed by a brief overview of the baseline environmental conditions, and consideration of the key 'impact pathways' for the Immingham Eastern Ro-Ro Terminal (i.e. the potential mechanisms by which a source of change could occur that is sufficient to cause a possible significant impact to a feature/receptor). Any topics and/or impact pathways that are not considered to be relevant and are proposed to be scoped out of the EIA are also reviewed. Details are then provided of the specific impact assessment approach and further work that is proposed to be carried out to determine the significance of scoped-in impact pathways.

6.2 Physical processes

6.2.1 This section sets out the proposed scope of the Immingham Eastern Ro-Ro Terminal ES chapter that will report the findings of the physical processes assessment of the proposed development.

Legislation, policy and guidance position

6.2.2 The potential effects of the Immingham Eastern Ro-Ro Terminal on physical processes will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- The Planning Act 2008;
- The Marine and Coastal Access Act 2009 (MCAA);
- The Habitats Regulations, which implement the Birds and Habitats Directives;
- The Water Framework Regulations, which implement the European WFD (2000/60/EC);
- The Waste (England and Wales) Regulations 2011, which implement Directive 2008/98/EC on waste (Waste Framework Directive);
- NPSfP (DfT, 2012);
- UK Marine Policy Statement (HM Government, 2011) as required by Section 44 of the Marine and Coastal Access Act 2009;
- East Inshore and East Offshore Marine Plans (Defra, 2014);
- UK Marine Strategy (Defra, 2019a); and
- Relevant local policy.

Description of the existing environment

Data sources

6.2.3 A desk-based study will be undertaken to inform the baseline characterisation on which the impact assessment will be based. This will include the following key data sources:

- Hydrodynamic data collected by ABPmer during 2020, including 6-month deployment of 1 MHz Acoustic Wave and Current Profiler (AWAC) (waves at 1 hr intervals, currents at 10-minute intervals) and water quality sensors (Conductivity-Temperature Depth (CTD) and Turbidity at 10-minute intervals) between 15 November 2019 and 05 June 2020 at the proposed development site and a subsequent 3-month deployment at HIT between 05 June 2020 and 13 September 2020;
- Repeat bathymetric surveys conducted throughout the wider study area by ABP;
- Site specific marine sediment samples to be collected in 2021 within the boundaries of the Immingham Eastern Ro-Ro Terminal for particle size analysis (PSA) (a sediment sampling plan request has been submitted to the MMO; SAM/2021/00053);
- Historic marine surface sediment samples (2001) collected in the area of IOH for PSA analysis;
- Numerical modelling tools developed specifically for the Immingham Eastern Ro-Ro Terminal studies and covering assessment of hydrodynamic, wave and sediment transport impacts for the proposed works (jetty construction, dredging and disposal);

- Various ABPmer reports covering project work for ABP in and around the Immingham region (including those related to IOT, HIT, Immingham Eastern Terminal and associated maintenance dredging and disposal studies); and
- Guidance documents relevant to the study, including Environment Agency Coastal Flood Boundary datasets for extreme events; UK Climate Projections (UKCP18) for influence of future climate change.

Study area

6.2.4 The study area is the area over which potential direct and indirect effects of the Immingham Eastern Ro-Ro Terminal may occur during construction and operation. The direct effects on physical processes are those confined to within the footprint of the proposed development, i.e. the piers, dredge and disposal of dredge material. Indirect effects are those that may arise due to wider changes in the estuary flow and sedimentary regime and any change to the estuary morphology as a result of the proposed development.

6.2.5 The study area for the physical processes topic is considered to be the proposed development site and the adjacent Immingham coastline, the existing jetties across the near-field and the central part of the Humber Estuary, generally between Sunk Chanel and Halton Middle. Within the far-field region, the study area includes the wider Humber Estuary from the mouth to at least the Hull Bend. Should any of the dredge disposal options necessitate it, the study area may be extended in order that the full extent of potential impact is considered within the assessment.

6.2.6 The physical processes chapters will, through further desk-based analysis and assessment, including numerical modelling, refine the study area for the purposes of the impact assessment.

General setting

6.2.7 The Humber is one of the largest estuaries in the UK and drains more than one fifth of the land area of England, some 23,690 km² (Townend *et al*., 2000). The main tributaries include the Trent, Ouse, Don and Aire. Additional freshwater inputs to the Humber include the Rivers Calder, Hull, Derwent, Swale, Ure, Nidd and Wharfe. At over 30,000 ha the Humber Estuary is the largest macro tidal coastal plain estuary on the British North Sea Coast.

6.2.8 Although the name Humber applies only to the 62 km reach between Spurn Point and Trent Falls; the estuary as defined by its physical properties is much more extensive, reaching over 100 km inland to Cromwell Weir on the River Trent and Naburn Lock on the River Ouse. Today the estuary area is significantly smaller than its original extent following the deceleration of the Holocene sea level rise (*circa* 6,000 years BP), due to the formation of saltmarshes and intertidal flats, followed by their latter reclamation by man over historical times.

Bathymetry and morphology

6.2.9 In plan shape, the Humber Estuary has a meandering funnel shape widening towards the mouth, where a southerly orientated spit has formed in response to littoral drift processes and antecedent geological controls. The funnel shape is demonstrated by the exponential decrease in estuary area, width, and depth from the mouth to the head.

6.2.10 The estuary can be divided into three regions:

- The Inner Humber (Trent Falls to Humber Bridge);
- The Middle Humber (Humber Bridge to Grimsby); and
- The Outer Humber (Grimsby to Spurn Point).

6.2.11 In the Inner Humber, downstream of Trent Falls, where the Rivers Trent and Ouse merge, the estuary is characterised by a number of extensive intertidal banks composed of sand/silt. These banks include Winteringham Middle Sand, Redcliff Middle Sand, Hessle Sand and Barton Ness Sand.

6.2.12 The Middle Humber is similar in its characteristics to the Inner Humber, having a number of banks and channels which have a preferred configuration. In the northernmost section, the main channel close to the Hull Waterfront, but westwards, where it meets Hessle Sand, a secondary channel develops along the southern shore. Downstream the reach is dominated by Skitter and Foul Holme Sands.

6.2.13 The Outer Humber is dominated by a three-channel system at the mouth, a large submerged sandbank (the Middle Shoal), and a single deep channel leading to the Middle Humber. The three channels are Haile Channel, Bull Channel and Hawke Channel. Upstream, Hawke Channel is extensively dredged and the resulting channel, known as Sunk Dredged Channel (SDC), provides shipping access to the ports of Immingham and Hull. The presence of boulder clay deposits in the Outer Humber provides a geological constraint that influences the position of some of the sand banks, intertidal areas and Spurn Point itself. The Outer Humber contains a number of disposal grounds.

6.2.14 The Humber Estuary has a macro tidal range, fast flows and a high background suspended sediment content. This means the bed of the estuary is very dynamic in its morphology, both in the short term and on longer time scales, particularly in areas where there are no constraints, either geological or man-made. This dynamism manifests itself in cyclical variations in the positions of channels and banks throughout different regions of the estuary, with many of these regions showing an interconnectivity of process. The dominant influences on morphological change are tides, waves and freshwater flows, tidal surges and biological activity.

6.2.15 These influences produce changes in suspended sediment concentrations (SSC), deposition rates, bed composition and ultimately channel/bank configurations. The dynamic nature of the Humber is illustrated by the interactions existing between the various bank systems in the Inner and Middle Humber. Channel migration in the Inner Humber releases sand, which forms banks off Barton and New Holland in the upper Middle Humber. Furthermore, there is a sediment exchange between Barton Ness Sand and Skitter Sand lower down the Humber, which ultimately helps determine the shape and levels across Halton Flats.

6.2.16 Between Immingham and Grimsby, the estuary is at its deepest, and relatively speaking, its most stable location. The main channel varies between 10 and 20 m below CD and is bounded by steep 'hard sides' thought to comprise boulder clay, which are relatively in-erodible to current day hydrodynamics. On the south side of the channel a relatively wide and gently sloping shallow subtidal 'ledge' forms Burcom Shoal and Stallingborough Flats. Behind this is the intertidal Pyewipe mudflat, which has accreted above the 'ledge' predominantly due to the construction of the Grimsby Dock System. To the north, near Hawkins Point, the intertidal area is narrow compared to the areas up and down estuary. This is due to human intervention through the reclamation of Sunk Island in this area.

6.2.17 Across the proposed development site, the near field bathymetry is influenced by the deeper approaches to the Port of Immingham and the relatively shallower subtidal region behind the existing jetties (Figure 5). Bed elevation within the approaches to Immingham, the Sunk Channel and on the berths at IOT reaches around -20 mCD. Across the proposed development site, bed levels range from around -10 mCD offshore, sloping up towards the land along the Immingham foreshore. The intertidal area adjacent to the proposed development is around 230 m in width, narrowing slightly to the south, to around 160 m at the landward end of the IOT jetty.

6.2.18 A review of historical bathymetric charts extending both up and down estuary of the proposed development shows that in the 1930s, the channel up estuary was considerably deeper than present day, with depths of the order of -16 m CD centred about 1 km from the shoreline. The channel has consistently in-filled until about 1990, resulting in a depth of around -7 mCD. During the last 15 years, depths have been relatively stable, although variations between -6 m and 7 mCD have occurred.

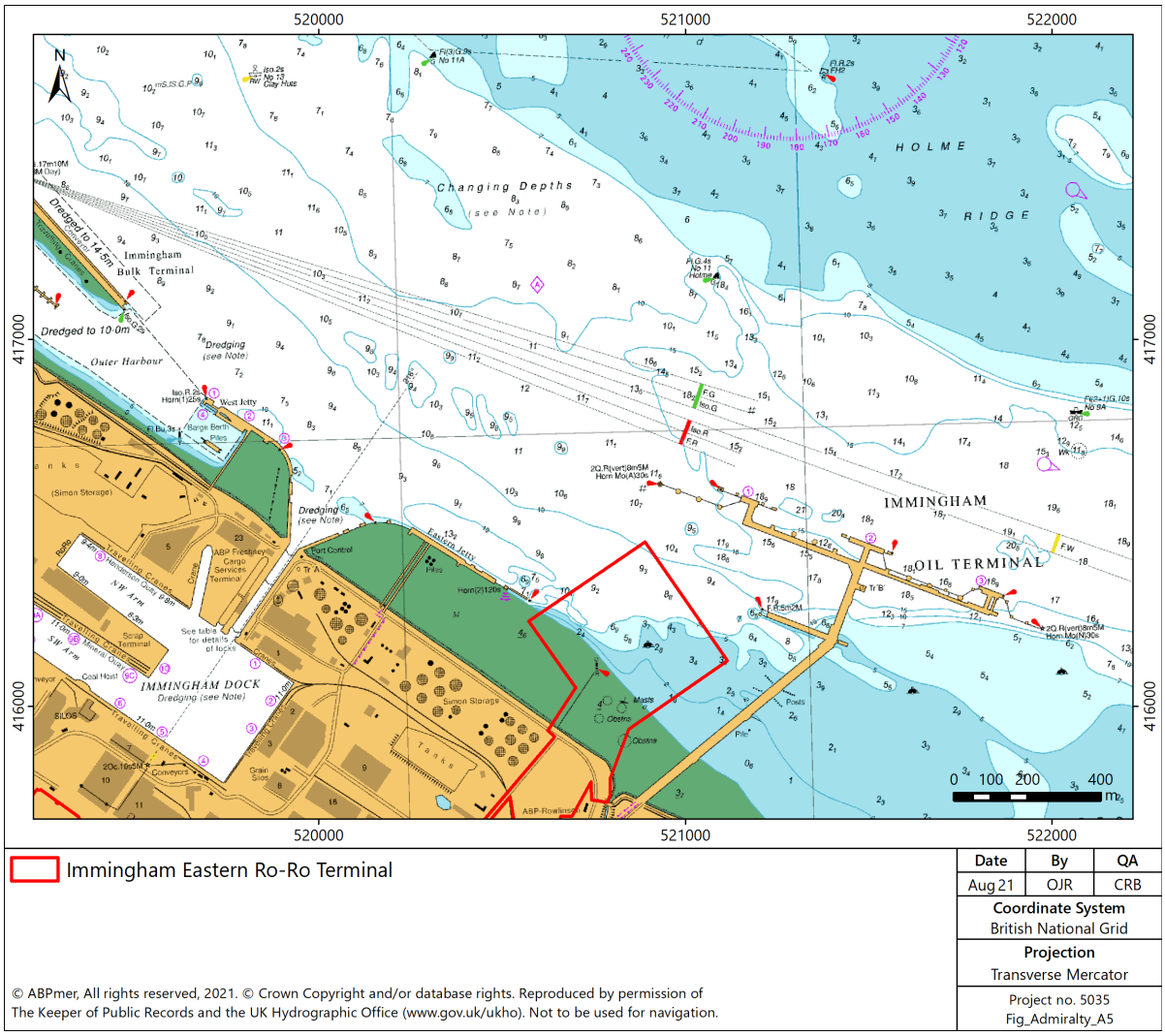


Figure 5. Admiralty chart of Humber Estuary surrounding Port of Immingham

Tides and water levels

6.2.19 The Humber Estuary is macro tidal with a mean spring tidal range of 5.7 m at Spurn increasing to 7.4 m at Saltend then decreasing to 6.9 m at Hessle which is 45 km inland. Tides are semi diurnal with a slight diurnal inequality, amounting to a 0.2 m difference in high water spring tides at Immingham. Standard tidal levels at Immingham are provided in Table 6.

6.2.20 The Humber tides are driven by the amphidromic system centred off the west coast of Denmark in the central North Sea. As the tide passes south of North Shields, it enters shallow water conditions which amplify the tidal range. This amplified tidal range drives the Humber tidal system so that the macro tidal range within the estuary is a product of the general morphology of the east coast as well as the estuary itself.

Table 6. Standard tide levels for Immingham

Tidal Level		Immingham	
		mCD	mODN
Highest Astronomical Tide	HAT	8.00	4.10
Mean High Water Springs	MHWS	7.30	3.40
Mean High Water Neaps	MHWN	5.80	1.90
Mean Sea Level	MSL	4.18	0.28
Mean Low Water Neaps	MLWN	2.60	-1.30
Mean Low Water Springs	MLWS	0.90	-3.00
Lowest Astronomical Tide	LAT	0.10	-3.80
Mean Spring Tidal Range (MHWS – MLWS)		6.40 m	
Mean Neap Tidal Range (MHWN – MLWN)		3.20 m	
Note: Conversion from mCD to mODN at Immingham = -3.90 m.			

Surge levels

6.2.21 Current extreme predictions determined by the Environment Agency for Immingham are considered to be the most up-to-date and appropriate for this review (Environment Agency, 2018). These are provided in Table 7 for a baseline year of 2017.

Table 7. Predicted extreme water levels for the Port of Immingham

Return Period (Years)	Annual Exceedance Probability (%)	Extreme Water Level (mODN)
1	100	4.15
2	50	4.25
5	20	4.40
10	10	4.51
20	5	4.62
25	4	4.66
50	2	4.77
75	1.3	4.85
100	1	4.90
150	0.67	4.97
200	0.5	5.03
250	0.4	5.06
300	0.33	5.10
500	0.2	5.20
1,000	0.1	5.34
10,000	0.01	5.85

Source: Environment Agency, 2018

6.2.22 The maximum water level currently recorded at Immingham occurred on 5 December 2013 at 19:00 hours with a level of 5.216 m Ordnance Datum Newlyn (ODN) compared to the prediction of 3.689 m ODN, therefore, the meteorological surge effect was 1.527 m.

Sea level rise

6.2.23 The above data do not allow for sea level rise in the future. Given an assumed design life of 50 years from 2021, using the latest UKCP18 relative sea level research and assuming an Representative Concentration Pathway (RCP) 8.5 95%ile scenario will add 0.52 m to the water levels provided in Table 7.

Flows

6.2.24 Measured flow speed data has been collected in proximity to the proposed development site between November 2019 and June 2020. Figure 6 shows a current rose of the data collected by the AWAC bed frame over the full deployment period.

6.2.25 The data reveals the flow regime fronting Immingham is generally rectilinear, with flows aligned approximately east-southeast on the ebb to west-northwest on the flood. Peak flows above 1.8 m/s are recorded during the ebb tide, with slightly slower flows on the flood phase of the tide.

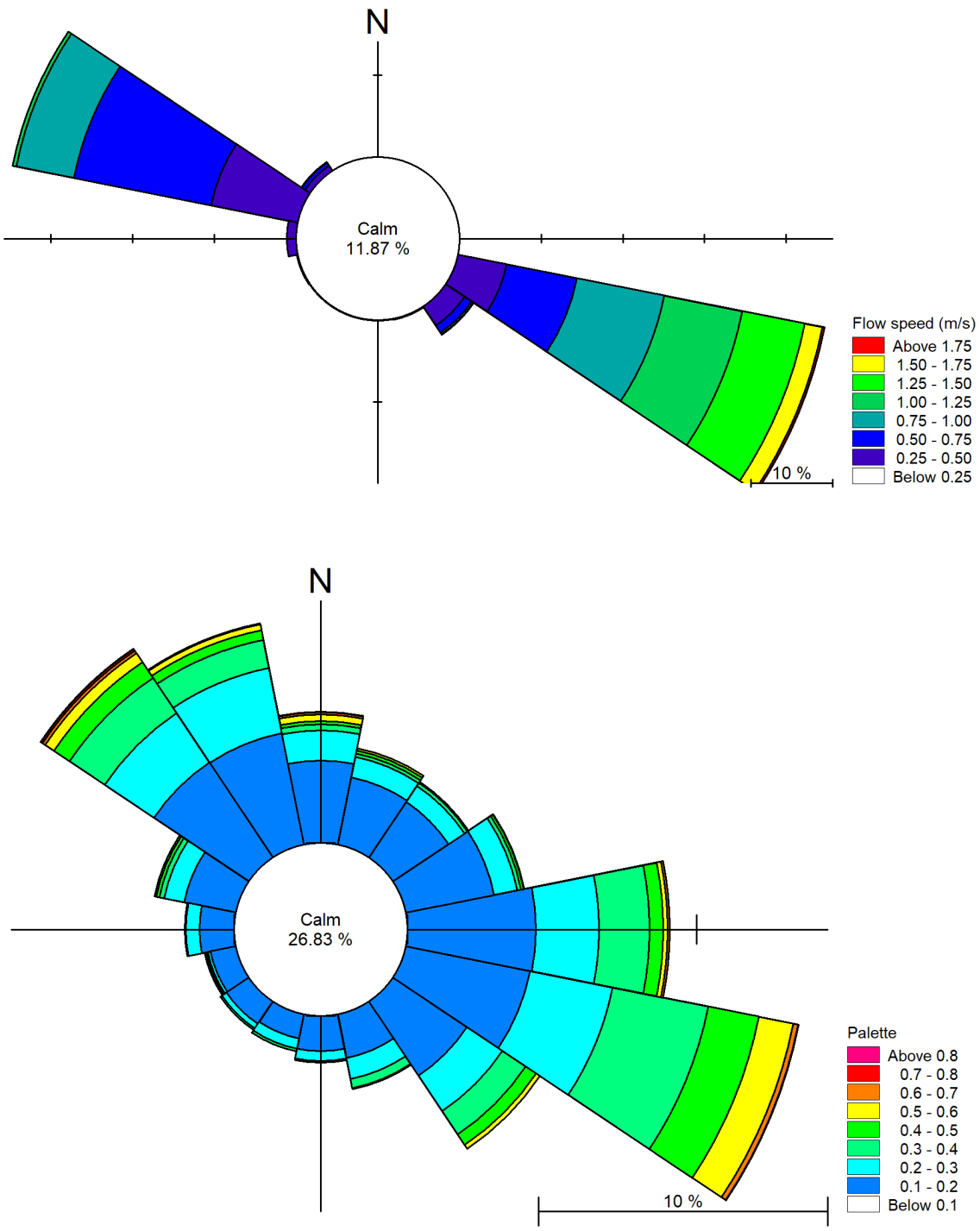


Figure 6. Current rose (top) and wave rose (bottom), based on measured data collected between November 2019 and June 2020

Waves

6.2.26 The wave climate across the proposed development site is generally protected from large waves approaching from the North Sea by a combination of sheltering effects (from Spurn Head, the various banks and channels within the outer parts of the Humber Estuary, and by the local jetties at Immingham).

6.2.27 Measured data from an AWAC bed frame deployment in the vicinity of the proposed site has been collected between November 2019 and June 2020. The data from this survey is used to provide the wave rose shown in Figure 6. This reveals that the wave regime at the site is dominated by waves approaching from the northwest and the southeast (coincident with the longest fetch lengths at the site). Waves with Hs of above 0.7 m are observed from both of these main approach directions, with a peak Hs value during the deployment, of 0.84 m.

Geology and sediments

6.2.28 The Humber lies in a complex of solid and superficial geology which can be simplified into three groups: the pre-Quaternary, the glacial (or Quaternary) and Post Glacial (or Holocene).

6.2.29 The estuary upstream of the Humber Bridge represents an older estuary system formed in the last interglacial (120,000 to 80,000 years BP) with the estuary mouth at this time being located near the current Bridge. Downstream of this point, the estuary is more recent in geological terms, the channel having formed in immediate post glacial times as melt water cut down through glacial till deposits. During the post glacial period of sea level rise, the former river channel underwent marine transgression and became subject to estuarine sedimentation.

6.2.30 The bed sediments within the vicinity of the study area are understood to be a mixture of muds and sands. Previous sampling in the Immingham area has also identified the potential for chalk outcrops at depth.

6.2.31 Measurements of SSC in the Immingham area, collected between November 2019 and June 2020 in the vicinity of the proposed development, show that during ebb tides SSC can vary from a few hundred mg/l to over 1,000 mg/l, whilst the range of SSC on the flood is generally of the order of three times greater. The SSC are also generally higher on spring tides and during the winter months, compared to summer months.

Future baseline

6.2.32 Hydrodynamic and sedimentary processes will continue to be influenced by natural and human-induced variability, ongoing cyclic patterns and trends (e.g. ongoing maintenance dredging and disposal) with or without the proposed development.

6.2.33 The future baseline will also be influenced by climate change and, in particular, increased rates of mean sea level rise (SLR). Projections of change for Immingham up to 2100 are 0.99 m (based on UKCP18 RCP8.5 95%ile climate change scenario). Water levels in the future, as now, will also be affected by unpredictable surge and weather-related events.

Possible environmental impacts

6.2.34 The proposed development has the potential to affect physical processes during both construction and operation. The physical processes chapters will set out the assessment of the likely changes to be generated by the Immingham Eastern Ro-Ro Terminal, both beneficial and adverse and during both the construction and operational phases.

Scoped in

6.2.35 The potential impact pathways during the construction phase are as follows:

- Increased SSC and potential sedimentation over the extent of the disturbance plume as a result of the construction of the new piers (piling) and capital dredging works;
- Increased SSC and potential sedimentation as a result of the deposit of capital dredge material at a licensed offshore disposal site; and
- Changes in seabed bathymetry and composition as a result of deposition of dredged/disposal material within the area of the respective plumes.

6.2.36 The potential impact pathways during the operational phase are as follows:

- Local changes to hydrodynamic regime (flow speed and direction) as a result of the piers (piling) and capital dredging;
- Local changes to the wave regime, as a result of the piers (piling) and capital dredging;
- Associated local changes to the sediment transport pathways, as a result of localised changes to the driving hydrodynamic (and wave) forcing;
- Increased SSC and potential sedimentation in the area of dispersal plume as a result of maintenance dredging;
- Increased SSC and potential sedimentation as a result of deposition of maintenance dredge material at a licensed disposal site; and
- Changes in seabed bathymetry and composition as a result of deposition of dredged/disposed maintenance dredge material.

6.2.37 Potential cumulative effects on physical processes could arise as a result of other coastal and marine developments in the area, as well as ongoing activities, including maintenance dredging and disposal activities. These will be considered as part of the cumulative and in-combination assessment (Section 5.2).

Scoped out

6.2.38 At the current stage there is considered to be insufficient evidence to exclude any potential pathways from further assessment within the EIA.

Further assessment work required

6.2.39 The methods adopted for the assessment of the physical processes changes will be slightly different to those adopted for other environmental topics. This is because whilst the proposed development has the potential to cause changes to hydrodynamic and sedimentary processes, these changes are not, in themselves, generally recognised as environmental features/receptors and, therefore, do not equate to 'impacts'. The impacts will instead be the consequence of these changes on other environmental features. For example, 'changes' in the transport and deposition of sediment may 'impact' on the structure and function of marine habitats and their associated species.

6.2.40 It should be noted, therefore, that it is intended that the assessment undertaken in relation to this topic, will apply the same impact assessment methodology as described in Section 5.2 and will assess the potential 'exposure to change' resulting from the impact pathways that have been scoped into the assessment. The consequent significance of effects resulting from physical processes changes on other environmental features/receptors will be assessed in other topic-specific ES chapters, including water and sediment quality, nature conservation and marine ecology, and coast protection, flood defence and drainage.

6.2.41 It is recognised that physical processes changes may potentially impact on physical environmental receptors, such as the local coastline and the nearshore sandbank and channel system, along with existing berth and jetty infrastructure. For these physical receptors, therefore, an assessment of impact significance will be undertaken following the methodology presented in Section 5.2. In accordance with published guidance and an established approach that has been used in numerous previous EIAs, the assessment will include an evaluation of the importance/value and sensitivity of relevant physical processes receptors.

6.2.42 Numerical modelling tools and conceptual analyses will be used to predict coastal processes, hydrodynamic and sedimentary effects by comparing the baseline and future environmental conditions created by the Immingham Eastern Ro-Ro Terminal. This will include predicting the changes to tidal water levels and currents, SSC and erosion and accretion patterns, and waves. The models will also allow for the fate of sediment plumes from marine construction and maintenance dredging and disposal activities to be simulated.

6.2.43 Changes in hydrodynamic and sedimentary processes will be considered in the context of climate change (specifically sea level rise) over the design life of the Immingham Eastern Ro-Ro Terminal by assessing the effects under projected future sea levels. The existing geotechnical information will also be analysed to optimise the construction and dredging methods and minimise changes in physical processes during construction and operation. Some existing ground investigation data does exist which will be used to inform the specifications of any project specific GI works. Ultimately this data will be required in order to inform the specifics of the marine infrastructure and in particular the diameter, number and driven depth of the steel tubular piles (see also Section 6.8 relating to landside works).

6.2.44 The modelling will be completed using existing models of the Humber Estuary, with updates to ensure mesh resolution and model performance across the primary study area remains suitable. ABPmer hold existing models using a range of modelling software products, including Deltares Delft3D suite and the Danish Hydraulic Institute (DHI) software package MIKE21FM (Flexible Mesh). Both of these modelling tools have previously been developed specifically for oceanographic, coastal and estuarine applications within the Humber region. The selected modelling tool will be subject to update with latest available bathymetric and topographic data, along with a further verification stage using local measurements.

6.2.45 Following the refinement of the models to replicate the baseline conditions, the models will be updated to include a representation of the marine elements of the Immingham Eastern Ro-Ro Terminal, namely the piers, the dredge footprint and the dredge disposal site(s). The models will also be updated to include a representation of any other coastal and marine developments that may overlap or interact with the Immingham Eastern Ro-Ro Terminal to allow the potential for cumulative effects to be assessed.

6.2.46 There is sufficient available information and data sources to support the numerical modelling and conceptual analyses and no further field survey work is considered necessary (with the exception of the GI surveys to inform the engineering design).

6.3 Water and sediment quality

6.3.1 This section sets out the proposed scope of the Immingham Eastern Ro-Ro Terminal ES chapter that will report the findings of the water and sediment quality assessment of the proposed development.

Legislation, policy and guidance position

6.3.2 The potential effects of the Immingham Eastern Ro-Ro Terminal on water and sediment quality will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- The Marine and Coastal Access Act 2009 (MCAA);
- The Habitats Regulations, which implement the Birds Directive (2009/147/EC) and Habitats Directives (92/43/EEC);
- The Water Framework Regulations, which implement the WFD (2000/60/EC);
- Bathing Waters Directive (2006/7/EC);
- Nitrates Directive (91/676/EEC);
- Urban Waste Water Treatment Directive (91/271/EEC);
- Shellfish Waters Directive (2006/113/EC; now subsumed within the WFD)[4];
- NPSfP (DfT, 2012);
- UK Marine Policy Statement (HM Government, 2011) as required by Section 44 of the Marine and Coastal Access Act 2009;
- East Inshore and East Offshore Marine Plans (Defra, 2014);
- UK Marine Strategy (Defra, 2019a);
- Advice Note Eighteen: The Water Framework Directive (Planning Inspectorate, 2017a);
- Relevant local policy; and
- The Environment Agency's "Clearing the Waters for All" guidance (Environment Agency, 2016).

Description of the existing environment

Data sources

6.3.3 A desk-based study will be undertaken to inform the baseline characterisation on which the impact assessment will be based. This will include the following key data sources:

- 'Catchment Data Explorer' website (Environment Agency, 2020a);
- Water body summary table within the Environment Agency (2016a) 'Clearing the Waters for All' guidance;
- Multi-Agency Geographic Information for the Countryside (MAGIC) website (Natural England, 2020) available at http://www.magic.gov.uk;
- 'Find a bathing water' website (Environment Agency, 2021a);
- List of Shellfish Water Protected Areas in England (Defra, 2016);
- 'Check for Drinking Water Safeguard Zones and NVZs' website (Environment Agency, 2020b);
- Site specific marine sediment samples to be collected in 2021 within the boundaries of the Immingham Eastern Ro-Ro Terminal for particle size analysis (PSA) and chemical contamination analysis (a sediment sampling plan request has been submitted to the MMO; SAM/2021/00053); and
- Historic marine surface sediment samples (2001) collected in the area of IOH for PSA and chemical contamination analysis.

[4] This Directive was repealed by the WFD in 2013. The rules set down, particularly in regard to microbiology and physical-chemistry parameters of relevance to River Basin Management Plans, were integrated in the WFD.

Study area

6.3.4 The study area is the area over which potential direct and indirect effects of the Immingham Eastern Ro-Ro Terminal may occur during construction and operation. The direct effects on water and sediment quality are those that may arise due to accidental releases during construction. Indirect effects are those that may arise due to sediment that is disturbed into the water column during the marine works resulting in changes in water quality through changes in the levels of dissolved oxygen or the release of sediment-bound contaminants.

6.3.5 The study area for the water and sediment quality topic is considered to be the proposed development site and the adjacent Immingham coastline, the existing jetties across the near-field and the central part of the Humber Estuary, generally between Sunk Chanel and Halton Middle. Within the far-field region, the study area includes the wider Humber Estuary from the mouth to at least the Hull Bend. Should any of the dredge disposal options necessitate it, the study area may be extended in order that the full extent of potential impact is considered within the assessment.

6.3.6 The water and sediment quality ES chapter will, through further analysis and assessment (including numerical modelling), refine the study area for the purposes of the impact assessment.

Water quality

6.3.7 Water quality standards are regulated at EU level through the WFD (2000/60/EC), the Priority Substances Directive (2008/105/EC, 2013/39/EU), the revised Bathing Water Directive (2006/113/EC) and the Marine Strategy Framework Directive (2008/56/EC). The WFD provides for holistic management of all water bodies including rivers, estuaries, groundwater, lakes and coastal waters to 1 nm offshore. The WFD integrates and requires protection of designated shellfish waters, through The Water Environment (Water Framework Directive) (England and Wales) (Amendment) Regulations 2016; bathing waters, through The Bathing Water Directive (2006/7/EC) (BWD); nature conservation sites, through the Habitats and Birds Directives (92/43/EEC, 2009/147/EC); and eutrophication, through the Nitrates Directive (91/676/EC).

6.3.8 The Environment Agency published River Basin Management Plans (RBMPs), which set out measures through which compliance with WFD objectives will be achieved. The Humber River Basin District RBMP identifies the Humber Lower water body (ID: GB530402609201) within and surrounding the Immingham Eastern Ro-Ro Terminal (including Humber Estuary disposal sites) (Environment Agency, 2020a) (Figure 7). It is recorded as a heavily modified water body (HMWB) due to coastal protection use, flood protection use, and navigation use. This means ‘ecological potential’ is applied rather than ‘ecological status’. The current (2019) overall status of this waterbody is ‘moderate’, with an ecological potential of ‘moderate’, and a chemical status of ‘fail’. The reason for the

'fail' chemical status is based on priority substances Cypermethrin and Dichlorvos, and priority hazardous substances Polybrominated diphenyl ethers (PBDE), perfluorooctane sulphonate (PFOS), Benzo(b)fluoranthene, Benzo(g-h-i)perylene, Mercury and Its Compounds, and Tributyltin Compounds. Surface water bodies overlapping the landside works are detailed in Section 6.8.

6.3.9 Cleethorpes designated bathing waters is located approximately 11.5 km south east of the Immingham Eastern Ro-Ro Terminal, and Humberston Fitties is located approximately 15 km south east. Cleethorpes was assessed as having 'excellent' bathing water quality in 2019 (Environment Agency, 2021a). Cleethorpes bathing water quality has improved from a 'good' classification in 2016 and 2017. Humberston Fitties was assessed as having 'good' bathing water quality in 2019 (Environment Agency, 2021a). Humberston Fitties bathing water quality has deteriorated from a 'excellent' classification in 2016, 2017 and 2018.

6.3.10 There are no Shellfish Water Protected Areas in the vicinity of the Immingham Eastern Ro-Ro Terminal (Defra, 2016). The nearest is the West Wash Shellfish Water Protected Area, located over 65 km south.

6.3.11 The landside extent of the Immingham Eastern Ro-Ro Terminal is located on land included in the North Beck Drain Nitrate Vulnerable Zone (NVZ), covering Immingham as well as South Killingholme and Healing, as designated under the Nitrates Directive (Environment Agency, 2020b) (Figure 7).

6.3.12 There are no sensitive areas designated under the Urban Waste Water Treatment Directive (91/271/EEC) in the vicinity of the Immingham Eastern Ro-Ro Terminal (Defra, 2012).

6.3.13 The main watercourses in the vicinity of the proposed development site (within 5 km) are South Killingholme Haven which drains to the north-west corner of the Port of Immingham, (but is defined as part of the Humber Estuary water body), North Killingholme main drain, Habrough Marsh drain and the Humber Estuary itself.

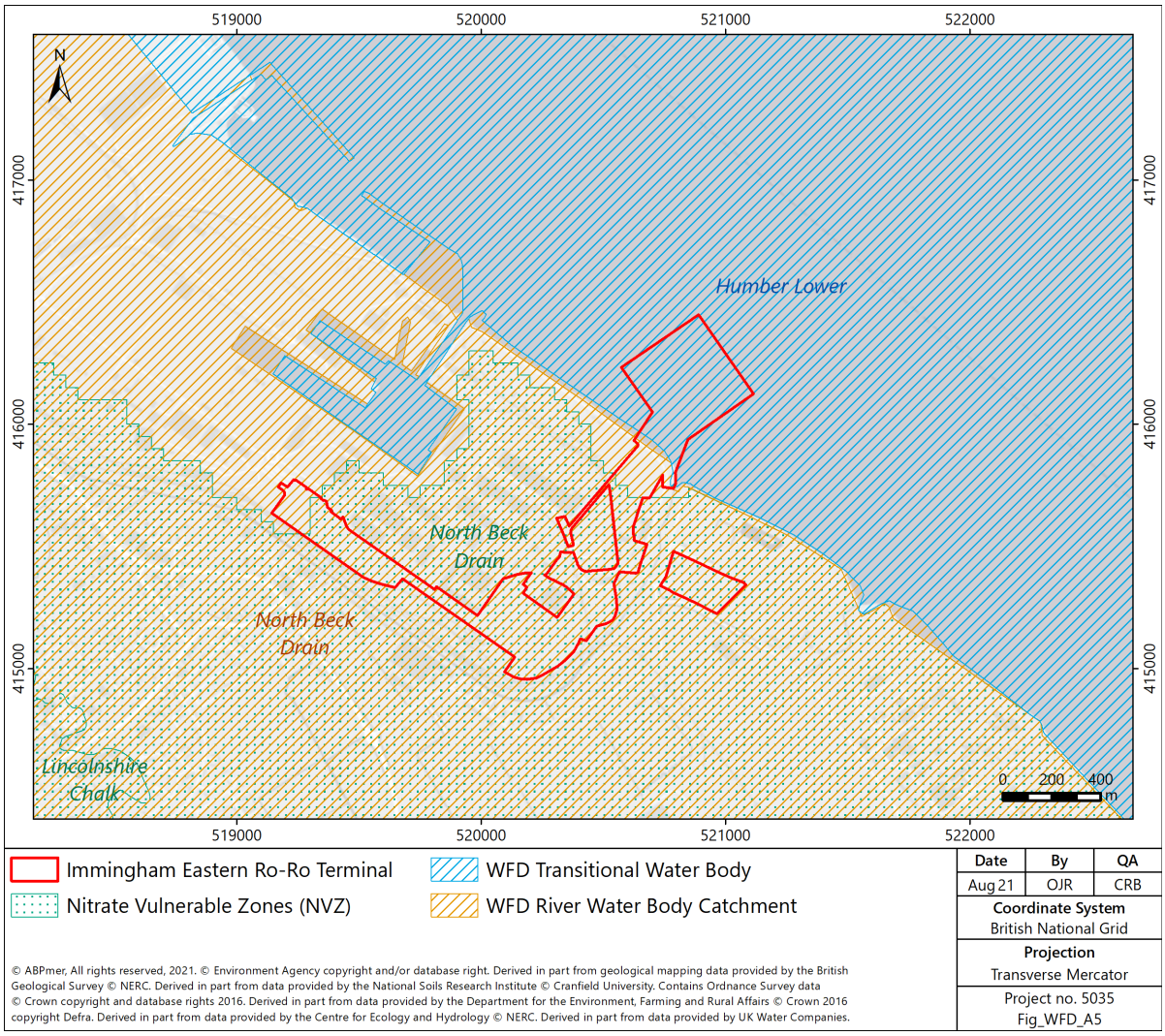


Figure 7. WFD waterbodies and sensitive receptors surrounding Immingham Eastern Ro-Ro Terminal

Sediment quality

6.3.14 The UK has not adopted formal quantitative Environmental Quality Standards (EQS) for sediments. In the absence of any quantified UK standards, therefore, common practice for characterising baseline sediment quality conditions is to compare against the Cefas Guideline Action Levels for the disposal of dredged material (MMO, 2014).

6.3.15 Cefas Guideline Action Levels are used as part of a 'weight of evidence' approach to assessing material suitability for disposal at sea. Cefas guidance indicates that, in general, contaminant levels below Action Level 1 (AL1) are of no concern and are unlikely to influence the licensing decision. Material with contaminant levels above Action Level 2 (AL2), however, is generally considered unsuitable for disposal at sea whilst dredged material with contaminant levels between AL1 and AL2 requires further consideration before a decision can be made as to disposal. As a consequence, the Action Levels should not be viewed as pass/fail thresholds and it is also recognised that these guidelines are not statutory requirements.

6.3.16 Borehole logs were collected in 2001 to inform the dredge and disposal of material for the development of IOH (ABP Research and Consultancy Ltd, 2001). These were taken to the west of the proposed development between Immingham Bulk Terminal and Western Jetty (Figure 8). Four borehole samples were analysed for trace metals, organotins, polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs); BH206, BH209, BH210, and BH212 (Table 8 to Table 10).

6.3.17 Considering all contaminants and samples together, the sediments within the top 4 m of the alluvium in the area of the IOH dredge were considered to have slight to moderate levels of contamination. The levels were approximately in line with that experienced throughout the estuary during the time they were sampled. Anthropogenic pollution of heavy metals and organochlorides/organotins have only been in existence for the last 200 years and from port activity at Immingham since the early 1900s. Pollution inputs to the estuary were likely to have been highest in the 1950s through to the 1970s, with a general trend towards cleaner sediments since the early 1990s (ABP Research and Consultancy Ltd, 2001).

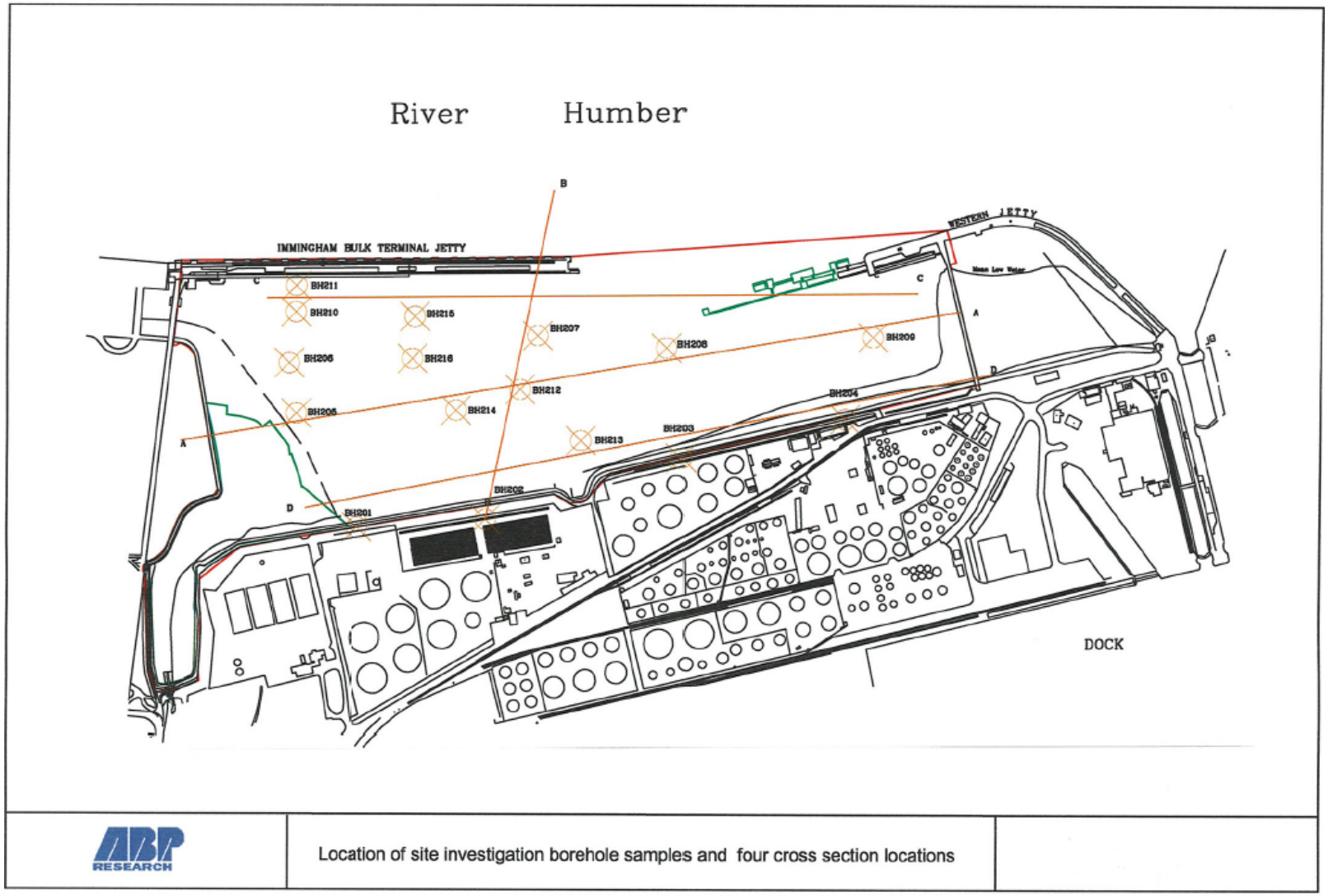


Figure 8. Existing borehole locations at Immingham Outer Harbour

Table 8. Chemical composition of sediments in the Immingham Outer Harbour development area

Lab Ref. No	Sample Ref.	Sample Depth (m)	Determinant Total																
			As	Cd	Cr	Pb	Hg	Se	Cu	Ni	Zn	Ba	pH	SO_4	g/l SO_4	Sulphide	Hydro-carbon oil by IR	Dibutyl tin	Tributyl tin	Water soluble boron
			mgkg^{-1} dried weight										Value	mgkg^{-1} dried weight						
F8501	206P2	1.0	31	<0.5	62	89	<0.3	1.1	40	35	210	190	7.8	1800	0.99	10	33	<0.1	<0.1	12.0
F8502	206P3	2.0	24	<0.5	31	56	<0.3	0.9	28	18	140	210	8.0	780	0.19	30	26	<0.1	<0.1	6.1
F8503	206P5	4.0	50	<0.5	80	100	0.4	1.1	49	42	270	260	7.9	1500	0.40	40	31	<0.1	<0.1	9.6
F8504	209P2	0.2	27	<0.5	47	66	<0.3	1.2	35	28	180	210	8.0	1100	0.29	20	25	<0.1	<0.1	7.1
F8505	209P4	1.2	58	<0.5	70	80	<0.3	0.5	28	29	210	230	8.0	740	0.10	10	<10	<0.1	<0.1	8.9
F8506	209P6	2.2	18	<0.5	36	72	0.3	1.2	29	14	140	320	8.3	700	0.08	20	40	<0.1	<0.1	5.4
F8507	210P1	0.0	34	<0.5	64	87	<0.3	0.8	38	33	220	240	8.0	690	0.05	10	35	<0.1	<0.1	11.0
F8508	210P2	1.0	62	<0.5	90	120	0.3	1.0	46	41	300	240	7.9	1300	0.38	10	18	<0.1	<0.1	9.8
F8509	P210P3	2.0	62	<0.5	88	120	0.4	1.3	48	45	300	300	8.0	650	0.06	10	<10	<0.1	<0.1	9.2
F8510	210P5	4.0	32	<0.5	56	79	<0.3	0.8	36	29	200	200	8.0	850	0.17	<10	310	<0.1	<0.1	9.0
F8511	212P1	0.0	31	<0.5	61	91	0.3	1.1	40	34	230	210	7.8	1800	0.63	10	<10	<0.1	<0.1	9.4
F8512	212P2	1.0	39	<0.5	67	85	<0.3	1.0	34	32	230	250	8.0	1100	0.25	20	11	<0.1	<0.1	9.2
F8513	212P3	2.0	41	<0.5	69	87	0.3	1.2	34	31	230	2460	7.9	1100	0.31	<10	<10	<0.1	<0.1	8.7
F8514	212P4	3.0	16	<0.5	26	28	<0.3	1.2	20	25	95	170	8.1	2000	0.62	130	27	<0.1	<0.1	7.5

Table 9. PAH composition of sediments in the Immingham Outer Harbour development area

Lab Ref. No	F8501	F8502	F8503	F8504	F8505	F8506	F8507	F8508	F8509	F8510	F8511	F8512	F8513	F8514
Sample Ref.	206P2	206P3	206P5	209P2	209P4	209P6	210P1	210P2	P210P3	210P5	212P1	212P2	212P3	212P4
Sample Depth (m)	1	2	4	0.2	1.2	2.2	0	1	2	4	0	1	2	3
Naphthalene	0.4	0.4	0.6	0.5	0.7	0.2	0.5	0.7	0.6	2.5	0.4	0.5	0.2	2.0
Acenaphthylene	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	<0.1	<0.1	0.1	<0.1	0.1	<0.1	<0.1	0.2	0.2	0.1	<0.1	<0.1	0.1	<0.1
Fluorene	0.2	<0.1	0.2	0.1	0.2	0.2	0.2	0.3	0.2	0.1	0.1	0.2	0.1	<0.1
Phenanthrene	0.6	0.4	0.9	0.6	0.6	0.7	0.6	1.1	0.9	0.8	0.6	0.7	0.6	0.3
Anthracene	0.2	0.1	0.4	0.2	0.2	0.3	0.2	0.3	0.8	0.6	0.2	0.2	0.2	<0.1
Fluoranthene	0.8	0.5	1.4	0.8	0.8	1.0	0.7	1.3	1.4	0.8	0.9	0.9	0.8	0.3
Pyrene	0.7	0.5	1.3	0.7	0.7	0.9	0.7	1.2	1.2	0.7	0.8	0.5	0.7	0.3
Benzo (a) anthracene	0.4	0.3	0.7	0.4	0.4	0.5	0.5	0.7	0.8	0.4	0.4	0.4	0.4	0.2
Chrysene	0.5	0.3	0.7	0.4	0.4	0.5	0.4	0.8	0.8	0.4	0.5	0.4	0.4	0.2
Benzo (a) fluoranthene	0.3	<0.1	0.7	0.4	0.3	0.4	0.5	0.6	0.6	0.3	0.4	0.4	0.5	0.2
Benzo (b) fluoranthene	0.5	0.2	0.7	0.7	0.3	0.3	0.3	0.8	0.8	0.4	0.3	0.3	0.3	0.1
Benzo (a) pyrene	0.5	0.3	0.9	0.4	0.4	0.4	0.4	0.8	0.8	0.4	0.5	0.4	0.4	0.2
Indeno (1,2,3-cd) pyrene	0.5	0.3	0.8	0.3	0.4	0.3	0.3	0.7	0.7	0.4	0.4	0.3	0.4	0.1
Dibenzo (a,b) anthracene	0.1	0.1	0.3	0.1	0.2	0.1	<0.1	0.2	0.3	<0.1	0.2	0.2	<0.1	<0.1
Benzo (g,h,i) perylene	0.6	0.3	0.8	0.4	0.5	0.4	0.5	0.8	0.8	0.5	0.5	0.4	0.4	0.2
Total PAH	6.5	4.1	10.6	6.2	6.3	6.4	6.1	10.6	11.0	8.6	6.4	6.0	5.7	4.6
All results expressed in mg/kg dry weight basis														
Total PAH = Sum of 16 identified components														

Table 10. PCB composition of sediments in the Immingham Outer Harbour development area

Sample Ref.	206P2	206P3	206P5	209P2	209P4	209P6	210P1	210P2	P210P3	210P5	212P1	212P2	212P3	212P4
Sample Depth (m)	1	2	4	0.2	1.2	2.2	0	1	2	4	0	1	2	3
PCB Congener 18	1.4	1.0	2.2	0.8	1.7	<0.5	0.9	3.5	2.8	1.3	0.9	1.3	<0.5	1.1
PCB Congener 28	5.1	2.7	8.9	2.7	4.5	<0.5	2.7	11.0	9.4	4.3	3.3	5.0	0.7	3.5
PCB Congener 31	2.0	1.3	2.7	1.1	1.9	0.6	1.2	3.9	3.6	1.5	1.4	1.9	0.7	1.7
PCB Congener 44	2.0	1.2	4.1	1.0	1.5	<0.5	1.2	4.6	3.2	1.5	1.1	1.3	<0.5	1.4
PCB Congener 47	1.1	0.8	2.2	0.5	0.9	<0.5	0.7	2.2	2.0	0.8	0.5	0.7	<0.5	0.6
PCB Congener 49	1.6	1.0	3.5	0.8	1.5	<0.5	1.1	4.1	3.0	1.2	0.9	1.1	<0.5	1.1
PCB Congener 52	5.0	2.6	8.6	2.1	4.2	<0.5	2.7	11.0	7.7	3.1	2.4	2.9	<0.5	2.9
PCB Congener 66	2.1	1.1	4.5	1.1	1.9	<0.5	1.2	4.2	3.7	1.5	1.2	1.4	<0.5	1.6
PCB Congener 101	3.7	1.9	7.5	1.8	3.1	<0.5	2.5	9.8	5.8	2.3	2.2	2.0	<0.5	2.4
PCB Congener 105	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	0.9	0.9	<0.5	<0.5	0.6	<0.5	<0.5
PCB Congener 110	2.4	1.2	4.9	1.3	1.8	<0.5	1.8	5.7	3.8	1.7	1.8	1.6	<0.5	1.5
PCB Congener 118	1.3	0.8	3.3	0.9	1.3	<0.5	1.4	4.4	2.4	1.3	1.1	1.2	<0.5	1.3
PCB Congener 126	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	0.7	0.9	<0.5	<0.5	0.5	<0.5	<0.5
PCB Congener 138	1.5	1.0	5.8	1.6	2.0	<0.5	2.4	5.8	5.9	2.7	2.6	3.1	<0.5	2.7
PCB Congener 141	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	0.7	0.7	<0.5	<0.5	<0.5	<0.5	<0.5
PCB Congener 149	2.3	1.4	5.0	1.0	1.7	<0.5	2.0	4.3	2.4	1.2	1.1	1.1	<0.5	1.3
PCB Congener 151	1.0	0.5	1.6	<0.5	0.6	<0.5	0.6	1.3	0.9	<0.5	<0.5	<0.5	<0.5	<0.5
PCB Congener 153	1.3	0.8	4.8	1.1	1.7	<0.5	1.9	4.6	4.6	2.3	2.1	2.4	<0.5	2.0
PCB Congener 156	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PCB Congener 158	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PCB Congener 170	<0.5	<0.5	1.3	<0.5	<0.5	<0.5	0.7	1.1	1.5	0.7	0.6	0.9	<0.5	<0.5
PCB Congener 180	0.9	0.5	3.8	0.9	1.1	<0.5	1.8	2.7	3.5	1.6	1.5	2.0	<0.5	1.5
PCB Congener 183	0.6	<0.5	2.0	0.5	0.8	<0.5	0.9	1.6	1.8	0.7	0.6	0.8	<0.5	0.6
PCB Congener 187	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	0.7	0.8	<0.5	<0.5	<0.5	<0.5	<0.5
PCB Congener 194	<0.5	<0.5	1.3	<0.5	<0.5	<0.5	0.5	0.6	1.0	0.6	0.5	0.5	<0.5	<0.5
Total PCBs	39.3	24.3	82.1	23.7	36.2	12.6	31.2	90.4	73.6	33.8	29.3	34.8	12.9	31.7
Total ICES 7	18.8	10.3	42.7	11.1	17.9	3.5	15.4	49.3	39.3	17.6	15.2	18.6	3.7	16.3
All results expressed in ng/g														

Future baseline

6.3.18 If the proposed development were not to take place, water and sediment quality will continue to be influenced by natural and human-induced variability, ongoing cyclic patterns and trends (e.g. ongoing maintenance dredging and disposal, and existing discharge licences in the area). The future baseline will also be influenced by climate change, such as changes in sea temperature.

Possible environmental impacts

6.3.19 The proposed development has the potential to affect water and sediment quality during both construction and operation. The water and sediment quality chapters of the ES will set out the assessment of the likely changes to be generated by the Immingham Eastern Ro-Ro Terminal, both beneficial and adverse and during both the construction and operational phases.

Scoped in

6.3.20 The potential impact pathways during the construction phase are as follows:

- Changes to dissolved oxygen concentrations as a result of increased SSC during piling, capital dredging and disposal activities;
- Changes to chemical water quality as a result of potential sediment-bound contaminants being released during piling, capital dredging and disposal activities; and
- Redistribution of sediment-bound contaminants during piling, capital dredging and disposal activities.

6.3.21 The potential impact pathways during the operational phase are as follows:

- Changes to dissolved oxygen concentrations as a result of increased SSC during the maintenance dredging and disposal activities;
- Changes to chemical water quality as a result of potential contaminants in the seabed sediment being released during maintenance dredging and disposal activities; and
- Redistribution of sediment-bound contaminants during maintenance dredging and disposal activities.

6.3.22 Potential cumulative effects on water and sediment quality could arise as a result of other coastal and marine developments in the area, as well as ongoing activities, including maintenance dredging and disposal activities. These will be considered as part of the cumulative and in-combination assessment (Section 5.2).

Scoped out

6.3.23 The following pathways are proposed to be scoped out of the EIA:

- **Changes to levels of contaminants in water (including accidental spillages) during construction and operation**: The proposed works will not directly introduce contaminants to the marine environment and good practice measures, such as those described in 'Guidance for Pollution Prevention: Works and maintenance in or near water (GPP5)' , will be used to minimise and mitigate the potential for accidental spillages during dredging and disposal. The potential risk of spillages will be minimised and mitigated through the application of environmental best practice management measures. This impact pathway has, therefore, been scoped out of further assessment in the EIA.

Further assessment work required

6.3.24 A desk-based review of the Environment Agency's Water Quality Data Archive, and other historic developments and sample data will be undertaken to support a detailed understanding of water and sediment quality in the study area. This will include a review of dissolved oxygen, nutrient and contaminant concentrations, both dissolved in water and sediment bound.

6.3.25 A sediment contamination survey of the proposed dredge area will be required to characterise the dredge material and to support any application to dispose of dredge material at an existing licensed disposal site. A sediment sampling plan request has been submitted to the MMO (SAM/2021/00053) to confirm the suite of contaminants, number of samples, sample locations, replicates and any sampling with depth required, taking account of available guidelines for the management of dredge material to be disposed at sea (OSPAR Commission, 2014).

6.3.26 Contaminant concentrations in sediment samples will be compared to Cefas Guideline ALs to determine their suitability for disposal at sea. Contaminant concentrations in sediments will also inform the assessment of potential changes to dissolved concentrations in the water column and predicted redistribution of contaminants as a result of the proposed development.

6.3.27 The outputs of the physical processes assessment (Section 6.2) will be used to inform the water and sediment quality assessment. Incremental changes to dissolved contaminant concentrations, in addition to background concentrations, will be compared to EQS values to consider potential ecological impacts, based on maximum allowable concentrations (MAC; short-term) and thresholds for annual averages (AA; long-term). The outputs of the physical processes assessment will also support an assessment of changes to dissolved oxygen concentrations.

6.3.28 A WFD assessment will be undertaken to determine the potential implications of the proposed development on the objectives of the relevant

water bodies (Section 4.5). This assessment will be based on the information and analysis provided within the ES in relation to changes in physical processes, water and sediment quality, and impacts on nature conservation and marine ecology receptors. The WFD assessment will be provided as an appendix to the ES following the format specified in the latest 'Clearing the Waters for All' guidance (Environment Agency, 2016).

6.4 Nature conservation and marine ecology

6.4.1 This section sets out the proposed scope of the Immingham Eastern Ro-Ro Terminal ES chapter that will report the findings of the nature conservation and marine ecology assessment of the proposed development. Specifically, this includes consideration of potential effects on benthic habitats and species (including non-native species), fish, marine mammals and coastal waterbirds. This section also considers coastal waterbirds utilising intertidal and subtidal habitats for roosting and feeding. Breeding birds utilising terrestrial habitats (including waterbirds) are considered within the section on terrestrial ecology (Section 6.4.9).

Legislation, policy and guidance position

6.4.2 The potential effects of the Immingham Eastern Ro-Ro Terminal on nature conservation and marine ecology receptors will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- The Habitats Directive (92/43/EEC);
- The Birds Directive (2009/147/EC);
- The Marine and Coastal Access Act 2009 (MCAA);
- The Wildlife and Countryside Act (WCA) 1981, as amended;
- The Countryside and Rights of Way Act (CRoW) 2000;
- The Natural Environment and Rural Communities (NERC) Act 2006;
- The Habitats Regulations, which implement the Birds Directive (2009/147/EC) and Habitats Directives (92/43/EEC);
- The Water Framework Regulations, which implement the European WFD (2000/60/EC);
- NPSfP (DfT, 2012);
- UK Marine Policy Statement (HM Government, 2011) as required by Section 44 of the Marine and Coastal Access Act 2009; and
- East Inshore and East Offshore Marine Plans (Defra, 2014);
- UK Biodiversity Action Plan (Her Majesty's Stationary Office (HMSO), 1994), superseded by the UK Post-2010 Biodiversity Framework (JNCC, 2012);
- Lincolnshire Local Biodiversity Action Plan;
- UK Marine Strategy (Defra, 2019a);
- Advice Note Ten: Habitat Regulations Assessment relevant to Nationally Significant Infrastructure Projects (Planning Inspectorate, 2017b); and
- Relevant local policy.

Description of the existing environment

Data sources

6.4.3 A desk-based study will be undertaken to inform the baseline characterisation on which the impact assessment will be based. This will include the following key data sources:

Nature conservation sites

- Natura 2000 standard data forms or information sheets for each designation: Information on the species and habitats listed in the original citations;
- MAGIC Interactive Map (http://www.magic.gov.uk): Information on the boundaries of designated sites (Natural England, 2020); and
- Natural England Conservation Advice for Marine Protected Areas: Humber Estuary SAC (Natural England, 2021a) and Humber Estuary SPA (Natural England, 2021b) available at https://designatedsites.naturalengland.org.uk/.

Benthic habitats and species

- Project Specific Surveys: Both intertidal and subtidal samples will be collected to characterise the infaunal benthic assemblage within and near to the proposed development footprint. The proposed scope and methods of the surveys are described in more detail in the section on '*Further assessment work required*';
- Humber Estuary SAC Intertidal Sediment Survey: Ecological survey work undertaken in 2014 to monitor and assess the intertidal mudflat and sandflat communities of the Humber Estuary (Franco *et al.,* 2015);
- IOH Benthic Surveys: Intertidal sampling at 14 stations (using a Day Grab (0.06 m²) or Van Veen Grab (0.03 m²)) and subtidal sampling at 17 stations in the Port of Immingham area in 2009 (ABPmer, 2009);
- South Humber Channel Marine Studies: Benthic sampling in the intertidal (using a 0.01 m² core from 36 stations) and subtidal (0.1 m² Hamon grab from 30 stations) between the Humber Sea Terminal and Immingham Port undertaken in 2010 (Institute of Estuarine and Coastal Studies (IECS), 2010);
- HU056 Disposal Site Monitoring: Benthic invertebrate samples collected at five sites within the disposal sites and at hsix locations nearby (triplicate samples at all locations) in 2017; and
- Clay Huts Disposal Site Benthic Monitoring: Benthic invertebrate samples collected from four stations in 2008 from within and near to the Clay Huts disposal sites (ABPmer, 2009).

Fish

- South Humber Channel Marine Studies: Fish surveys in the intertidal (four double-ended fyke nets) and subtidal (eight beam trawls) between the Humber Sea Terminal and Port of Immingham undertaken in 2010 (IECS, 2010);
- Review of fish population data in the Humber Estuary: A review of available data to describe the fish populations in the Humber Estuary (Environment Agency, 2013);
- Environment Agency Transitional and Coastal Waters (TraC) Fish Monitoring: The results of the most recently available Water Framework Directive (WFD) fish monitoring for the nearest sites to the proposed development (seine netting/bream trawls at Foulholme Sands and otter trawls at Burcom). These sites are located approximately 3.5 km from the proposed development with data available up to 2017 for Foulholme Sands and 2019 for Burcom (Environment Agency, 2021b);
- Cefas Spawning and Nursery Grounds of Selected Fish Species in UK waters: Distribution maps of the main spawning and nursery grounds for 14 commercially important species (cod, haddock, whiting, saithe, Norway pout, blue whiting, mackerel, herring, sprat, sandeels, plaice, lemon sole, sole and Norway lobster) (Ellis *et al.*, 2012); and
- Fish Atlas of the Celtic Sea, North Sea, and Baltic Sea: The study provides an overview of information collected from internationally coordinated and national surveys and presents data and information on the recent distribution and biology of demersal and small pelagic fish in these ecoregions (Heessen *et al.,* 2015).

Marine mammals

- Donna Nook Seal Counts: The latest pup counts available from the Lincolnshire Wildlife Trust;
- Marine Mammal Sightings for Immingham and the Humber Estuary: Sightings data compiled from a variety of sources including the Seawatch Foundation (Seawatch Foundation, 2021) and Lincolnshire Environmental Records Centre;
- At-sea Distribution Data for Grey and Harbour Seals: The latest habitat-based predictions of at-sea distribution for grey and harbour seals in the British Isles (including the Humber Estuary region) estimated using data from animal-borne telemetry tags by the Sea Mammal Research Unit (SMRU) (Carter *et al.*, 2020);
- Donna Nook Telemetry Data; The results of the tagging of 11 grey seals from the Donna Nook colony to understand the movements of grey seals in the region (Russel, 2016);
- Special Committee on Seals Annual Report: Information on the status of seals around the UK coast is reported annually by the Sea Mammal Research Unit (SMRU) advised Special Committee on Seals (SCOS) (SCOS, 2021);
- The Identification of Discrete and Persistent Areas of Relatively High Harbour Porpoise Density in the Wider UK Marine Area: The report presents the results of 18 years of survey data in the Joint Cetacean

Protocol (JCP), undertaken to inform the identification of discrete and persistent areas of relatively high harbour porpoise density in the UK marine area (Heinänen and Skov, 2015); and
- Small Cetaceans in European Atlantic Waters and the North Sea (SCANS) III Data: Cetacean surveys to estimate the abundance of cetacean species in shelf and oceanic waters of the European Atlantic undertaken in 2016. Teams of observers searched along 60,000 km of transect line, recording thousands of groups of cetaceans from 19 different species. The survey (SCANS-III) is the third in a series that began in 1994 (SCANS) and continued in 2005 (SCANS-II) (Hammond *et al.*, 2021).

Coastal waterbirds

- IOH Ornithology Surveys: Pre and post consent monitoring of coastal waterbird surveys as part of the IOH development. These surveys which overlap with the proposed development area (Figure 10) have been undertaken between October and March and involve five counts every two hours after high water twice a month. The surveys started in winter 1997/98 and have been ongoing annually since then. The most recent 5-years of data (2016/17 to 2020/21) will be analysed;
- Wetland Bird Survey (WeBS) Core Counts Data: Core count data for data for 'Immingham Docks - Sector K' (ID 38905) which overlaps with the proposed development. The most recent 5-years of data available from the British Trust for Ornithology (BTO) (2015/16 to 2019/20) will be analysed. In addition, estuary wide WeBS data for the Humber Estuary for the same period will also be reviewed to provide contextual information (Frost *et al.*, 2021);
- Natural England Designated Sites Portal: Background information on the ecology of SPA qualifying bird species in the Humber Estuary (Natural England, 2021b); and
- BTO Research Report Analysing WeBS data for the Humber Estuary: Population trends of waterbird species in different parts of the Humber Estuary for the period 2000/01 to 2016/17 (Woodward *et al.,* 2018).

Study area

6.4.4 The study area is the area over which potential direct and indirect effects of the Immingham Eastern Ro-Ro Terminal may occur during construction and operation. The direct effects on nature conservation and marine ecology receptors are those that occur within the footprint of the proposed development, such as the direct disturbance to benthic habitats and associated species as a result of the new piers. Indirect effects are those that may arise outside this footprint, such as the potential noise and visual disturbance effects on waterbirds during construction.

6.4.5 The study area for the nature conservation and marine ecology topic is focused on the Port of Immingham area and proposed disposal sites with data for the wider Humber Estuary region presented where relevant to

provide contextual information and to ensure the area of potential effects (e.g. noise disturbance) are fully considered.

6.4.6 The nature conservation and marine ecology ES chapter will, through further analysis and assessment, refine the study area for the purposes of the impact assessment.

Nature conservation sites and protected species

6.4.7 The Immingham Eastern Ro-Ro Terminal falls within the boundaries of the Humber Estuary SAC, SPA and Ramsar site (collectively forming the Humber EMS; Figure 9). For the Humber Estuary SAC, the primary reason for designation is the presence of two broad scale habitats, “Estuaries” and “Mudflats and sandflats not covered by seawater at low tide”. These broad scale habitats support other more specific habitats which are qualifying features but not a primary reason for designation.

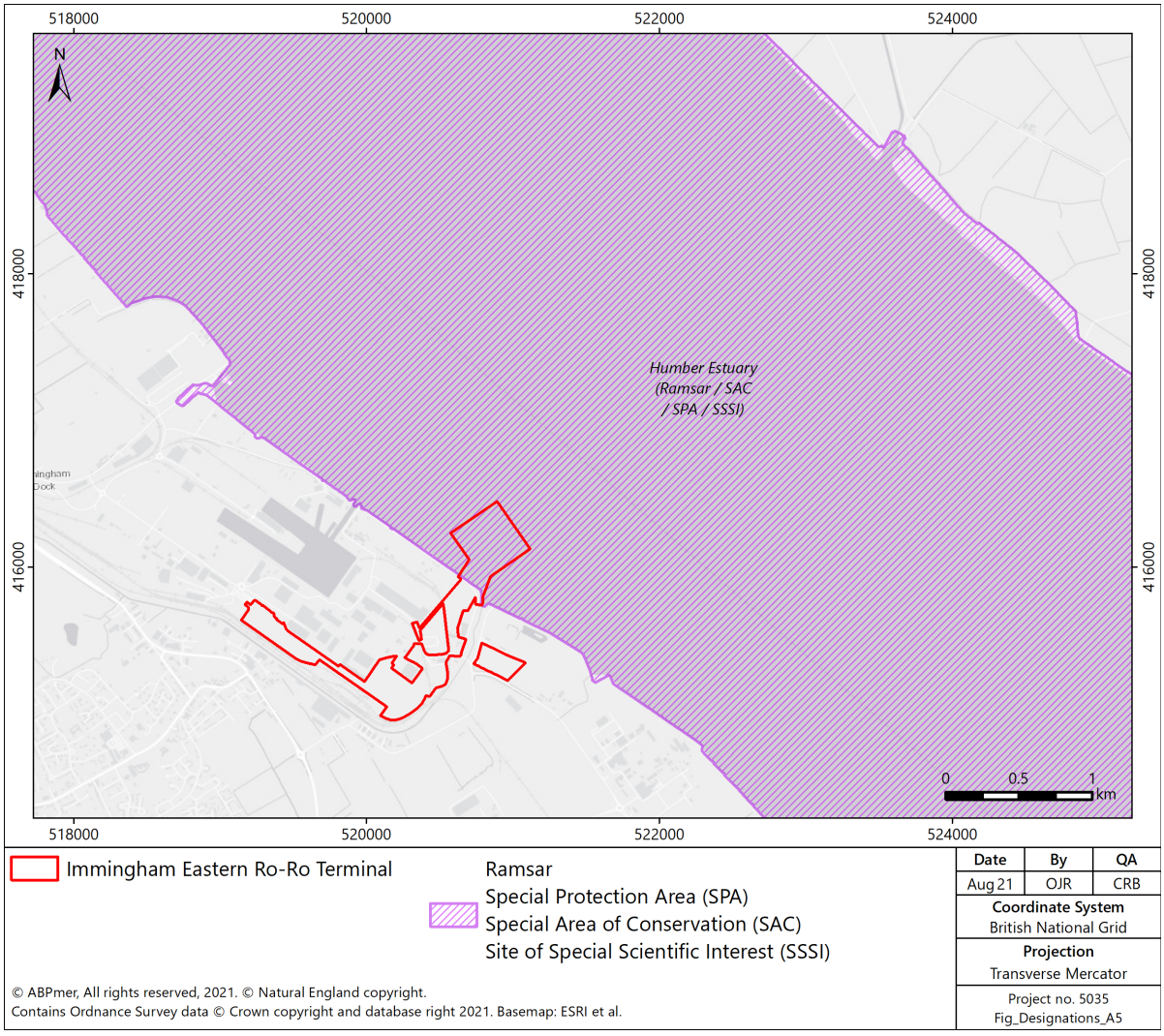


Figure 9. Humber Estuary nature conservation designations

6.4.8 These are:

- Sandbanks which are slightly covered by sea water all the time;
- Coastal lagoons (identified as a priority feature);
- Salicornia and other annuals colonizing mud and sand;
- Atlantic salt meadows (Glauco-Puccinellietalia maritimae);
- Embryonic shifting dunes;
- Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes');
- Fixed coastal dunes with herbaceous vegetation ('grey dunes') (identified as a priority feature); and
- Dunes with Hippopha rhamnoides.

6.4.9 Alongside the habitats that the SAC is designated for, there are also three mobile species listed on Annex II of the EU Habitats Directive (92/43/EEC) that are included in the designation. The three species are:

- Sea lamprey Petromyzon marinus;
- River lamprey Lampetra fluviatilis; and
- Grey seal Halichoerus grypus.

6.4.10 Qualifying features of the Humber Estuary SPA and Humber Estuary Ramsar site are shown in Table 11 and Table 12 respectively.

Table 11. Qualifying features of the Humber Estuary SPA

Internationally Important Populations of Regularly Occurring Annex 1 Species	
Breeding Species Population	
Bittern† *Botaurus stellaris*	2 calling males (10.5 % of the GB population)
Marsh Harrier *Circus aeruginosus*	10 breeding females (6.3 % of the GB population)
Avocet *Recurvirostra avosetta*	64 pairs (8.6 % of the GB population)
Little Tern *Sternula albifrons*	51 pairs (2.1 % of the GB population)
Wintering Species Population	
Bittern†	4 (4.0 % of the GB population)
Hen harrier *Circus cyaneus*	8 (1.1 % of the GB population)
Bar-tailed Godwit *Limosa lapponica*	2,752 (4.4 % of the GB population)
Golden Plover *Pluvialis apricaria*	30,709 (12.3 % of the GB population)
Avocet *Recurvirostra avosetta*	54 (1.7 % of the GB population)
On passage Species population	
Ruff *Calidris pugnax*	128 (1.4 % of the GB population)

Internationally Important Populations of Regularly Occurring Migratory Species	
Wintering Species Population	
Teal† *Anas crecca*	2,322 (<1 % of the population)
Wigeon† *Mareca penelope*	5,044 (<1 % of the population)
Mallard† *Anas platyrhynchos*	2,456 (<1 % of the population)
Turnstone† *Arenaria interpres*	629 (<1 % of the population)
Common Pochard† *Aythya ferina*	719 (<1 % of the population)
Greater Scaup† *Aythya marila*	127 (<1 % of the population)
Brent Goose† *Branta bernicla*	2,098 (<1 % of the population)
Goldeneye† *Bucephala clangula*	467 (<1 % of the population)
Sanderling† *Calidris alba*	486 (<1 % of the population)
Dunlin *Calidris alpina*	22,222 (1.7 % of the Northern Siberia/Europe/Western Africa population)
Red Knot *Calidris canutus*	28,165 (6.3 % of the North-eastern Canada/Greenland/Iceland/North-western Europe population)
Ringed Plover† *Charadrius hiaticula*	403 (<1 % of the population)
Oystercatcher† *Haematopus ostralegus*	3503 (<1 % of the population)
Black-tailed Godwit *Limosa limosa*	1,113 (3.2 % of the Icelandic Breeding population)
Curlew† *Numenius arquata*	3,253 (<1 % of the population)
Grey Plover† *Pluvialis squatarola*	1,704 (<1 % of the population)
Shelduck *Tadorna tadorna*	4,464 (1.5 % of the North-western Europe population)
Redshank *Tringa totanus*	4,632 (3.6 % of the Eastern Atlantic Wintering population)
Northern Lapwing† *Vanellus vanellus*	22,765 (<1 % of population)
On passage Species Population	
Sanderling†	818 (<1 % of the population)
Dunlin	20,269 (1.5 % of the Northern Siberia/Europe/Western Africa population)
Red Knot	18,500 (4.1 % of the North-eastern Canada/Greenland/Iceland/North-western Europe population)
Ringed Plover†	1,766 (<1 % of the population)
Black-tailed Godwit	915 (2.6 % of the Icelandic Breeding population)
Whimbrel† *Numenius phaeopus*	113 (<1 % of the population
Grey Plover†	1,590 (<1 % of the population)
Greenshank† *Tringa nebularia*	77 (<1 % of the population)
Redshank	7,462 (5.7 % of the Eastern Atlantic Wintering population)

Internationally Important Assemblage of Waterfowl	
Waterfowl assemblage	153,934 waterfowl
†Species with this symbol do not represent a population that is > 1 % of the international threshold but are included in the wildfowl assemblage.	

Table 12. Qualifying marine features of the Humber Estuary Ramsar Site

Ramsar Criterion	
Criterion 1 – natural wetland habitats that are of international importance	
The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons.	
Criterion 3 – supports populations of plants and/or animal species of international importance	
The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast.	
Criterion 5 – Bird Assemblages of International Importance	
Wintering waterfowl	153,934 waterfowl (5-year peak mean 1998/99-2002/3)
Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance	
Species	Spring/Autumn Population (5-year peak mean 1996-2000)
Golden Plover	17,996 (2.2 % of the Iceland and Faroes/East Atlantic population)
Red Knot	18,500 (4.1 % of the West and Southern African wintering population)
Dunlin	20,269 (1.5 % of the West Siberia/West Europe population)
Black-tailed Godwit	915 (2.6 % of the Iceland/West Europe population)
Redshank	7,462 (5.7 % of the population)
Species	Wintering Population (5-year peak mean 1996/7-2000/1)
Shelduck	4,464 (1.5 % of the North-western Europe Population)
Golden Plover	30,709 (3.8 % of the Iceland and Faroes/East Atlantic population)
Red Knot	28,165 (4.1 % of the West and Southern African wintering population)
Dunlin	22,222 (1.7 % of the West Siberia/West Europe population)
Black-tailed Godwit	1,113 (3.2 % of the Iceland/West Europe population)
Bar-tailed Godwit	2,752 (2.3 % of the West Paleartic population)
Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path	
The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas.	

6.4.11 The Humber Estuary Site of Special Scientific Interest (SSSI) also overlaps with the extent of the Immingham Eastern Ro-Ro Terminal. This is designated for its nationally important habitat assemblage (intertidal mudflats and sandflats, and coastal saltmarsh) geological interest, importance to breeding, wintering and passage birds, breeding grey seal and the presence of river and sea lamprey.

6.4.12 The Holderness Inshore Marine Conservation Zone (MCZ) is the nearest MCZ to the Immingham Eastern Ro-Ro Terminal (located approximately 20 km away). The site is designated for intertidal sand and muddy sand as well as a variety of subtidal rock and sedimentary habitats.

6.4.13 The nearest Local Nature Reserve (LNR) is Cleethorpes Sands LNR (located approximately 13 km south east of the Immingham Eastern Ro-Ro Terminal) which supports a variety of intertidal and coastal habitats.

Protected species

6.4.14 The Wildlife and Countryside Act 1981 (as amended) (WACA) protects various animals, plants, habitats in the UK. Relevant protected WACA species recorded in the Humber Estuary region include:

- The tentacled lagoon worm *Alkmaria romijni;*
- The lagoon sand shrimp *Gammarus insensibilis*;
- Twaite shad *Alosa fallax* and allis shad *Alosa alosa*;
- Cetacean (whale and dolphin) species; and
- All bird species.

6.4.15 Marine species are also protected from being killed, injured or disturbed both inside and outside designated sites under the provisions of the European Habitats Directive. Of particular relevance to the Humber Estuary, this includes:

- Common seal *Phoca vitulina* and grey seal *Halichoerus grypus* (listed in Annex II and V);
- Bottlenose dolphin *Tursiops truncatus* and harbour porpoise *Phocoena phocoena* (listed in Annex II and IV);
- Sea lamprey *Petromyzon marinus* (listed in Annex II) and river lamprey (listed in Annex II and V);
- Twaite shad *A. fallax* and allis shad *A. alosa* (listed in Annex II and V); and
- Atlantic salmon *Salmo salar* (listed in Annex II and V).

6.4.16 Seals are also protected under the Conservation of Seals Act 1970 (taking effect in England, Scotland, Wales).

6.4.17 All naturally occurring wild bird species, their eggs, nests and habitats are strictly protected under the Birds Directive.

6.4.18 In addition, some marine fauna and habitats are listed as priority species and habitats of principle importance in England, as required under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 (England). Species of principle importance which are of relevance to the Humber Estuary include various species of waterbird, commercial fish (such as cod *Gadus Morhua* and herring *Clupea harengus*), migratory fish (such as lampreys, European smelt *Osmerus eperlanus*, Atlantic salmon and European eel *Anguilla anguilla*). Habitats of principle importance of relevance to the Humber Estuary include intertidal mudflats and coastal saltmarsh.

6.4.19 European eels are also afforded protection as part of the Eels (England and Wales) Regulations 2009. The regulations which apply to all freshwater and estuarine waters of England and Wales gives powers to statutory bodies to implement measures for the recovery of European eel stocks including improving access, habitat quality and fishing pressure.

6.4.20 European smelt are an MCZ Feature of Conservation Importance (FOCI).

Benthic habitats and species

Humber Estuary overview

6.4.21 The Humber Estuary supports a wide variety of marine habitats including intertidal mudflats and sandflats, intertidal seagrass beds, coastal lagoons, saltmarsh, reedbeds, subtidal sandbanks and mixed sediment habitats (Humber Nature Partnership, 2015; Natural England, 2015; Franco, 2015).

6.4.22 The intertidal area of the Humber Estuary is extensive, covering approximately 10,000 ha, of which more than 90 % is mudflat and sandflat (English Nature, 2003). The largest areas of mudflat occur in the outer Humber Estuary at Spurn Bight and Pyewipe, at Foul Holme and Skitter Sand in the mid Humber Estuary and across most of the Estuary width in the inner estuary above the Humber Bridge. This habitat changes from moderately exposed sandy shores at the mouth of the Humber Estuary to sheltered muddy shores within the main body of the Estuary and up into the tidal rivers. The mid and upper Humber Estuary is characterised by fringing reedbeds *Phragmites australis* on the upper shore while saltmarshes are present along the north bank and on the Lincolnshire coast east of Cleethorpes (English Nature, 2003; Natural England, 2021a; Natural England 2021b; Franco, 2015).

6.4.23 The subtidal area of the Estuary is approximately 16,800 ha in extent (English Nature, 2003). The subtidal environment of the Humber is highly dynamic and varies according to the composition of the bottom sediments, salinity, sediment load and turbidity and dissolved oxygen. Many of these factors vary with the season or state of the tide. Subtidal sand (including muddy sand) is the predominant subtidal sediment type in the Humber Estuary. The high mobility of sediments and high turbidity means that this habitat is typically relatively impoverished with a limited fauna characterised

by very low densities of opportunistic species and species adapted to these conditions (Natural England, 2021a; Natural England 2021b; English Nature, 2003).

6.4.24 Invasive marine species known to occur in the Humber Estuary region include slipper limpet *Crepidula fornicata*, Chinese mitten crab *Eriocheir sinensis*, Pacific oyster *Magallana gigas* and acorn barnacle *Austrominius modestus* (Natural England, 2015; IECS, 2010).

Immingham area

6.4.25 Subtidal benthic surveys undertaken in the Port of Immingham area in 2009 and 2010 (see the data sources section above for further details) predominantly recorded mud or muddy sand habitat which was generally impoverished (with < 5 taxa occurring at the majority of sites). The most commonly recorded infaunal species (generally recorded in low abundances) were the polychaetes *Capitella capitata*, *Streblospio shrubsolii* and *Polydora cornuta*, oligochaetes *Tubificoide*s spp, copepods and nematodes (ABPmer, 2009; IECS, 2010).

6.4.26 Intertidal benthic surveys as part of the same survey programmes (see the data sources section above for further details) recorded the oligochaete *Tubificoides benedii*, nematodes, the polychaete *Streblospio shrubsolii* and the amphipod *Corophium volutator* as the most common species occurring on the intertidal mudflat habitat. These species were generally present in most of the samples and occurred at higher abundances than all other species throughout the survey area. In addition, the bivalve *Limecola balthica* was widespread and the polychaete *Hediste diversicolor* was also present at some upper shore stations (ABPmer, 2009; IECS, 2010).

6.4.27 The species recorded in both the subtidal and intertidal surveys are considered commonly occurring estuarine species characteristic of this area of the Humber Estuary.

Disposal sites

6.4.28 At present, subject to identifying alternative beneficial disposal options, it is envisaged that the majority of material will be deposited at Clay Huts disposal site (HU060) with consolidated boulder clay (*circa* 20,000 m³) expected to go to Holme Channel disposal site HU056 (providing there is capacity).

6.4.29 Benthic surveys undertaken in 2008 within and near to Clay Huts disposal sites recorded the polychaetes *Arenicola marina, Pygospio elegans* as well as nematodes and amphipods (ABPmer, 2009). Benthic monitoring in 2017 at the Holme Channel disposal site (HU056) recorded commonly occurring estuarine species such as the polychaetes *Polydora cornuta, Pygospio elegans Arenicola marina and Capitella* spp., bivalve *Limecola balthica,* mysid shrimps and amphipods. The assemblages recorded at all these disposal sites were considered typical of the Humber Estuary with no protected species recorded.

Fish

Humber Estuary overview

6.4.30 The Humber Estuary contains a varied fish fauna, totalling over 80 species with the majority common to most UK estuaries. The Humber Estuary fish assemblage comprises resident, nursery, seasonal and migratory species, typical of estuarine fish communities (Environment Agency, 2013; Elliot and Marshall, 2000).

6.4.31 The Humber Estuary is considered to be a nursery ground for a variety of commercially important species including cod *Gadus morhua*, herring *Clupea harengus*, plaice *Pleuronectes platessa*, sole *Solea solea* and whiting *Merlangius merlangus,* as well as a spawning ground for sole (Ellis *et al*., 2012; Heessen *et al*., 2015). Other commonly occurring estuarine and marine species recorded in the Humber Estuary include flounder *Platicthys flesus*, gobies *Pomatoschistus* sp., dab *Limanda limanda*, sprat *Sprattus sprattus*, sandeels *Ammodytes* sp., 3-spined stickleback *Gasterosteus aculeatus,* sea bass *Dicentrarchus labrax,* sand smelt *Atherina presbyter* and grey mullet species (such as thick lipped grey mullet *Chelon labrosus* and thin-lipped grey mullet *Liza ramada*) (Environment Agency, 2013; Environment Agency, 2021b; IECS, 2010).

6.4.32 Diadromous migratory fish (species migrating between freshwater and seawater) which occur in the Humber Estuary include salmonids (Atlantic salmon *Salmo salar* and sea trout *Salmo trutta*), lampreys (river lamprey *Lampretra fluviatilis* and sea lamprey *Petromyzon marinus*), European eel *Anguilla anguilla*, shads (allis shad *Alosa alosa* and twaite shad *Alosa fallax*) and European smelt *Osmerus eperlanus*. Of these species, European eel, European smelt and river lamprey have been the species most commonly recorded in sampling in the Humber Estuary (Environment Agency, 2013).

6.4.33 In general, the abundance and diversity of fish increases towards the mouth of the estuary. The outer reaches are characterised by a community dominated by inshore marine species such as whiting, dab, plaice and sole. The middle and upper reaches of the estuary support more euryhaline species including flounder, European eel, gobies and sprat (Marshall and Elliot, 1997; Elliott and Marshall, 2000).

6.4.34 The Humber Estuary is considered to support a fish assemblage typical of other estuaries in North Western Europe. However, a higher fish diversity than recorded in other estuaries in the UK has been found which may be due to the large catchment area and high fluvial flow which could allow freshwater taxa to actively or passively occur in greater numbers into the estuary (Waugh *et al*., 2019). Freshwater species recorded in the upper Humber Estuary include roach *Rutilus rutilus*, common bream *Abramis brama* and silver bream *Blicca bjoerkna* (Environment Agency, 2013).

Immingham area

6.4.35 Intertidal fyke net and subtidal beam trawl surveys were undertaken in May/June 2010 at stations between the Humber Sea Terminal and the Port of Immingham (see the data sources section above for further detail).

6.4.36 The intertidal sampling (fyke netting) catch was dominated by flatfish species (flounder and sole) which consisted of 1+group flounder (born the year before) and mostly 0+ group sole, which suggested the area is used as a flatfish nursery. Single individuals of pollock, five-bearded rockling *Ciliata Mustela* and sand goby *Pomatoschistus minutus* were also recorded (due to the small size of sand goby, this fish is normally misrepresented in fyke net catches).

6.4.37 Sand gobies and sole were the most abundant species recorded in the subtidal sampling (beam trawls) with other species recorded in lower abundances including whiting, five-bearded rockling *Ciliata Mustela* and river lamprey. Sole caught in the subtidal survey were significantly larger than the specimens from the fyke nets. This is consistent with earlier research by Cefas that analysed annual 2 m beam trawl and 1.5 m push net survey data from the period 1981 to 1995 and found that 0-group sole were highest in the 2 to 5.9 m depth band (Rogers *et al.,* 1998).

Marine mammals

Humber Estuary overview

6.4.38 The most commonly occurring marine mammals recorded in the Humber Estuary region are seals with populations of both grey seal *Halichoerus grypus* and common (harbour) seal *Phoca vitulina* occurring. Further information about the abundance and distribution of these species is provided below followed by a description of cetacean (whale, dolphin and porpoise) species occurring in the region.

6.4.39 The intertidal area at Donna Nook is the main haul out site in the region and is an important breeding ground for grey seals. In 2016, there were an estimated 60,500 grey seal pups born in Britain (SCOS, 2021) with approximately 3 % of the pup production occurring at Donna Nook. Breeding occurs once a year between October and December and the vast majority of seals breed at Donna Nook, with a few seals breeding on Skidbrooke Ridge, south of Donna Nook. Peak grey seal pup numbers in winter 2020/21 at Donna Nook consisted of 2,214 seals. This is 28 more than in 2019/2020 and 148 more than in 2018/2019.

6.4.40 The intertidal mudflats also provide an important habitat throughout the year for grey seals to haul out or rest, particularly during the spring when all grey seals (except young born the previous year) are moulting. Aerial seal counts undertaken in August 2019 recorded 5,265 grey seals hauled out at Donna Nook. Totals numbers at this colony have increased from the low hundreds recorded in the late 1990s and early 2000s to counts over 5,000 seals in more recent years (SCOS, 2021).

6.4.41 Tagging studies have shown that most feeding activity of grey seals occurs within 100 km of haul out sites but they also frequently undertake longer movements (SCOS, 2021). Seals tagged at Donna Nook were recorded undertaking wide ranging movements in the outer Humber Estuary and approaches as well as more widely in the North Sea (Russel, 2016).

6.4.42 The Humber Estuary region also supports a small population of common seal. As per the grey seal, Donna Nook is also the key haul out site for common seals. A total of 128 common seals were recorded in 2019 as part of annual aerial monitoring in the region in August 2019. Since the 1990s numbers have generally fluctuated between 100 and 400 counts annually (SCOS, 2021). Harbour seals typically forage within 40 to 50 km of haul out sites (SCOS, 2021).

6.4.43 While over ten species of cetacean have been recorded in the southern North Sea, only harbour porpoise *Phocoena phocoena* and white-beaked dolphin *Lagenorhynchus albirostris* can be considered as regularly occurring throughout most of the year and minke whale *Balaenoptera acutorostrata* as a frequent seasonal visitor (Department of Energy and Climate Change (DECC), 2016).

6.4.44 Near to the Humber Estuary, high densities of harbour porpoises have been recorded offshore from the Lincolnshire coast and the Holderness Coast (Hammond *et al*., 2021; Heinänen and Skov, 2015). Harbour porpoise are also frequently recorded foraging in the Humber Estuary (Seawatch Foundation, 2021).

Immingham area

6.4.45 Dedicated marine mammal survey data or sightings records for the Immingham area are limited. However, given that seals (particularly grey seals) are regularly recorded foraging in the Humber Estuary, this species would be expected to occur relatively frequently in this area. Harbour porpoises have also been recorded foraging in this section of the Humber Estuary (Seawatch Foundation, 2021).

Coastal waterbirds

Humber Estuary overview

6.4.46 The Humber Estuary is a site of national and international importance for its wader and wildfowl (ducks and geese) populations, regularly supporting over 130,000 waterbirds during winter and passage periods (Frost *et al.*, 2021; Woodward *et al.,* 2018).

6.4.47 The most abundant wading bird species recorded in the Humber Estuary are Golden Plover and Knot (5-year mean peak for 2015/16 to 2019/20 of 31,237 and 22,500 birds respectively). Other wading birds occurring in large numbers include Dunlin (5-year mean peak of 15,954 birds), Oystercatcher, Black-tailed Godwit, Grey Plover, Curlew, Avocet and Bar-tailed Godwit

(Frost *et al.,* 2021). Important areas for feeding and roosting waders include the Pyewipe frontage on the south bank and Paull Holme, Cherry Cobb, Foulholme, Spurn and Sunk Island Sands on the north bank of the estuary. In the inner section of the Humber Estuary, sites such as Blacktoft Sands, Alkborough and Read's Island Flats are considered important (Natural England, 2021b).

6.4.48 The most abundant wildfowl bird species recorded in the Humber Estuary are Pink-footed Goose and shelduck (5-year mean peak of 14,345 and 4,515 birds respectively). Other commonly occurring wildfowl include Teal, Dark-bellied Brent Geese, Wigeon, Greylag Goose and Mallard (Frost *et al.,* 2021). Pink-footed Goose are recorded in large numbers at Read's Island with Dark-bellied Brent Geese and Wigeon, principally in areas along the southern shore from Cleethorpes to Saltfleetby (Natural England, 2021b).

6.4.49 Black-headed Gull (5-year mean peak of 11,217 birds) as well as Herring Gull and Common Gull (occurring in lower numbers) are widespread in the Humber Estuary.

6.4.50 Diving birds occurring in the Humber Estuary include Common Scoter and Goldeneye (5-year mean peak of 682 and 329 birds respectively) with Cormorants and Tufted Duck also occurring in relatively large numbers.

6.4.51 Sandwich Tern (5-year mean peak of 686 birds) and Common Tern (5-year mean peak of 486 birds) are regularly recorded, particularly in passage periods. Little Tern also breed at a few locations in the Humber Estuary area.

Immingham area

6.4.52 Coastal waterbird surveys of the foreshore in the area of proposed development (between Marsh Lane (Immingham) Western Jetty to the IOT Jetty ('Sector B' in Figure 10) have recorded over 20 bird species with approximately 15 species considered regularly occurring. The results of surveys for the last five years of surveys (2016/17 to 2020/21) are briefly summarised below.

6.4.53 The most numerous wading bird species recorded foraging within the area over this period were Dunlin and Black-tailed Godwit (5-year mean peaks of 388 and 334 birds respectively). Other wading birds recorded included Redshank, Turnstone, Oystercatcher and Curlew. Shelduck were the most abundant wildfowl species recorded foraging (5-year mean peak of 67 birds). Lower numbers of other ducks such as Teal and Mallard were also recorded

6.4.54 With respect to roosting birds, Dunlin and Redshank were the most numerous species recorded (5-year mean peaks of 233 and 109 birds respectively). Other species regularly recorded roosting included Shelduck (5-year mean peak of 57 birds) as well as Black-tailed Godwit, Curlew and Turnstone.

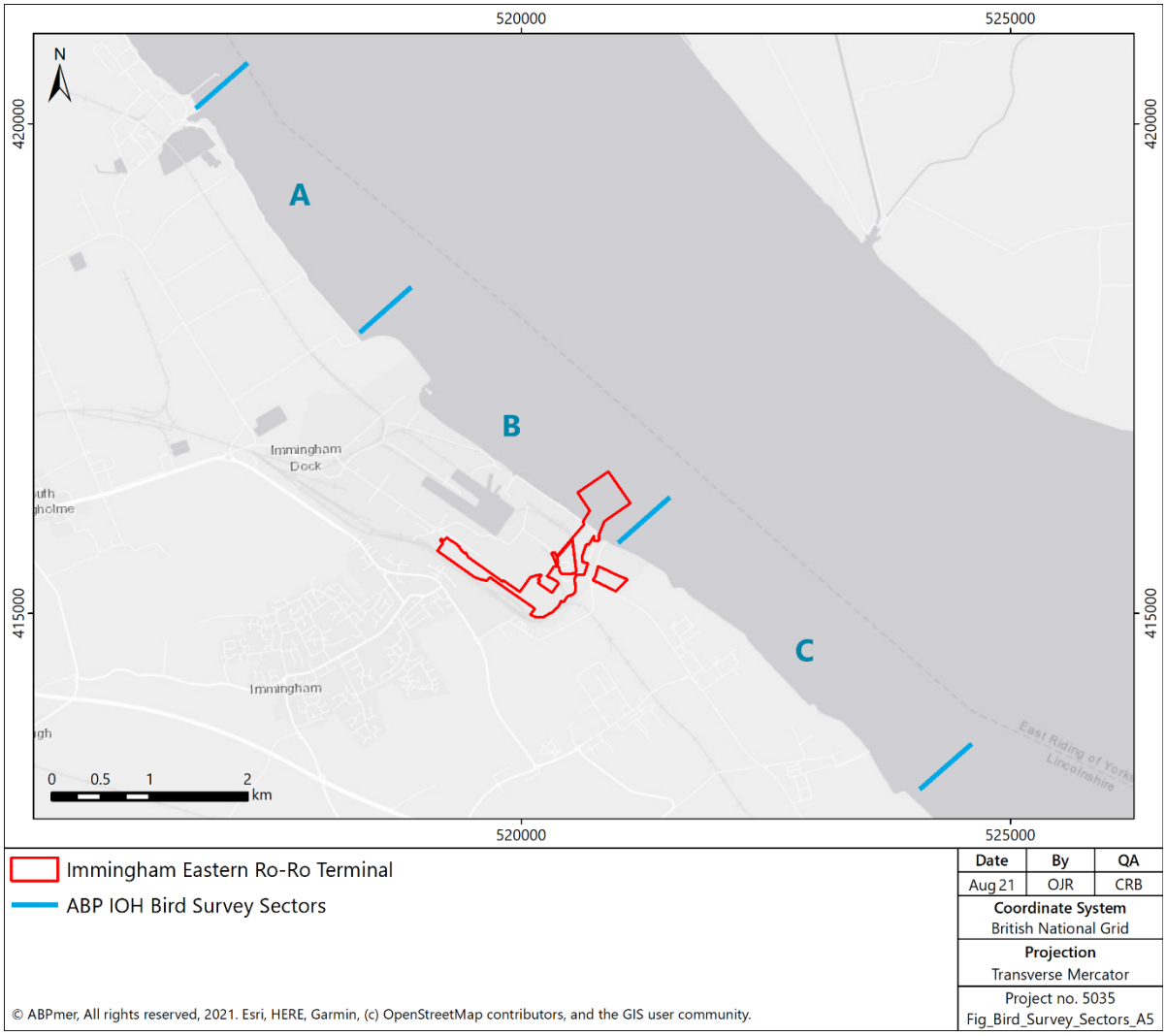


Figure 10. Pre and post consent monitoring locations of coastal waterbird surveys as part of the Immingham Outer Harbour development

Future baseline

6.4.55 If the proposed development were not to take place, nature conservation and marine ecology receptors, namely protected sites, benthic ecology, fish and shellfish, marine mammals and coastal waterbirds, will continue to be influenced by natural and human-induced variability, ongoing cyclic patterns and trends. The future baseline will also be influenced by climate change, ocean acidification and increases in non-native species. These could lead to changes in distribution, abundance, health and reproduction in marine species, potentially affecting future populations.

Possible environmental impacts

6.4.56 The proposed development has the potential to affect nature conservation and marine ecology receptors during both construction and operation. The nature conservation and marine ecology chapters in the ES will set out the assessment of the likely changes to be generated by the Immingham

Eastern Ro-Ro Terminal, both beneficial and adverse and during both the construction and operational phases.

Scoped in

6.4.57 The potential impact pathways during the construction phase are as follows:

Benthic habitats and species

- Direct loss of intertidal habitat as a result of capital dredging;
- Direct loss of intertidal and subtidal habitats and species as a result of the piles;
- Direct changes to benthic habitats and species as a result of capital dredging and dredge disposal;
- Indirect changes to benthic habitats and species as a result of changes to hydrodynamic and sedimentary processes during capital dredging and dredge disposal;
- Changes in water and sediment quality during capital dredging and dredge disposal;
- Underwater noise and vibration disturbance during piling, capital dredging and dredge disposal; and
- Introduction and spread of non-native species.

Fish

- Direct loss of intertidal habitat a result of dredging;
- Direct loss or changes to fish populations and habitat as a direct result of capital dredging and dredge disposal;
- Changes in water and sediment quality during capital dredging and dredge disposal; and
- Underwater noise and vibration disturbance during construction.

Marine mammals

- Underwater noise and vibration disturbance during construction.

Coastal waterbirds

- Direct loss of intertidal feeding and roosting habitat a result of capital dredging;
- Direct loss and change to feeding and roosting habitat a result of the piles;
- Changes to foraging and roosting habitat as a result of capital dredging and dredge disposal; and
- Airborne noise and visual disturbance during construction.

6.4.58 The potential impact pathways during the operational phase are as follows:

Benthic habitats and species

- Direct changes to benthic habitats and species as a result of sediment removal and deposition during operation (specifically maintenance dredging, dredge disposal and due to operational berth vessel movements);
- Indirect changes to benthic habitats and species as a result of changes to hydrodynamic and sedimentary processes during operation;
- Changes in water and sediment quality during operation;
- Underwater noise and vibration disturbance during operation; and
- Introduction and spread of non-native species.

Fish

- Changes to fish populations and fish habitat during operation (as a result of maintenance dredging, dredge disposal and operational berth vessel movements);
- Changes in water and sediment quality during operation; and
- Underwater noise and vibration disturbance operation.

Marine mammals

- Underwater noise and vibration disturbance during operation.

Coastal waterbirds

- Changes to foraging and roosting habitat during operation (as a result of maintenance dredging, dredge disposal and operational berth vessel movements); and
- Airborne noise and visual disturbance during operation.

6.4.59 Potential cumulative effects on nature conservation and marine ecology receptors could arise as a result of other coastal and marine developments in the area, as well as ongoing activities, including maintenance dredging and disposal activities. These will be considered as part of the cumulative and in-combination assessment (Section 5.2).

Scoped out

6.4.60 The following pathways during the construction phase are proposed to be scoped out of the EIA:

All marine ecology receptors (benthic habitats and species, fish, marine mammals and coastal waterbirds)

- **Changes to seabed habitats and species as a result of sediment deposition during piling**: Piling has the potential to result in the localised resuspension of sediment as a result of seabed disturbance. The amount of sediment that settles out of suspension back onto the seabed as result of piling is expected to be negligible and benthic habitats and species are not expected to be sensitive to this level of

change. This impact pathway has, therefore, been scoped out of the assessment for benthic habitats and species, as well as for other marine ecology receptors (fish, marine mammals and coastal waterbirds) in terms of changes to supporting habitat and prey resources.

- Indirect changes to seabed habitats and species as a result of changes to hydrodynamic and sedimentary processes due to the presence of the piles: The pile structures have the potential to result in changes to hydrodynamic and sedimentary processes (e.g. flow rates, accretion and erosion patterns). However, such effects are anticipated to be negligible and highly localised (which will be confirmed by the physical processes assessment) and marine habitats and species are not expected to be sensitive to this level of change. This impact pathway has, therefore, been scoped out of the assessment for benthic habitats and species as well as for other marine ecology receptors (fish, marine mammals and coastal waterbirds) in terms of changes to supporting habitat and prey resources. The physical processes assessment (Section 6.2) will determine the scale/magnitude of these indirect changes and confirm if this impact pathway requires any further consideration in the nature conservation and marine ecology assessment at the PEIR/ES stage.
- **Changes in water and sediment quality during piling**: The expected negligible, highly localised and temporary changes in suspended sediment levels (and related changes in sediment bound contaminants and dissolved oxygen) associated with bed disturbance during piling is considered unlikely to produce adverse effects in any marine species. This impact pathway has, therefore, been scoped out of the assessment for all marine ecology receptors (fish, marine mammals and coastal waterbirds). The physical processes assessment (Section 6.2) and water and sediment quality assessment (Section 6.3) will determine the scale/magnitude of these changes and confirm if this impact pathway requires any further consideration in the nature conservation and marine ecology assessment at the PEIR/ES stage.

6.4.61 In addition, the following pathways during both the construction and operational phase are proposed to be scoped out of the EIA:

Marine mammals

- Changes to marine mammal foraging habitat and prey resources during dredging and dredge disposal (both capital and maintenance) and operational berth vessel movements: There is the potential for impacts to marine mammals as a result of changes to marine mammal foraging habitat and prey resources. However, the footprint of the proposed development only covers a highly localised area that constitutes a negligible fraction of the known ranges of local marine mammal populations. This impact pathway has, therefore, been scoped out of the assessment.
- **Collision risk during construction and operation**: Vessels involved in construction, dredging activity or berth operations will be mainly stationary or travelling at low speeds, making the risk of collision low.

Furthermore, the region is already characterised by heavy shipping traffic. Marine mammals foraging within the Humber Estuary routinely need to avoid collision with vessels and are, therefore, considered well adapted to living in an environment with high levels of vessel activity. This impact pathway has, therefore, been scoped out of the assessment.

- **Water quality impacts during dredging and dredge disposal** (**both capital and maintenance) and operational berth vessel movements**: The plumes resulting from dredging would be expected to have a relatively minimal and local effect on SSC in the vicinity of the proposed development. Marine mammals in the Humber Estuary are well adapted to highly turbid conditions and, therefore, not sensitive to the scale of changes in SSC anticipated during capital dredging (Todd *et al*., 2015). Any temporary and localised changes in water column contamination levels are considered unlikely to produce any lethal and sub-lethal effects in these highly mobile species (the concentrations required to produce these effects are generally acquired through long-term, chronic exposure to prey species in which contaminants have bioaccumulated) (Todd *et al.,* 2015). The potential for water quality impacts to marine mammals during piling has, therefore, been scoped out of the assessment. The physical processes assessment (Section 6.2) will determine the scale/magnitude of changes in SSC and confirm if this impact pathway requires any further consideration in the nature conservation and marine ecology assessment at the PEIR/ES stage.

Further assessment work required

6.4.62 The significance of the above impact pathways will be assessed for the purposes of the ES using the proposed impact assessment methodology (Section 5.2). In accordance with published guidance, the assessment will include a detailed evaluation of the importance/value and sensitivity of relevant marine ecology receptors at the site, as well as details of proposed mitigation measures to avoid or reduce any significant adverse effects.

6.4.63 It is recognised that there are important linkages between the nature conservation and marine ecology topic and other EIA topics. For example, the assessment of indirect impacts on nature conservation and marine ecology receptors will be informed by the outcomes of the physical processes (Section 6.2) and water and sediment quality assessments (Section 6.3).

6.4.64 Information will also be provided to enable the competent authority to undertake an AA, assessing the effects of the proposed development on the interest features of European/Ramsar sites. This HRA will be provided as a technical appendix to the ES (Section 4.5).

Survey requirements

6.4.65 Site specific fish, marine mammal or waterbird surveys are not considered to be necessary for the Immingham Eastern Ro-Ro Terminal given that the existing available data sources are adequate for the purposes of

characterising these receptors in the study area as part of the EIA and HRA. The site-specific surveys and studies that are proposed to be carried out to inform the impact assessment are described in the following sections.

Subtidal benthic habitat survey

6.4.66 A benthic survey will be undertaken to characterise the benthic fauna within the following areas.

- **Proposed development footprint**: It is currently proposed that up to 10 stations are sampled. The location of these stations is shown in Figure 11.
- **Clay Huts Disposal Site (HU060)**: It is currently proposed that six stations are sampled (four in the disposal site and two nearby). The location of these stations is shown in Figure 12.

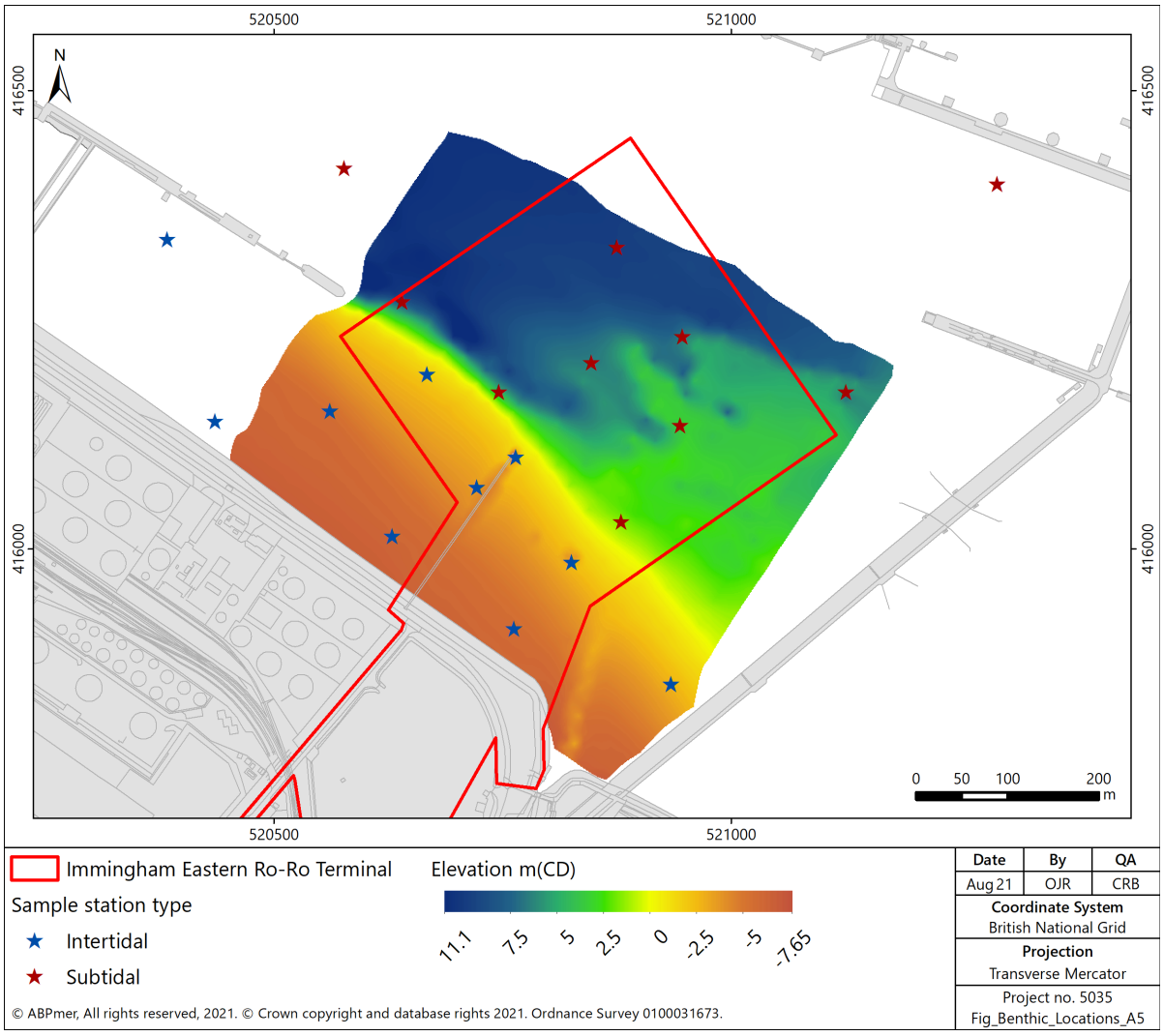


Figure 11. Proposed benthic survey sampling locations in proposed development footprint

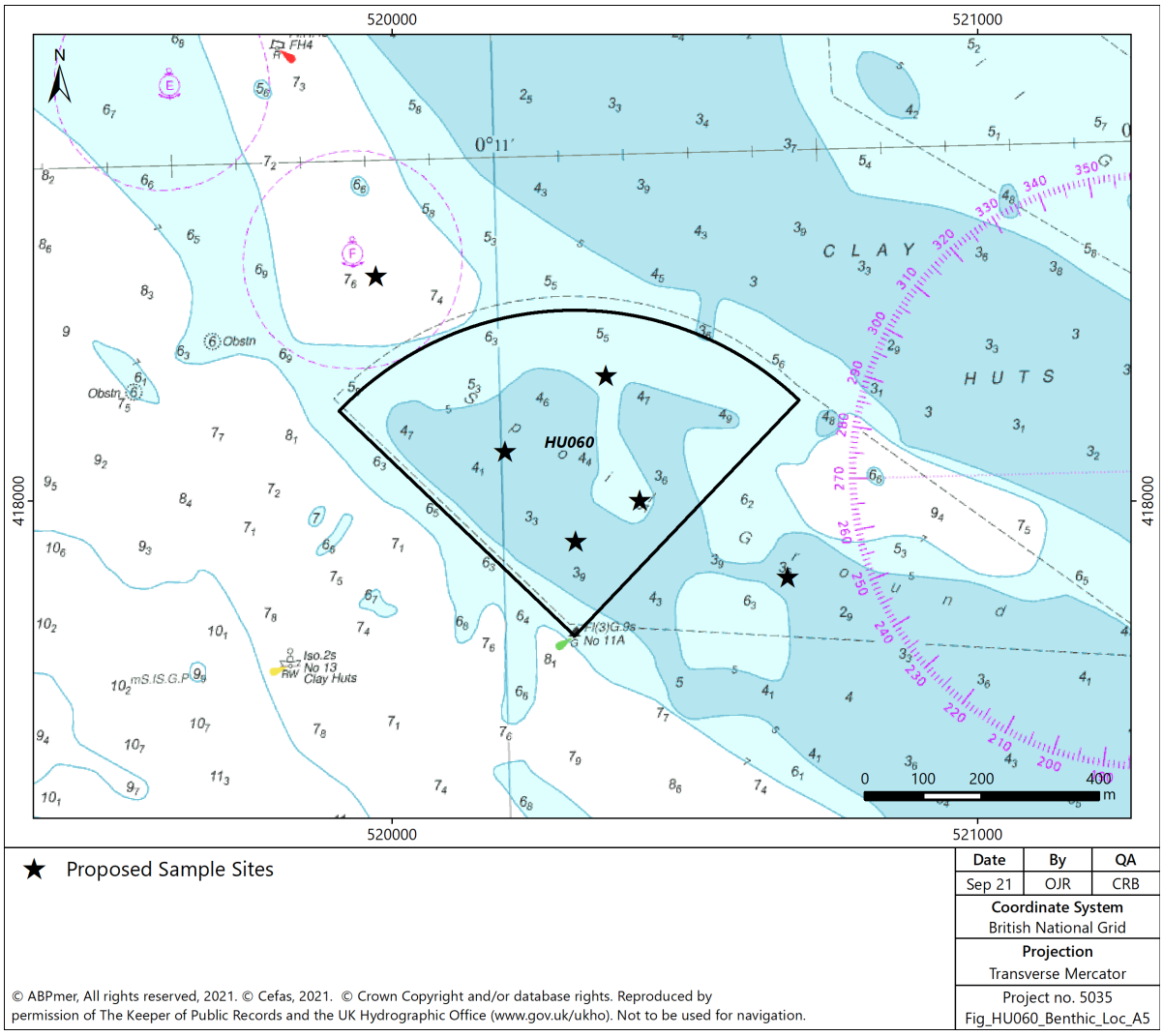


Figure 12. Proposed benthic survey sampling locations at disposal site HU060

6.4.67 Relatively contemporary benthic survey data is available for Holme Channel disposal site HU056 (collected in 2017). During the survey, samples were collected at five stations within the disposal sites and at six locations nearby. This data is considered suitable for baseline characterisation purposes with no other additional sampling proposed for this disposal site.

6.4.68 The benthic samples will be collected using a 0.1 m² Day Grab or Hamon Grab for macrofauna analysis (faunal composition, abundance and biomass). An additional sample will be taken at each station for determination of PSA and Total Organic Carbon (TOC).

6.4.69 At each site, up to three attempts will be made to retrieve a suitable sample (i.e. a grab containing sufficient volume of sediment for analysis). The sediment depths within the grab that will be used for sample acceptance are a minimum of 7 cm for muddy or soft sediments and 5 cm for hard packed or coarse sediments. Anything less than these values will only be retained if no other viable sample can be collected. Samples will be sieved and fixed on

the vessel and sent to an accredited National Marine Biological Analytical Quality Control (NMBAQC) laboratory within five hours of collection.

Intertidal benthic habitat survey

6.4.70 In order to characterise the intertidal benthic community present in the vicinity of the proposed marine works, an intertidal sampling survey will be undertaken using a dedicated two-person hovercraft to access the shoreline safely. It is proposed that 10 stations are sampled (Figure 11).

6.4.71 At each of these stations, a sample will be collected using a 0.01 m² hand-held corer (to a depth of approximately 15 cm) and analysed for macrofaunal analysis (faunal composition, abundance and biomass). An additional core sample will also be collected at each station for PSA and TOC.

6.4.72 Field notes will also be made about the nature of the habitats at each of the sampling points. Information recorded will include details on the sediment type, evidence of bird feeding (e.g. footprints), the specific characteristics of the habitat at the precise point where the samples will be retrieved and general characteristics of the wider habitat. A photographic record of the sediment type and the broader habitat appearance will also be taken.

6.4.73 Samples will be sent to an accredited NMBAQC laboratory to be analysed.

Underwater noise modelling

6.4.74 Underwater noise modelling will be undertaken to assess the potential effects of underwater noise associated with the proposed development (i.e. piling, dredging and vessel movements). In accordance with good practice guidance (National Physics Laboratory, 2014), a simple logarithmic spreading model will be used to predict the propagation of sound pressure with range. This model is represented by a logarithmic equation and will incorporate factors for noise attenuation and absorption losses based on empirical data from coastal environments. The advantage of this model is that it is simple to use and quick to provide first order calculations of the received (unweighted) sound pressure levels (SPL) with distance from the source due to geometric spreading.

6.4.75 Although the logarithmic spreading model generally represents a simplistic model of propagation loss, its use is an established approach in EIAs that has been widely accepted by UK regulators for recent port and waterfront developments. Furthermore, the National Oceanic and Atmospheric Administration (NOAA) Fisheries in the United States recommends the use of the practical spreading model to developers and has incorporated this model in their pile driving calculation spreadsheet to assess the potential impacts of pile driving on fish (NOAA, 2020). The proposed piling and dredging works will be in very shallow water and, therefore, the propagation of noise will be limited. Overall, therefore, a simple logarithmic spreading

model is considered proportionate and appropriate to use for this underwater noise assessment.

6.4.76 A range of available published criteria will then be used to assess the potential physiological and behavioural effects of underwater noise on key sensitive receptors in the study area (or zone of influence), including fish and marine mammals (e.g. Popper *et al*. 2014; Hawkins *et al*., 2017; NOAA, 2018; Southall *et al*., 2007; 2019).

6.4.77 The potential significance of these effects will then be assessed in the context of the physical nature of the location, the spatiotemporal variability of underwater noise generated by the proposed development, and the baseline (ambient noise) environment. The latest available scientific literature of vibration (particle motion) effects on benthic invertebrates and fish will also be reviewed to inform the underwater noise assessment.

6.5 Terrestrial ecology

6.5.1 This section sets out the proposed scope of the approach to identifying and assessing impacts on terrestrial ecology resulting from the Immingham Eastern Ro-Ro Terminal.

6.5.2 A Phase 1 Habitat survey and Preliminary Ecological Appraisal (PEA) was undertaken in July 2021, a summary of which is provided in this chapter. Given the low ecological value of the habitats identified, and that the site does not support any protected or notable species with the exception of a limited suite of breeding bird species (for which standard pre-construction mitigation measures will be adopted for legislative compliance), terrestrial ecology is proposed to be scoped out of the EIA.

6.5.3 Potential impacts on the adjacent Humber Estuary EMS, which incorporates the SPA, SAC, Ramsar and SSSI designations, will be assessed in the nature conservation and marine ecology ES chapter (see Section 6.4) and, therefore, are not considered further in this section.

Legislation, policy and guidance position

6.5.4 The following policy, legislation and guidance has been taken into account when considering the potential effects of the proposed development on terrestrial ecology receptors:

- The Habitats Directive;
- The Birds Directive;
- Regulation (EU) 1143/2014 on the introduction and spread of invasive alien species (IAS);
- The Wildlife and Countryside Act (WCA) 1981, as amended;
- The Countryside and Rights of Way Act 2000;
- The Habitats Regulations, which implement the Birds Directive (2009/147/EC) and Habitats Directives (92/43/EEC);

- The Natural Environment and Rural Communities (NERC) Act 2006;
- Animal Welfare Act 2006;
- National Planning Policy Framework (Ministry of Housing, Communities and Local Government (MHCLG), 2021);
- NPSfP (DfT, 2012);
- UK Biodiversity Action Plan (HMSO, 1994), superseded by the UK Post-2010 Biodiversity Framework (JNCC, 2012);
- Greater Lincolnshire Nature Partnership Local Nature Recovery Strategy (LNR); and
- Relevant local policy.

Description of the existing environment

Data sources

6.5.5 A desk-based study has been undertaken as part of a Preliminary PEA undertaken by Wold Ecology (Wold Ecology, 2021), and obtained data from the following key data sources:

- Multi Agency Geographical Information for the Countryside (MAGIC) website – for statutory designated sites within 2 km of the proposed development;
- Lincolnshire Ecological Records Centre (LERC) – for non-statutory designated sites, and for records of protected and notable species records within 2 km of the proposed development;
- Natural England Priority Habitat Inventory – for records of priority habitats within 2 km of the proposed development; and
- Local Authority Planning Portal – for any relevant ecological records pertaining to the proposed development site and its immediate surrounds.

Study area

6.5.6 The study area is the area over which potential direct and indirect effects of the Immingham Eastern Ro-Ro Terminal may occur during construction and operation. The direct effects on potential terrestrial ecology receptors are those that occur within the footprint of the proposed development, such as the direct disturbance of habitat and associated species as a result of landside construction activities. Indirect effects are those that may arise outside this footprint, such as the potential noise and visual disturbance effects on species.

6.5.7 For the purposes of the initial impact review in this Scoping Report, a 2 km desk study area, measured from the boundary of the proposed development site, was used to identify potentially relevant ecological receptors.

Nature conservation sites

6.5.8 As identified in Section 6.4 of this Scoping Report, the nearest statutory designated site to the proposed development is the Humber Estuary EMS,

which encompasses the Humber Estuary SPA, SAC, Ramsar and SSSI designations. The marine elements of the proposed development are within the Humber Estuary EMS and direct and indirect impacts on the designated habitats and features (including subtidal and intertidal habitats, marine species and coastal waterbird features) will be considered within the marine ecology chapter of the ES. No further consideration is, therefore, given to the Humber Estuary EMS in this section of the Scoping Report.

6.5.9 The desk study identified two non-statutory designated sites within 2 km of the proposed development:

- Laporte Road Brownfield Site Local Wildlife Site (LWS) – approximately 480 m south-east of the proposed development; and
- Homestead Park Pond LWS – approximately 1 km west of the proposed development.

6.5.10 Neither LWS has any habitat connectivity with the proposed development.

Habitats

6.5.11 A Phase 1 Habitat survey was undertaken on 22 July 2021 (Wold Ecology, 2021) and all habitats were mapped in accordance with the JNCC (2010) survey methodology.

6.5.12 The proposed development site is located within the boundaries of the wider Immingham Dock complex, in an industrialised location. The proposed development site is bound to the north by the Humber Estuary, to the south by an existing freight railway line, to the west by port development and to the east by arable farmland. A substantial unnamed drain and associated riparian habitat flows south-north adjacent to part of the proposed development, and outfalls into the Humber Estuary.

6.5.13 A large proportion of the proposed development site comprises hard standing, roads and materials storage within the operational port complex. These areas support little or no vegetation and are of no ecological importance.

6.5.14 Vegetated parts of the proposed development site are sparse given the regular disturbance to the areas as part of the ongoing operational port usage. In areas where crushed stone, damaged tarmac and railway ballast occur across large parts of the site, ephemeral/ short perennial vegetation has become established. This is a sparse covering of pioneer vegetation communities with a relatively diverse species assemblage. Species included evening primrose *Oenothera biennis*, wall speedwell *Veronica aervensis,* and rats tail fescue *Vulpia myuros.*

6.5.15 Areas of semi-improved grassland have also become established in undisturbed corners of the site, within which tall ruderal stands also occur frequently throughout. Grassland areas were dominated by species such as

cock's-foot *Dactylus glomerata*, creeping bent *Agrosis stolonifera* and false-oat grass *Arrhenatherum elatius*, with stands of common reed *Phragmites australis*.

6.5.16 There are occasional dense stands of scrub vegetation dominated by hawthorn *Crataegus monogyna* in unused parts of the site. A small number of scattered mature trees are present along the boundaries of the proposed development site with species recorded including Lawson cypress *Chamaecyparis lawsoniana*, silver birch *Betula pendula*, grey poplar *Populus alba x tremula*, London plane *Plantanus x acerifolia*, balsam poplar cultivar *Populus candicans* and goat willow *Salix caprea*.

6.5.17 An appraisal of the habitats has been undertaken against the UK Priority Habitat criteria for 'Open Mosaic Habitats on Previously Developed Land' (OMH), and although meeting some criteria, the site does not comply with all criteria required to achieve this habitat classification. None of the other habitats within the proposed development meet the criteria for UK Priority Habitats.

Bats

6.5.18 The desk study returned records of brown long-eared *Plecotus auritus*, noctule *Nyctalus noctula* and common pipistrelle *Pipistrellus pipistrellus* bats within 2 km of the proposed development site.

6.5.19 As part of the PEA, mature trees and buildings were appraised for their potential to support roosting bats, and none were considered suitable:

- Water tower – this was the only building identified in the baseline surveys, and was appraised as being of negligible suitability for roosting bats;
- Trees – there were very few mature trees within the proposed development site, and none had any features that were considered suitable to support roosting bats; and
- The buildings in the northernmost portion of the site (on the land adjacent to the Estuary) comprise a series of large operational warehouses and storage sheds that are unlikely to support roosting bats, although these will be fully appraised within the PEA submitted as part of the application.

6.5.20 It is therefore concluded that the proposed development site is not suitable for roosting bats. The majority of the proposed development site is dominated by open bare ground habitats with only small pockets of grassland/ scrub within the operational port complex. This, combined with the relatively exposed estuarine location of the site, means that it is sub-optimal for foraging and commuting bats, and would reasonably be only likely to support small numbers of common species of bats. Any loss of habitat would not be considered integral to the maintenance of the favourable conservation status of any local bat populations.

Great crested newt

6.5.21 The desk study returned records of great crested newt *Triturus cristatus* but these all dated back to the 1970s; there are no recent records of this species within 2 km of the proposed development site.

6.5.22 A combination of field survey and desk study identified one waterbody within the proposed development site, and six within 250 m of the proposed development. The pond within the site boundary is a small sump (<50 m²) at TA 20220 14962 in the south-east corner of the site, comprising a concrete man-made channel that runs beneath the railway line. At the time of the Phase 1 Habitat survey it was very shallow and is reasonably considered to dry most years. The pond scored 0.58 (below average suitability) on the great crested newt Habitat Suitability Index (HSI) assessment. Based on the likely poor water quality, salinity and relatively isolated nature of the pond within an industrial area, it is considered unsuitable for breeding great crested newt.

6.5.23 All six waterbodies within 250 m of the site boundary are industrial lagoons with poor water quality and/ or saline influences and are considered unsuitable for great crested newt.

6.5.24 Based on the lack of suitable habitat for great crested newt, it is reasonable to conclude that this species is likely absent from the proposed development site.

Breeding birds

6.5.25 The bare ground habitats present on site within the existing car storage area provide potential nesting opportunities for the Schedule 1 species little ringed plover *Charadrius dubius*. Although generally these areas are subject to regular disturbance as part of their current usage for car storage, the ephemeral breeding biology of this species means that if suitable undisturbed open areas of land become available, they could attempt to breed on the site. However, the habitats are unlikely to be used by anything other than occasional pairs of Ringed Plover on an *ad hoc* basis depending on the usage of the site in any given year at the start of the breeding season.

6.5.26 The water tower within the proposed development site could provide potentially suitable habitat for nesting peregrine *Falco peregrinus*. However, there was no evidence of nesting peregrine when the tower was inspected in July, when breeding activity would be readily detected. It is, therefore, reasonable to conclude that this species does not currently breed on site.

6.5.27 The mosaic of grassland, scrub and open areas may support a limited suite of common breeding species, but any habitat losses would be placed into context with the likely existing high levels of disturbance to habitats within the site boundary as a result of continued operational use.

Badger

6.5.28 The desk study returned records of badger within 2 km of the proposed development. However, no badger setts or signs of badger activity were recorded within the proposed development site as part of the Phase 1 Habitat survey undertaken in July.

6.5.29 Some of the areas of denser scrub were not accessible for the purposes of survey. However, given the urban nature of the site and the limited foraging opportunities for this species, it is considered unlikely to support badger.

Reptiles

6.5.30 The desk study did not identify any records of reptiles within 2 km of the proposed development.

6.5.31 The majority of the habitats within the proposed development site are considered unsuitable for reptiles as the site is dominated by bare ground and hardstanding. Any suitable potential habitat for reptiles is limited to small isolated patches of homogenous habitat that lack the habitat complexity favoured by reptiles for basking, refuge and hunting. On this basis, it is reasonable to conclude that reptiles are likely to be absent from the proposed development site.

Otter and water vole

6.5.32 The desk study returned records of both otter *Lutra lutra* and water vole *Arvicola amphibius* within 2 km of the proposed development. However, there is no suitable habitat for these species within the proposed development site boundary.

6.5.33 The unnamed drain that runs adjacent to part of the proposed development boundary could provide suitable habitat for both species. However, there is no habitat connectivity between the drain/ riparian habitat and the proposed development site as it is separated by the road/ rail network. Although these features would not be a barrier to the movement of otter onto the site, habitats within the site do not provide substantive cover for otter, and it is reasonable to conclude that even if present on the adjacent watercourse, this species would not be present on the site.

6.5.34 Water vole would not reasonably be expected to be present within the proposed development boundary because there is no suitable habitat for this species on the site.

Future baseline

6.5.35 The habitat within the study area is dominated by hardstanding and buildings associated with port operations, with small pockets of peripheral habitats. In the short term, in the absence of the proposed development, the site would continue to be utilised for port activity, and it is concluded that the

limited suite of semi-natural habitats recorded would not change significantly. It is, therefore, reasonable to conclude that there would continue to be negligible potential for protected species to occur within the proposed development footprint. The future baseline will also be influenced by climate change.

Possible environmental impacts

6.5.36 A PEA has been undertaken in accordance with CIEEM guidance (CIEEM, 2017), and a PEA report will be submitted as part of the DCO application.

6.5.37 Habitats within the proposed development boundary are reasonably concluded to be of low ecological value given its setting within an operational port, and the walkover survey did not identify the potential for protected species to be present (other than nesting birds, on which impacts can be mitigated through standard pre-construction measures). No further baseline surveys are identified as necessary. It is, therefore, concluded that the proposed development does not have the potential to result in significant effects on terrestrial ecology receptors during construction and operation, and this topic is proposed to be scoped out of the EIA.

6.5.38 Potential impacts on the Humber Estuary SPA/ SAC/ Ramsar/ SSSI will be assessed within the marine ecology chapter of the ES; this includes coastal waterbird features that may utilise the intertidal mudflat habitats adjacent to and within the boundary of the proposed development, as well as terrestrial habitats (e.g. for high tide roosting/ loafing). Information will also be provided to enable the competent authority to undertake an AA, assessing the effects of the proposed development on the interest features of European/Ramsar sites. This HRA will be provided as a technical appendix to the ES (Section 4.5).

6.5.39 In accordance with the recommendations in the PEA Report, the following precautionary mitigation will be implemented as part of the construction phase:

- Breeding birds - vegetation clearance (including trees and scrub) will be undertaken outside the breeding bird season (May to August inclusive) where possible. If this is not possible, vegetation to be cleared will be checked for the presence of active nests prior to removal. Where active nests are found, an appropriate buffer will be established around the nest and no clearance will be undertaken within the buffer until any young have fledged and the nest is no longer occupied; and
- Badger - should a badger sett(s) be subsequently recorded within the site boundary, a standard mitigation approach to sett closure through the Natural England licensing scheme would be adopted, in the event that damage/ disturbance to the sett(s) could not be avoided.

6.5.40 Any impacts on breeding birds are considered to be adequately addressed through these standard mitigation approaches. The loss of habitat as a

result of the proposed development would not reasonably give rise to significant effects on the species, given the likely sporadic suitability of the site as breeding habitat.

Further assessment work required

6.5.41 The PEA report will be submitted alongside the ES to support the DCO application. This will include the following:

- Desk study - for records of statutory and non-statutory sites, and protected and notable species within 2 km of the proposed development (the results of which are summarised in this Scoping Report);
- Phase 1 Habitat survey – to record and map habitats in accordance with the standard survey methodology (JNCC, 2010);
- Protected species habitat appraisal – to determine the potential for protected species to occur on the site, and to identify requirements for further survey; and
- Preliminary ecological appraisal – to identify key ecological constraints, mitigation and biodiversity enhancement opportunities.

6.5.42 Further ecology surveys are not considered necessary for the proposed development as these have been scoped out, using professional judgement, due to the habitat within the site not being suitable to support any such species.

6.6 Commercial and recreational navigation

6.6.1 This section sets out the proposed scope of the Immingham Eastern Ro-Ro Terminal ES chapter that will report the findings of the commercial and recreational navigation assessment of the proposed development.

Legislation, policy and guidance position

6.6.2 The potential effects of the Immingham Eastern Ro-Ro Terminal on commercial and recreational navigation will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- NPSfP (DfT, 2012);
- UK Marine Policy Statement (HM Government, 2011) as required by Section 44 of the Marine and Coastal Access Act 2009;
- East Inshore and East Offshore Marine Plans (Defra, 2014);
- The Port Marine Safety Code's (PMSC) 'Guide to Good Practice' (DfT and MCA, 2018);
- International Maritime Organization (IMO) Revised Guidelines for Formal Safety Assessment (FSA) for use in the IMO rule making process (IMO, 2018);
- Maritime and Coastguard Agency (MCA), Marine Guidance Notice (MGN) 654 (Merchant + Fishing) Offshore Renewable Energy

Installations (OREIs) - Guidance on UK Navigational Practice, Safety and Emergency Response (MCA, 2016); and
- DfT Port Marine Safety Code (DfT, 2016).

Description of the existing environment

Data sources

6.6.3 A desk-based study will be undertaken to inform the baseline characterisation on which the impact assessment will be based. This will include the following key data sources:

- Accident and Incident data from ABP, the Marine Accident Investigation Branch (MAIB) and Royal National Lifeboat Institution (RNLI);
- Automatic Identification System (AIS) data provided by the Marine Management Organisation (MMO) for 2019;
- Vessel movement statistics from the Port Management Information system; and
- Navigational features and charted information from United Kingdom Hydrographic Office (UKHO) Admiralty Charts.

Study area

6.6.4 The study area is the area over which potential direct and indirect effects of the Immingham Eastern Ro-Ro Terminal may occur during construction and operation.

6.6.5 The study area for the commercial and recreational navigation topic is considered to be the area comprising the Humber Estuary bounded on the west by a line crossing the River Humber north from the Humber International Terminal (HIT) and at the east by the Statutory Harbour Authority (SHA) area. This study area has been selected to encompass the marine works associated with the Immingham Eastern Ro-Ro Terminal and the main route to and from the project location. The size of study area is required as the project would establish new vessel services for the area which means that there are potential effects on other vessel traffic transiting the area.

6.6.6 As part of the exercise leading to the finalisation of the commercial and recreational navigation ES chapter, a further desk-based analysis and assessment will be undertaken to refine the study area for the purposes of the impact assessment.

Commercial navigation

6.6.7 The Humber Estuary is one of the busiest waterways in the United Kingdom. The Estuary handles around 40 thousand commercial shipping movements a year, bound for 27 principal dock, jetty, and river locations (including anchorages). The major Humber ports of Hull, Goole, Grimsby and Immingham account for the majority of cargo handled on the River Humber,

namely 9.2 million tonnes, 1.0 million tonnes and 45.6 million tonnes of cargo respectively in 2017 (DfT, 2021a).

6.6.8 Beyond the Estuary there is a north-south coastal route used mainly by commercial vessels on passage to/from ports in this area. The vessels using this route normally transit at depths greater than 15 mCD to avoid the approach channels to the Humber Estuary. Vessels approaching the Humber Estuary are regulated by an IMO adopted traffic separation scheme to deconflict vessels that are approaching and leaving the estuary. This scheme incorporates three defined channels forming an intersection area prior to the main estuary approach channel. The three defined channels are termed New Sand Hole, Sea Reach and Rosse Reach. The Humber Estuary is accessed via one main channel approach which passes close to Spurn Head.

6.6.9 Once vessels have entered the Humber Estuary, two principal routes are available. Deep draughted ships proceeding towards Immingham or Hull transit through the Sunk Dredged Channel which is marked by buoyage. Shallower draughted ships have the option of using the centre of the estuary between the anchorage areas of Hawke, Haile and Bull along the Bull Channel. Within the Humber Estuary the vast majority is open water, with spring tide flow rates up to 5.0 knots.

6.6.10 To regulate the flow of shipping into the Humber Estuary, the transit of large vessels is managed through the use of the 'Humber Passage Plan'. This applies to any vessel of over 40,000 tonnes deadweight, whether laden, part laden or light, or any vessel with a draught of 11 m or more and gas carriers of over 20,000 m³ capacity. The plan has been prepared by ABP to facilitate the safe movement of large vessels on the Humber.

Recreational navigation

6.6.11 The Humber Estuary has approximately 1,000 permanent berths for recreational craft, which are used predominantly on a weekend during summer months. There are also around 120 visitor's berths which represents an increase in activity in the estuary. The final category is that of those who launch from public slipways around the estuary which include smaller sailing vessels, owners of personal watercraft and small un-powered watercraft.

6.6.12 Established recreational vessel destinations in the Humber Estuary include: Hull Marina which has accommodation for 310 boats and 20 visitors; Goole Boathouse which offers 140 moorings and South Ferriby marina which provides accommodation for 100 boats plus 20 visiting vessels. In addition, there are various creeks around the estuary providing further capacity, namely Tetney Haven (Humber Mouth Yacht Club) where small numbers of moorings are available, Stone Creek (located on the north side of the river opposite Immingham), Hessle Haven and Barrow Haven, which both provide anchorages. The yacht havens of Brough and Winteringham (Humber Yawl

Club) also provide limited mooring for small vessels and visiting yachts and motor cruisers (HES, 2021).

6.6.13 There are no recreational sailing clubs operating at the Port of Immingham. The closest clubs are at Grimsby, namely the Grimsby and Cleethorpes Yacht Club who use Royal and Alexandra Docks and have 51 berths for permanent boats and the Cruising Association who use Grimsby Fish Dock with 150 berths for permanent boats and 25 visiting craft berths. In addition, there are 65 berths in Alexandra Dock South Marina. There is a slipway on Cleethorpes sea front used for the launching of personal power craft, small un-powered watercraft and day sailing craft.

Statutory Authorities

6.6.14 ABP is the SHA for the Port of Immingham and for the River Humber. In this capacity, ABP is charged with a set of powers and duties which include the management and regulation of the safety of navigation and marine operations in the SHA areas.

6.6.15 ABP is also the Competent Harbour Authority (CHA) with respect to pilotage for the Port of Immingham and the River Humber. ABP, as the CHA, has the power to issue Pilotage Directions that prescribe which vessels require a Pilot or Pilot Exemption Certificate (PEC) holder when navigating within the CHA area. Pilotage is provided and managed by Humber Estuary Services (HES) on behalf of all of the Humber Ports.

6.6.16 A Vessel Traffic Service (VTS) within the meaning of MGN 401[5] is provided for the River Humber. Humber VTS maintains a vessel traffic picture through the Automatic Identification System (AIS) and Radar providing information on weather, vessel movements and marine safety to vessels navigating in the VTS area. All sea-going vessels are required to report to Humber VTS when entering the VTS area and at designated reporting points identified on navigational charts.

6.6.17 ABP is the Local Lighthouse Authority (LLA) by virtue of the Merchant Shipping Act 1995. As LLA, ABP is responsible for the provision and maintenance of Aids to Navigation (AtoN). ABP is required to report any defects to AtoN and consult on any proposed changes, additions or removal of AtoN with Trinity House Lighthouse Authority as the General Lighthouse Authority for England and Wales.

6.6.18 Both the Port of Immingham and HES have committed to meeting the requirements of the PMSC. The PMSC requires that ports operate a Marine Safety Management System (MSMS) which is based on comprehensive and continuously updated set of risk assessments. The MSMS details how the

[5] Marine Guidance Note (MGN) 401: Navigation: Vessel Traffic Services (VTS) and Local Port Services (LPS) in the United Kingdom (https://www.gov.uk/government/publications/mgn-401-mf-amendment-2-navigation-vessel-traffic-services-and-local-port-services-in-the-uk)

ports fulfil their duties as SHAs and meet the marine safety requirements prescribed by the PMSC.

Future baseline

6.6.19 The future baseline scenario considers that if the Immingham Eastern Ro-Ro Terminal were not to proceed, activity within the Port of Immingham would continue. There is unlikely to be any short-term changes to shipping and navigation management.

Possible environmental impacts

6.6.20 The proposed development has the potential to affect commercial and recreational navigation during both construction and operation. The commercial and recreational navigation ES chapter will set out the assessment of the likely changes to be generated by the Immingham Eastern Ro-Ro Terminal, both beneficial and adverse and during both the construction and operational phases.

Scoped in

6.6.21 The potential impact pathways during the construction phase are as follows:

- Contact of works craft with Port infrastructure: manoeuvring of craft in close proximity to marine structures has the potential for contact with infrastructure during site development.
- Collision of passing vessels with works craft: as passing vessels (commercial, recreational or fishing) are manoeuvring around or in close proximity to the works there is the potential for collision with craft associated with Immingham Eastern Ro-Ro Terminal.
- Collision during navigation: vessel collision (commercial or recreational or fishing) with works craft whilst transiting to/from the site or during activities within the disposal site.
- Collision during towage operations: if materials for the proposed development are transported to site through the use of barges, there is potential for collision with commercial or recreational vessels in the area.
- Payload related incidents: if lifting operations are required from barges/vessels associated with the Project, there is potential for incidents to arise from dropped items or affected vessel stability.

6.6.22 The following potential impact pathways have been identified as part of the operational phase:

- Collision due to increased commercial vessel movements: vessels transiting within the Immingham Eastern Ro-Ro Terminal area in collision with other Port traffic (commercial, dredging, recreational or fishing).
- Collision due to increased maintenance dredging movements: dredging vessels on transit to/from the dredge pocket or during dispersal operations in collision with other marine traffic (commercial, recreational or fishing).

- Collision with passing traffic: vessels manoeuvring at the berth in collision with passing traffic (commercial, recreational or fishing).
- Contact with the quay: manoeuvring vessel, dredging vessel or tug in contact with the jetty as a result of collision avoidance, adverse weather, nature of the operation or interaction with a passing vessel.
- Mooring breakout with vessel alongside: There is potential for a vessel to break its moorings and leave the berth due to stress of weather, passing vessel or mooring equipment failure.

6.6.23 Within the PMSC, 'as low as reasonably practicable' (ALARP) is an industry wide concept applying to both health and safety and port marine safety. The core concept is that of 'reasonably practicable' which involves weighing up risk against the effort, time and money needed to control it. The PMSC specifically references ALARP in respect of the MSMS and Navigational Risk Assessments (NRAs).

6.6.24 Following the identification of impacts and likely effects to the environment as a result of the proposed development combined with navigation within the Estuary, their significance will be assessed within the EIA. This will determine whether the project's residual effects will be reduced to minor adverse or insignificant, which equates to ALARP defined as applied within the context of the PMSC.

6.6.25 Potential cumulative effects on commercial and recreational navigation could arise as a result of other coastal and marine developments in the area, as well as ongoing activities, including maintenance dredging and disposal activities. These will be considered as part of the cumulative and in-combination assessment (Section 5.2).

Scoped out

6.6.26 A separate NRA will be required for the Immingham Eastern Ro-Ro Terminal. As part of the NRA process, a hazard identification workshop will be held to identify the potential impacts associated with the development. Each of these impacts will be assessed and those which are significant will be taken through to inform the commercial and recreational navigation chapter of the ES. At this stage, therefore, no impact pathways are proposed to be scoped out.

Further assessment work required

6.6.27 An NRA will be required to support the DCO application for the Immingham Eastern Ro-Ro Terminal (Section 4.5). The NRA will be provided as an appendix to the ES. The outputs will inform the ES chapter for the commercial and recreational navigation topic. To provide local stakeholder input, a hazard identification workshop will be arranged. This workshop will bring together relevant navigational stakeholders for the area to discuss the potential impacts on navigational safety associated with the proposed development.

6.6.28 The data sources which will be used to gather the baseline information on commercial and recreational navigation and inform the ES are noted under 'data sources' above.

6.6.29 In order to assess the potential effects of the Immingham Eastern Ro-Ro Terminal upon commercial shipping and recreational navigation, relative to the baseline, a combination of analytical methods and expert judgement will be used. This includes qualitative assessments of data obtained from ABP and consideration of the existing evidence base and empirical evaluation.

6.6.30 The assessment methodology will follow the source-pathway-receptor model and the findings will be used to establish the potential magnitude of the predicted changes to the levels of marine risk and the overall significance of the likely effect of those changes. A receptor can only be exposed to a change if a pathway exists through which an effect can be transmitted between the source activity and the receptor.

6.6.31 The effects will be assessed through expert opinion using a set of NRAs. From the NRA process, a set of mitigation measures or mitigation controls will be identified, which will be implemented either directly into the scheme design, or via management practices. The overall objective is to maintain risk levels within a limit that is deemed ALARP (DfT, 2016). By virtue of the marine environment, these controls will be embedded within the background navigational environment, and include:

- Harbour Authority MSMS, which includes plans and processes to manage marine emergencies;
- Vessel traffic management and the reactive response to marine emergencies (following notification by the contractor/operator). The Harbour Authority will respond to a marine emergency with a range of resources including personnel, vessels, equipment and expert marine opinion. This does not, however, remove any responsibility from the contractor/operator in ensuring the safety of its own marine operations;
- Professional/trained mariners application of:
- IMO conventions of Safety of Life at Sea;
- International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW); and
- Convention on the International Regulations for Preventing Collisions at Sea (COLREGS), 1972; and
- Ensuring compliance with The International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) guidance on Aids to Navigation (AtoN).

6.7 Coast protection, flood defence and drainage

6.7.1 This section sets out the proposed scope of the Immingham Eastern Ro-Ro Terminal ES chapter that will report the findings of the coast protection, flood defence and drainage assessment of the proposed development.

Legislation, policy and guidance position

6.7.2 The potential effects of the Immingham Eastern Ro-Ro Terminal on coast protection, flood defence and drainage receptors will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- National Planning Policy Framework (MHCLG, 2021);
- NPSfP (DfT, 2012);
- National Planning Practice Guidance; Flood Risk and Coastal Change (MHCLG, 2014);
- National Planning Practice Guidance; Water supply, Wastewater and Water Quality (MHCLG, 2019a);
- The Water Framework Regulations, which implement the WFD (2000/60/EC);
- Flood and Water Management Act 2010);
- Flamborough Head to Gibraltar Point Shoreline Management Plan (Various Authors including Lead Authority East Riding of Yorkshire Council, 2011);
- Humber Flood Risk Management Strategy (Environment Agency, 2008);
- North East Lincolnshire Local Plan (North East Lincolnshire Council, 2018);
- North and North East Lincolnshire Strategic Flood Risk Assessment (North Lincolnshire Council and North East Lincolnshire Council, 2011);
- North East Lincolnshire Preliminary Flood Risk Assessment (North East Lincolnshire Council, 2011)
- North East Lincolnshire Local Flood Risk Management Strategy (North East Lincolnshire Council, 2015a)
- Grimsby and Ancholme Catchment Flood Management Plan (Environment Agency, 2009);
- North Lincolnshire Sustainable Drainage System (SuDS) and Flood Risk Guidance (North Lincolnshire Council, 2017); and
- Relevant local policy.

Description of the existing environment

Data sources

6.7.3 A desk-based study will be undertaken to inform the baseline characterisation on which the impact assessment will be based. This will include the following key data sources:

- Flamborough Head to Gibraltar Point Shoreline Management Plan (Various Authors including Lead Authority East Riding of Yorkshire Council, 2011);
- Humber Flood Risk Management Strategy (Environment Agency, 2008) (note that this Strategy is currently being updated and will be incorporated into the assessment should the update be completed and made publicly available);

- Immingham Section 19 Flood Investigation Report (Balfour Beatty, 2012);
- Environment Agency Flood Maps for Planning (https://flood-map-for-planning.service.gov.uk/) (Environment Agency, undated);
- Environment Agency Flood Risk Data (Product 4); and
- ABPmer Flood Resilience Report for the Port of Immingham (ABPmer, 2015).

Study area

6.7.4 The study area is the area over which potential direct and indirect effects of the Immingham Eastern Ro-Ro Terminal may occur during construction and operation. The direct effects on coastal protection, flood defence and drainage receptors are those within which the footprint of the proposed development are confined, i.e. the marine works. Indirect effects are those that may arise due to changes in the hydrodynamic (wave) environment or surface water as a result of the proposed development.

6.7.5 The initial study area for the coastal protection, flood defence and drainage topic is considered to be the area denoted by the adjacent flood cells in the Humber Estuary Strategy (2008). The study area will also extend upstream into the adjacent watercourse to the limit of tidal influence, including any new surface water discharges into this waterbody.

6.7.6 The coastal protection, flood defence and drainage ES chapter will, through further analysis and assessment (e.g. based on the findings of the FRA), refine (and potentially reduce in size) the study area for the purposes of the impact assessment.

Coast protection

6.7.7 In England, coastal District and Unitary Councils are typically responsible for producing Shoreline Management Plans (SMPs) that aim to identify, assess and subsequently reduce the risk associated with coastal processes to people and the developed, historic and natural environment of the coast. SMPs are non-statutory documents intended both to inform and be supported by the statutory planning process. The intention of an SMP is to develop a broad coast defence strategy that is technically, operationally, economically and environmentally sustainable. The SMP contains four types of policy which are defined as No Active Intervention (NAI), Advance the Line (ATL), Hold the Line (HTL) and Managed Realignment (MR).

Flood risk

6.7.8 The Environment Agency Flood Map for Planning indicates that the majority of the Port of Immingham is located within Flood Zone 3 i.e. land that is assessed to have a 1 in 200 or greater annual probability of flooding from the sea (> 0.5%) in any year. This is associated with the Humber Estuary.

6.7.9 The Environment Agency's Risk of Flooding from Surface Water map shows isolated areas across the site which are considered to be at risk. These generally occur around building footprints and hard standing areas. Where these coincide with the proposed development, they will be considered as part of a surface water drainage strategy.

6.7.10 It should be noted that the North Beck Drain is a Main River located approximately 400 m to the east of the site. The Harborough Marsh drain is also a Main River and largely skirts the southern and eastern perimeters of the port estate. It is, therefore, in very close proximity to the project location and may be used, once assessed, as part of the drainage strategy for clean rainwater runoff.

Future baseline

6.7.11 If the proposed development were not to take place, the existing coastal defence and drainage structures within the port estate would be maintained and hydrodynamic and sedimentary processes will continue to be influenced by natural and human-induced variability, ongoing cyclic patterns and trends (e.g. ongoing maintenance dredging and disposal).

6.7.12 The future baseline will also be influenced by climate change. The primary way in which climate change may interact with the proposed development is through changes in storminess/storm surges, wave heights, and sea levels, posing an increased risk of coastal damage and flooding. UK Climate Projections 2018 (UKCP18) provides a range of UK climate projection tools designed to help decision-makers assess their risk exposure to climate.

Possible environmental impacts

6.7.13 The proposed development has the potential to affect coastal protection, flood defence and drainage receptors during both construction and operation. The coast protection, flood defence and drainage ES chapter assess the likely changes to be generated by the proposed development, both beneficial and adverse and during both the construction and operational phases.

Scoped in

6.7.14 The potential impact pathways during the construction phase are as follows:

- Vulnerability to flood events during construction.

6.7.15 The potential impact pathways during the operational phase are as follows:

- Changes to current and future flood risk during operation; and
- Adaptation to future climate change allowing operations to continue.

6.7.16 The coast protection, flood defence and drainage assessment will also include consideration of the vulnerability of the proposed development to climate change.

6.7.17 The proposed development will need to take account of the potential future requirement for adaptation of the existing coastal defences. As an example, consideration will be given to access requirements for construction plant for maintenance work or improvements to the existing coast protection and flood defence structures.

6.7.18 Potential cumulative effects on coastal protection, flood defence and drainage could arise as a result of other coastal and marine developments in the area, as well as ongoing activities. These will be considered as part of the cumulative and in-combination assessment (Section 5.2).

Scoped out

6.7.19 At the current stage there is considered to be insufficient evidence to exclude any potential pathways from further assessment within the EIA.

Further assessment work required

6.7.20 The NPSfP states that all applications for port development of 1 ha or greater in Flood Zone 1 and all proposals for projects located in Flood Zones 2 and 3 should be accompanied by an FRA.

6.7.21 An FRA of the Immingham Eastern Ro-Ro Terminal will be undertaken, and it is envisaged that this will form a standalone document which forms an Appendix to the ES (see Section 4.5). This will incorporate contingency plans to deal with the risk of flooding during construction. The FRA will be informed by modelling data provided by the Environment Agency and, therefore, no hydraulic modelling will be undertaken as part of this study. The coastal defence, flood risk and drainage chapter of the ES will draw upon the information within the FRA (which will include information on how surface water will be managed on the site) as necessary.

6.7.22 The coastal defence, flood risk and drainage assessment and the FRA will follow the requirements of the NPSfP and further guidance found in the Planning Practice Guide documents which accompany the NPPF.

6.7.23 In accordance with the NPSfP and the NPPF, the FRA will be proportionate to the risk and appropriate to the scale, nature and location of the Immingham Eastern Ro-Ro Terminal. This assessment will specifically consider the potential effects of tidal, fluvial, groundwater, pluvial, sewer and artificial sources of flooding to the proposed development, and will consider the potential for changes to such flood risks as a result of the proposed development to off-site receptors, in accordance with national and local planning policy.

6.7.24 Extreme flood events with an annual probability of up to 0.1% (1 in 1,000) will be considered and the potential effects of climate change, in accordance with relevant national government guidance will be considered, both in terms of sea level rise and anticipated changes to precipitation rates; with relevant sea level rise factors and percentage increases in rainfall considered. Surface water runoff as a result of the Immingham Eastern Ro-Ro Terminal and proposed surface water drainage design will also be assessed with regard to the potential for changes on-site or downstream flood risk and water quality.

6.7.25 A desk-based assessment will be undertaken to ascertain the likely flood risk and drainage issues relevant to the proposed development. Both the potential adverse and beneficial effects of flood risk management infrastructure together with the consequences of their failure will be considered.

6.7.26 It will also include the assessment of the remaining 'residual' risks and the appropriate mitigation measures to address the residual risk. Consultation will be undertaken with the Environment Agency and North East Lincolnshire Council in their role as Lead Local Flood Authority (LLFA) during the preparation of the FRA, to obtain relevant data. The LLFA will also be consulted to discuss the risk of any drains/ordinary watercourses located within close proximity to the site.

6.7.27 The FRA and coastal defence, flood risk and drainage assessment chapter of the ES will consider the impacts that surface water runoff from the proposed development will have on the surrounding area/local watercourses including a comparison of runoff rates before and post-development. Consideration of potential effects of the proposed development in terms of flooding will be included.

6.7.28 To assess the risk of flooding to the site, flood data will be requested from the Environment Agency. A Product 4 data request will include a detailed flood map for the site, information on Environment Agency formal flood defences and modelled flood depths/levels for a range of return period events. This will help determine the risk to the site and will help inform mitigation measures if required.

6.8 Ground conditions, including land quality

6.8.1 This section sets out the proposed scope of the Immingham Eastern Ro-Ro Terminal ES chapter that will report the findings of the ground conditions assessment of the proposed development. The scope of the assessment covered by this chapter of the ES does not include matters relating to those elements of the proposed development that will take place within the marine environment. These matters are addressed in the separate section dealing with water and sediment quality (Section 6.3).

Legislation, policy and guidance position

6.8.2 The potential effects of the Immingham Eastern Ro-Ro Terminal on ground conditions will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- Part 2A of the Environmental Protection Act (EPA) 1990;
- The Contaminated Land (England) Regulations 2006 (as amended);
- Water Act 2014;
- Water Resources Act 1991 (as amended);
- The Environmental Damage (Prevention and Remediation) (England) Regulations 2015;
- The Waste (England and Wales) Regulations 2011;
- The National Planning Policy Framework (MHCLG, 2021);
- The Environment Agency guidance resource Land Contamination: Risk Management (Environment Agency, 2021c); and
- Relevant local policy.

Description of the existing environment

Data sources

6.8.3 A desk-based study will be undertaken to inform the baseline characterisation on which the impact assessment will be based. This will include the following key data sources:

- Environment Agency mapping and resources;
- British Geological Survey (BGS) GeoIndex Map Viewer;
- The UK Soil Observatory;
- The MAGIC interactive natural environment map viewer;
- Historical Ordnance survey maps;
- Database search i.e. Envirocheck or Groundsure report;
- Unexploded Ordnance (UXO) Desk Study;
- Any other relevant ABP site survey reports or historical records; and
- A Ground Investigation (GI) survey which is planned for the concept design phase.

Study area

6.8.4 The study area is the area over which potential direct and indirect effects of the Immingham Eastern Ro-Ro Terminal may occur during construction and operation. The direct effects on ground conditions are those that may arise through accidental release during construction and/or operation. The indirect effects involve disturbing the ground in such a way that contaminant linkages and pathways are created so as to create the migration of a pollution plume within the made ground into aquifers or by allowing potentially contaminated dusts, during construction, to migrate offsite to nearby residential and/or commercial properties.

6.8.5 The study area for the ground conditions topic is considered to be the entirety of the ground within the site boundary, along with a buffer extending 1 km around the site in order to identify potential off-site sources of contamination which could affect the site's baseline. This includes the artificial land of the existing port facility, geological deposits underlying artificial ground and any natural ground underlying water bodies within the area of the proposed development.

6.8.6 The ground conditions ES chapter will, through desk-based analysis and assessment, refine the study area for the purposes of the impact assessment.

Artificial geology

6.8.7 Artificial geology is not present across the proposed development site on the mapping shown on the BGS website. However, data from historical borehole logs (Borehole Ref: TA21NW10, TA21NW5, TA11NE274 and TA11NE325) indicates that Made Ground deposits are present in thicknesses up to 0.60 m below ground level (bgl). It should be noted that since these boreholes were progressed (1950s), it is anticipated that Made Ground may be more extensive across the proposed development site and in greater thicknesses, as a result of redevelopment within the dock area.

Drift (superficial) geology

6.8.8 The following information has been obtained from the BGS website.

6.8.9 The Natural Superficial Deposits in this area are understood to comprise Tidal Flat Deposits, which are described in the BGS Lexicon of Named Rock Units as "*unconsolidated sediment, mainly mud and/or sand; deposited on extensive nearly marshy land in the intertidal zone that is alternately covered and uncovered by the rise and fall of the tide*" (BGS, 2021a). A review of borehole logs available on the BGS GeoIndex Viewer (Borehole Ref: TA21NW3/D, TA21NW10, TA21NW5, TA11NE274 and TA11NE325) suggest that the Tidal Flat Deposits are present to a maximum depth of 12.3 m bgl.

6.8.10 In the east of the proposed development area, the Tidal Flat Deposits are underlain by peat (Borehole Ref: TA21NW3/D and TA21NW10). No peat deposits were, however, present in the west of the proposed development site. The peat and/ or Tidal Flat Deposits are reported to be underlain by Glacial Till across the area, with some interbedded sands and gravels to the west of the proposed development. The geology map indicates that the Glacial Till may be underlain by Glaciofluvial sheet deposits comprising sands and gravels, however, this is not recorded on the available borehole logs. The borehole logs suggest that the maximum depth these superficial deposits extend to are approximately 35 m bgl.

6.8.11 No previous ground investigation reports have been identified or reviewed at this stage.

Solid (bedrock) geology

6.8.12 The following information has been obtained from the BGS Geology of Britain viewer website (https://www.bgs.ac.uk/map-viewers/geology-of-britain-viewer/).

6.8.13 The underlying bedrock in this area is chalk of either the Flamborough Chalk Formation (central and south-eastern parts of the proposed development site) or the Burnham Chalk Formation (north-western parts of the proposed development site).

6.8.14 The BGS Lexicon of Named Rock Units describes the Flamborough Chalk Formation (FCM) as "*White, well-bedded, flint-free chalk with common marl seams (typically about one per metre)*" (BGS, 2021b). Common stylolitic surfaces and pyrite nodules.' The FCM is underlain by the Burnham Chalk Formation which is described as "*White, thinly-bedded chalk with common tabular and discontinuous flint bands; sporadic marl seams. Formal subdivision: none as defined here, but there are many named marl and flint bands throughout the succession that are used to divide the formation*" (BGS, 2021c).

6.8.15 From a review of borehole logs available on the BGS GeoIndex viewer, the weathered upper surface of the chalk bedrock is anticipated at depths of between approximately 15 m (TA21NW10) and 39 m bgl (TA11NE325).

Soils

6.8.16 The following information has been obtained from the UK Soil Observatory's (UKSO) online maps (http://mapapps2.bgs.ac.uk/ukso/home.html).

6.8.17 The UKSO online resources indicate that the soils in this area are defined as loamy and clayey soils of coastal flats with naturally high groundwater.

Groundwater

6.8.18 The superficial Tidal Flat Deposits underlying the proposed development site are recorded to be Unproductive Strata, defined by the Environment Agency (Environment Agency, 2017) as "*These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow*".

6.8.19 The Glacial Till is classified as a Secondary Undifferentiated Aquifer, which is defined by the Environment Agency as – "Has been assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type".

6.8.20 The Glaciofluvial sheet deposits are classified as a Secondary A Aquifer, which is defined by the Environment Agency as – "permeable layers capable

of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers".

6.8.21 The underlying chalk bedrock is recorded as containing a Principal Aquifer, which is defined by the Environment Agency as – "layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale".

6.8.22 There is a Source Protection Zone (SPZ) – SPZ1 Inner Zone in the south of the proposed development site. This is defined by the Environment Agency (Environment Agency, 2019) as being "*50-day travel time of pollutant to source with a 50 m default radius*". An SPZ2 Outer Zone is present beneath the majority of the south of the proposed development site and is defined by the Environment Agency as being "*400 day travel time of pollutant to source. This has a 250 or 500 metres minimum radius around the source depending on the amount of water taken*". Parts of the proposed development site to the east are within a SPZ3 Total Catchment, defined by the Environment Agency as being the – "*area around a supply source within which all groundwater ends up at the abstraction point. This is the point from where the water is taken. This could extend some distance from the source point*".

6.8.23 No information on groundwater abstractions is available at this time, but this will be addressed in the subsequent desk study.

Surface water

6.8.24 The proposed development site is located adjacent to the estuary of the River Humber. According to the Environment Agency Catchment Explorer (Environment Agency, 2020a) the proposed development site lies within the North Beck Drain river water body catchment (ID: GB104029067575) of the Becks Northern operational catchment (see Figure 7). It is recorded as a heavily modified water body (HMWB) due to coastal protection use, flood protection use, and navigational use. This means 'ecological potential' is applied rather than 'ecological status'. The current (2019) overall status of this waterbody is 'moderate', with ecological potential of 'moderate', and a chemical status of 'fail'. The reason for the 'fail' chemical status is based on priority hazardous substances PBDE and Mercury and its Compounds. No details of surface water abstractions or discharge consents are available at this time, but this will be addressed in the subsequent desk study. Marine surface water and sediment quality is discussed in greater detail in Section 6.3.

Mineral planning

6.8.25 The site of the proposed development does not encroach on any land designated for mineral extraction in the North East Lincolnshire Mineral Safeguarding Areas and Waste Sites Local Plan, adopted March 2018 (North East Lincolnshire Council, 2018).

6.8.26 It is noted that the Humber Estuary is identified on the Coal Authority's Interactive Map Viewer (https://mapapps2.bgs.ac.uk/coalauthority/home.html) as a Coal Mining Reporting Area and that the land below the low tide mark is within a Licence Area for the future underground mining of coal.

Designated sites for geological protection

6.8.27 The site of the proposed development does not encroach on any sites designated for geological protection according to the MAGIC mapping resource (https://magic.defra.gov.uk/MagicMap.aspx).

Contamination

6.8.28 According to available Environment Agency records (Environment Agency, 2021d), there have been no Category 1 Pollution Incidents in the vicinity of the proposed development site in the last five years. Based on Environment Agency records accessed via the Groundsure Enviro Data Viewer (https://www.groundsure.io/), the southern part of the proposed development falls within an area where a historical landfill occurs. Another historical landfill is also shown adjacent to the north of the proposed development site. There is one active authorised landfill located approximately 125 m to the south of the proposed development site. It is unknown at this stage what wastes were accepted at the authorised and historical landfills, but this will be further assessed in the subsequent desk study.

6.8.29 The proposed development site is located in an area associated with Immingham Dock and contaminants associated with this land use include PAHs, total petroleum hydrocarbons (TPH), metals and asbestos.

Future baseline

6.8.30 In addition to describing the existing baseline environment, the ground conditions assessment chapter of the Immingham Eastern Ro-Ro Terminal ES will seek to assess the likelihood of an environmental change, in contamination terms, without the proposed development.

6.8.31 The site of the proposed development forms part of the operational Port of Immingham and has been in active use for port purposes for a number of decades. In the absence of the Immingham Eastern Ro-Ro Terminal, the site will continue to be utilised for port activity.

Possible environmental impacts

6.8.32 The proposed development has the potential to affect ground condition receptors during both construction and operation. The ground conditions ES chapter will set out the assessment of the likely changes to be generated by the proposed development, both beneficial and adverse and during both the construction and operational phases.

6.8.33 The site of the proposed development comprises Made Ground and the construction will involve intrusive works such as excavation and piling (dredging may also be a relevant activity with regards to land contamination but is considered in Section 6.3 of this document and is, therefore, not considered further in this topic), which means that the following potential matters must be considered in the subsequent ES:

- Disturbance of underlying geology;
- Disturbance of existing made ground;
- Use of imported materials;
- Possible presence and mobilisation of localised contamination;
- Possible importation of contamination via imported material;
- Creation of pathways by piling; and
- Disturbance/ pollution risk to adjacent sensitive ecological receptors.

Scoped in

6.8.34 The potential impact pathways during the construction phase are as follows:

- Direct contact with/ ingestion/ inhalation of solid contaminants by human receptors during the construction phase;
- Direct contact with/ ingestion/ inhalation of contaminated waters by human receptors during the construction phase;
- Inhalation of ground gas/ vapours by human receptors during the construction phase;
- Migration of spills e.g. fuels into the underlying shallow groundwater or lateral migration via surface water run-off in to surface water; and
- Accumulation of explosive/ asphyxiant concentrations of ground gas during the construction phase.

6.8.35 The potential impact pathways during the operational phase are as follows:

- Direct contact with/ ingestion/ inhalation of solid contaminants by human receptors during the operational phase;
- Direct contact with/ ingestion/ inhalation of contaminated waters by human receptors during the operational phase;
- Inhalation of ground gas/ vapours by human receptors during the operational phase;
- Accumulation of explosive/ asphyxiant concentrations of ground gas during the operational phase;
- Direct contact with services, buildings and infrastructure;
- Migration of contaminants from Secondary A Aquifer to deeper Principal Aquifer, via preferential pathways created (i.e. piling activity); and
- Migration of contaminants to adjacent sensitive ecological receptors and surface waters.

6.8.36 It is envisaged that embedded mitigation measures will be designed into the construction works to minimise environmental effects. Where relevant these

will be considered as part of the ground conditions assessment work that is undertaken to inform the ES.

6.8.37 Potential cumulative effects on ground conditions could arise as a result of other coastal and marine developments in the area, as well as ongoing activities. These will be considered as part of the cumulative and in-combination assessment (Section 5.2).

Scoped out

6.8.38 There are no potential pathways which are to be scoped out at this stage. Potential impacts to 'best and most versatile' agricultural soils will not, however, be considered as the proposed development site is identified as Urban on the Provisional Agricultural Land Classification Grade map on the MAGIC Map Application (accessed 05/08/2021) and indeed forms part of the operational port estate.

Further assessment work required

6.8.39 Initially a more detailed desk-based analysis of the potential for ground contamination at the proposed development site will be undertaken. This will include a review of historical maps, local authority records, and publicly available data together with a site walkover inspection and discussion with ABP operatives regarding operational site history. A review of any relevant site investigation and remediation reports and site drainage surveys will also be undertaken.

6.8.40 At this stage, it is envisaged, that the desktop analysis will be informed by sources including:

- Environment Agency mapping and resources;
- British Geological Survey (BGS) GeoIndex Map Viewer;
- The UK Soil Observatory;
- The MAGIC interactive natural environment map viewer;
- Historical Ordnance survey maps;
- Database search i.e. Envirocheck or Groundsure report;
- Unexploded Ordnance (UXO) Desk Study;
- Any other relevant ABP site survey reports or historical records; and
- A Ground Investigation (GI) survey which is planned for the concept design phase.

6.8.41 The desk-based information will then be used to devise a Conceptual Site Model (CSM), as described in the government guidance on managing land contamination (Environment Agency, 2021c), where any plausible linkages between the contamination source and sensitive receptors will be qualitatively assessed.

6.8.42 The CSM will take account of the information gathered at the desk-based assessment and consider the potential pollutant linkages between any contaminative sources, the migration pathways and the sensitive receptors.

Where a plausible linkage is concluded to be present in the CSM, the linkage will be assessed qualitatively as to the potential level of risk and then where considered to be greater than a low risk, assessed further by means of additional investigation followed by a generic semi-quantitative assessment.

6.8.43 Significance criteria will be used to enable a consistent and transparent assessment of the potential effects (adverse or beneficial) from the Immingham Eastern Ro-Ro Terminal as a result of ground conditions. This is likely to comprise the following:

- Assessment of the sensitivity of a receptor - receptors are defined in Part IIA of the Environmental Protection Act 1990 as:
- Human beings;
- An ecological system, or organism within such system, within a location that has been identified for protection under various European, National and local designations (including SSSI, SPA, SAC, National Nature Reserve (NNR));
- Property in the form of buildings and services;
- Controlled waters (surface water courses and groundwater); and
- The marine environment.
- Assessment of the magnitude of the potential impact - for example, a potential adverse impact of high magnitude may be the introduction of a pollutant linkage as a result of the construction or operation of the proposed development. Conversely, a potential beneficial impact of high magnitude may be the removal of a contaminant source as a result of the construction of the proposed development and an associated substantial improvement in ground conditions at the site. Where a potential impact is identified, the magnitude of the impact and, therefore, the significance of the contamination risk, will be determined by considering the temporal nature of the impact (i.e. temporary/ reversible/ permanent, frequent/ infrequent/ rare and short/ medium/ long term) and the geographic scope of the potential impact.

6.8.44 For the purposes of this assessment, the significance of effect, having regard to the sensitivity of the receptor and the magnitude of the impact, will be described as either:

- **Major Adverse**: Major environmental risk to a sensitive environmental receptor, and/or humans (site users, neighbouring residents) requiring extensive remedial works;
- **Moderate Adverse**: Moderate environmental risk to a sensitive environmental receptor, and/or humans (site users, neighbouring residents) requiring monitoring and local remedial work;
- **Minor Adverse**: Minor environmental risk to a sensitive environmental receptor, and / or humans;
- **Negligible**: No appreciable environmental risk to a sensitive environmental receptor, and / or humans;

- **Minor Beneficial**: Minor reduction in environmental risk to humans or a sensitive environmental receptor;
- **Moderate Beneficial**: Moderate reduction in environmental risk to humans or a sensitive environmental receptor; and
- **Major Beneficial**: Substantial reduction in environmental risk to humans or a sensitive environmental receptor.

6.8.45 Consultation will be undertaken, as necessary, including with North East Lincolnshire Council and with the Environment Agency in their role as statutory consultees in relation to ground conditions during the preparation of the ES chapter, to obtain relevant data.

6.9 Air quality

6.9.1 This section sets out the proposed scope of the Immingham Eastern Ro-Ro Terminal chapter of the ES that will report the findings of the air quality assessment of the proposed development.

Legislation, policy and guidance position

6.9.2 The potential effects of the Immingham Eastern Ro-Ro Terminal on air quality will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- Clean Air Strategy (Defra, 2019b);
- National Planning Policy Framework (MHCLG, 2021) and relevant Planning Practice Guidance (MHCLG, 2019a);
- NPSfP (DfT, 2012);
- The UK Marine Policy Statement (HM Government, 2011);
- Institute of Air Quality Management (IAQM)/Environmental Protection UK (EPUK) Guidance on land-use planning and development control: planning for air quality (IAQM, 2017);
- Air Quality Standards Regulations 2016 (as amended);
- IAQM Guidance on the assessment of dust from demolition and construction (2014); and
- Relevant local policy.

Description of the existing environment

Data sources

6.9.3 A desk-based study will be undertaken to inform the baseline characterisation on which the impact assessment will be based. This will include the following key data sources:

- Defra's Pollution Climate Mapping (PCM) Model Compliance Link Outputs (Defra, 2019c);

- Defra's Background Pollutant Concentration Maps (Defra, 2018a);
- North East Lincolnshire Council Local Air Quality Management Data (North East Lincolnshire Council 2020a; 2020b);
- North Lincolnshire Council Local Air Quality Management Data (North Lincolnshire Council, 2020); and
- Baseline and future baseline traffic data.

Study area

6.9.4 The study area is the area over which potentially significant direct and indirect effects of the Immingham Eastern Ro-Ro Terminal may occur during construction and operation.

6.9.5 At this scoping stage, it is envisaged that the study area for the construction phase will be informed by the distances provided in the screening criteria set out in the IAQM guidance (2014). The study area will include human health receptors within 350 m of the proposed development site and within 50 m of roads used by construction traffic within 500 m of the entrance(s) into the site of the proposed development, and sensitive ecological habitats (designated sites) within 50 m of the proposed development site.

6.9.6 For the assessment of emissions from road traffic during the construction and operation, the study area will include appropriate road links having regard to the outputs from the traffic and transport assessment. The network will cover, as a minimum, all roads expected to be significantly affected by the construction and operation of the Immingham Eastern Ro-Ro Terminal. Such roads will be determined by comparing the change in traffic flows anticipated as a result of construction and operation of the proposed development against the screening criteria provided in IAQM guidance and Environmental Protection UK guidance (2017).

6.9.7 The study area for the operational assessment will include the closest residential receptors adjacent to the roads on which traffic flow is most affected by the proposed development. This will obviously depend on the routes to be taken by construction and operational phase development-related traffic, which will be identified by the traffic and transport assessment.

6.9.8 In addition to these residential receptors, a number of ecological designated sites are also likely to be considered within the assessment. The proposed development overlaps a number of sites of international nature conservation importance (Section 6.4). These sites are the Humber Estuary SAC, SPA, Ramsar site and SSSI. Within these designated areas, there are a number of habitats, some of which are sensitive to air pollutants. The study area will cover, if required, all roads within 200 m of these sites.

6.9.9 The air quality ES chapter will, through further desk-based analysis and assessment, refine the study area for the purposes of the impact assessment.

Local Air Quality Management and monitoring

6.9.10 North East Lincolnshire Council undertake monitoring of air quality in their administrative area as part of their Local Air Quality Management duties. This includes the monitoring of nitrogen dioxide (NO_2) at two automatic monitoring sites and 30 passive monitoring sites. Of those monitoring sites, four are located at Immingham, including one of the automatic monitoring sites. In 2019, concentrations ranged from 16.5 µg/m³ to 24.5 µg/m³ at roadside locations in the town and 13.5 µg/m³ at an urban background location.

6.9.11 North Lincolnshire Council also undertake monitoring of air quality within their administrative area, some of which is located adjacent to the A160, at South Killingholme, between the Port of Immingham and the A180/M180. This monitoring includes one automatic monitoring site and four passive monitoring sites. In 2019, concentrations ranged from 17 µg/m³ to 29 µg/m³ at roadside locations in the town and 15 µg/m³ to 18 µg/m³ at urban background locations.

Future baseline

6.9.12 In addition to describing the existing baseline environment, the air quality chapter of the Immingham Eastern Ro-Ro Terminal ES will seek to explain what the environmental change, in air quality terms, would likely be if the proposed development were not to go ahead.

6.9.13 The site of the proposed development forms part of the operational Port of Immingham and has been in active use for port purposes for a number of decades. The current use of the site is for bulk cargo, steel sections, lorry and automotive storage. In the absence of the Immingham Eastern Ro-Ro Terminal, the site would continue to be utilised for port activity.

Possible environmental impacts

6.9.14 The proposed development has the potential to affect air quality receptors during both construction and operation. The air quality ES chapter will set out the assessment of the likely changes to be generated by the Immingham Eastern Ro-Ro Terminal, both beneficial and adverse and during both the construction and operational phases.

Scoped in

6.9.15 The potential impact pathways during the construction phase are as follows:

- Impacts to nearby resident's health and amenity, and to ecological systems as a result of fugitive emissions of dust and fine particulate matter (PM_{10}) associated with construction activities;
- Impacts to nearby resident's health and to ecological systems from exhaust emissions from on-site construction plant and/or construction

vehicles travelling to and from the Immingham Eastern Ro-Ro Terminal site; and
- Impacts to nearby resident's health and to ecological systems due to emissions to air from vessels when the proposed Immingham Eastern Ro-Ro Terminal is under construction.

6.9.16 The potential impact pathways during the operational phase are as follows:

- Impacts to nearby resident's health and to ecological systems from changes in road traffic emissions when the proposed Immingham Eastern Ro-Ro Terminal is operational, and
- Impacts to nearby resident's health and to ecological systems due to emissions to air from vessels when the proposed Immingham Eastern Ro-Ro Terminal is operational.

6.9.17 Potential cumulative effects on air quality could arise as a result of other nearby developments in the area. These will be considered as part of the cumulative and in-combination assessment (Section 4.2).

Scoped out

6.9.18 At the current stage no air quality matters have been scoped out of the assessment.

Further assessment work required

6.9.19 The following paragraphs provide an explanation of the further assessment work that is envisaged.

Construction phase emissions

6.9.20 The assessment of dust and PM_{10} impacts during construction will be undertaken having regard to the methodology set out in the guidance from the IAQM on the assessment of dust from demolition and construction (Version 1.1) (2014). This guidance provides an approach for assessing and defining the risk of impacts of emissions of dust and PM_{10} from construction activities.

6.9.21 The assessment will be undertaken to determine the level of risk of dust and PM_{10} impacts and should such prove necessary, provide recommendations for appropriate mitigation measures that will be employed during works to ensure that these impacts will not be significant during the construction phase.

6.9.22 An assessment of exhaust emissions from on-site plant during the construction phase will be undertaken. This again will have regard to the IAQM guidance (2014). However, the IAQM guidance reports that *"Experience of assessing the exhaust emissions from on-site plant (also known as non-road mobile machinery or NRMM) and site traffic suggest that they are unlikely to make a significant impact on local air quality, and in the*

vast majority of cases they will not need to be quantitively assessed." (paragraph 4.1). It is considered that this is likely to be the case in respect of the proposed Immingham Eastern Ro-Ro Terminal.

6.9.23 An assessment of the impact of emissions from construction road traffic generated by the Immingham Eastern Ro-Ro Terminal will also be undertaken having regard to guidance produced by the Environmental Protection UK (EPUK) and the IAQM – Guidance on land-use planning and development control: Planning for air quality v1.2 (2017).

6.9.24 The volume of construction traffic, once determined in sufficient detail, will be screened against the criteria set out in this guidance. If the volume of traffic is below the thresholds specified in the guidance, the effect can be judged to be insignificant. If the thresholds are exceeded, a more detailed assessment will be made, for example using the ADMS-Roads dispersion model.

6.9.25 An assessment of emissions from any vessel movements generated during construction will be made using published screening criteria. Should the screening criteria set out in Defra's Local Air Quality Management Technical Guidance (LAQM.TG16) (2018b) be exceeded, a more detailed assessment would be required.

6.9.26 The number of additional vessel movements during construction works is, however, anticipated to be minimal, particularly considering the existing operational baseline. Significant air quality impacts are not, therefore, envisaged. This, however, will be confirmed by the assessment.

Operational phase emissions

6.9.27 An assessment of the impact of emissions from operational road traffic generated by the Immingham Eastern Ro-Ro Terminal will be undertaken, again with regard to the guidance produced by the Environmental Protection UK (EPUK) and the IAQM – Guidance on land-use planning and development control: Planning for air quality v1.2 (2017).

6.9.28 Should the guidance criteria be exceeded, an assessment of road traffic emissions during the operational stage will be undertaken. The approach will be agreed with the appropriate stakeholders and will likely include dispersion modelling with use of Advance Dispersion Modelling System software. .

6.9.29 Peak traffic movements associated with the Immingham Eastern Ro-Ro Terminal may potentially exceed these criteria. This will be considered as part of the assessment process.

6.9.30 The impacts at individual receptor locations will be determined following EPUK and IAQM Guidance on Land-Use Planning and Development Control Planning for Air Quality (2017). The overall significance of the impacts will

then be determined using professional judgement, based on the number and nature of the predicted impacts at individual receptor locations across the study area.

6.9.31 An assessment of emissions from vessel movements during the operational phase will also be undertaken with reference to Defra's LAQM.TG16 guidance (2018b), which provides screening criteria to determine whether emissions from shipping operations require quantitative assessment. Should the screening criteria be exceeded, a more detailed assessment would be required. The approach to which would be agreed with relevant stakeholders in advance and likely include dispersion modelling and best-practice methods.

6.10 Airborne noise and vibration

6.10.1 This section sets out the proposed scope of the Immingham Eastern Ro-Ro Terminal ES chapter that will report the findings of the airborne noise and vibration assessment of the proposed development.

Legislation, policy and guidance position

6.10.2 The potential effects of the Immingham Eastern Ro-Ro Terminal on airborne noise and vibration will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- Environmental Noise (England) Regulations 2006 (as amended 2008, 2009, 2010);
- Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise - Declaration by the Commission in the Conciliation Committee on the Directive relating to the assessment and management of environmental noise (Environmental Noise Directive (END));
- Environmental Protection Act 1990;
- Control of Pollution Act 1974;
- National Planning Policy Framework (MHCLG, 2021);
- Noise Policy Statement for England (Defra, 2010);
- NPSfP (DfT, 2012);
- Planning Practice Guidance on Noise (MHCLG, 2019a);
- North East Lincolnshire Local Development Plan 2013 to 2032 (adopted 2018);
- Design Manual for Roads and Bridges LA111 Noise and vibration – Version 2 (Highways England, 2020);
- British Standard BS 5228:2009+A1:2014: 'Noise and Vibration Control on Construction and Open Sites – Part 1: Noise' (BSI, 2014a);
- BS 5228:2009+A1:2014: 'Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration' (BSI, 2014b);
- BS 4142:2014+A1:2019: 'Methods for rating and assessing industrial and commercial sound' (BSI, 2019);

- BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings' (BSI, 2014c); and
- 'Calculation of Road Traffic Noise' (CRTN) (Department of Transport/ Welsh Office, 1998).

Description of the existing environment

Data sources

6.10.3 A desk-based study will be undertaken to inform the baseline characterisation on which the impact assessment will be based. This will include reference to the following key data sources:

- Satellite imagery;
- Ordnance Survey Mapping; and
- UK environmental noise mapping undertaken as per the requirements of the END Directive.

Study area

6.10.4 The study area is the area over which potential direct and indirect effects of the Immingham Eastern Ro-Ro Terminal may occur during construction and operation.

6.10.5 The study area of the assessment is defined by the locations of nearby noise sensitive receptors (NSRs) with the potential to be affected by the anticipated Development impacts. For construction noise, this is NSRs within 300 m of the proposed development site. For construction vibration, this is NSRs within 100 m of the proposed development site. For operational noise, this is NSRs within 1 km of the proposed development site. For road traffic noise, this is NSRs within 50 m of the roads which will be used by vehicles associated with construction and operational activities.

6.10.6 The airborne noise and vibration ES chapter will, through further desk-based analysis and assessment, refine the study area for the purposes of the impact assessment.

Summary of existing baseline environment

6.10.7 The nearest human noise sensitive receptors to the proposed development site have been identified as the residential properties in Table 13. These receptors are shown in Figure 13.

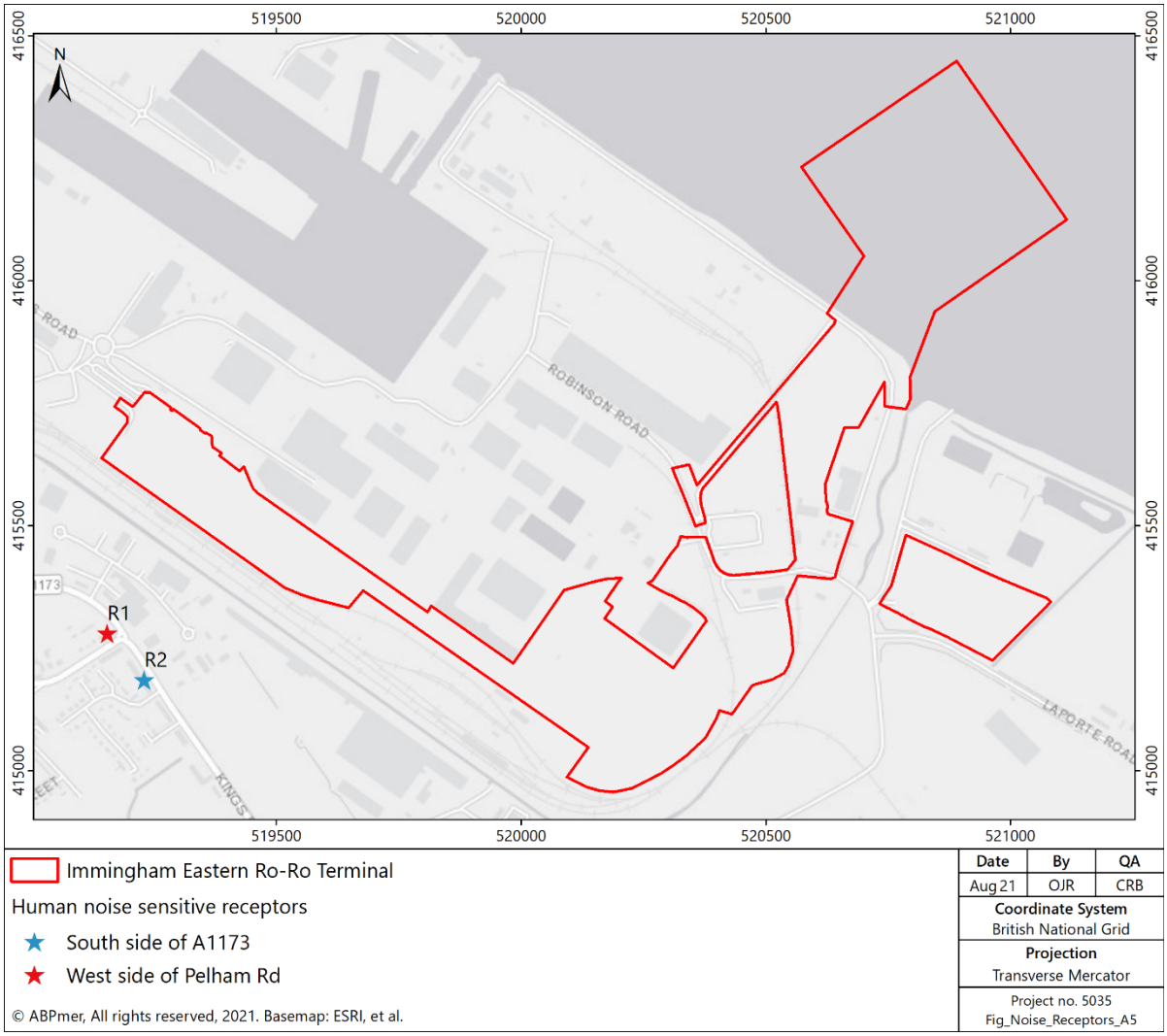


Figure 13. Nearest human noise sensitive receptors

6.10.8 Publicly available data have been reviewed to identify the likely sources contributing to the baseline sound climate in the vicinity of the identified noise sensitive receptors. At R1, potential sources are road traffic on the A1173, the industrial/commercial premises on the north side of the A1173 and Immingham Lorry Park. At R2, potential sources are road traffic on the A1173, the industrial/ commercial premises on the north side of the A1173 and Immingham Lorry Park.

Table 13. Identified noise sensitive receptors

NSR	Description	Approximate distance from Proposed Development Site Boundary (m)
R1	West side of Pelham Rd	310
R2	South side of A1173	270

Future baseline

6.10.9 In addition to describing the existing baseline environment, the airborne noise and vibration assessment chapter will seek to explain what the environmental change, in noise and vibration terms, would likely be if the proposed development were not to go ahead.

6.10.10 The site of the proposed development forms part of the operational Port of Immingham and has been in active use for port purposes for a number of decades. The current use of the site is for bulk cargo, steel sections, lorry and automotive storage. In the absence of the Immingham Eastern Ro-Ro Terminal, the site would continue to be utilised for port activity.

Possible environmental impacts

6.10.11 During construction, noise and vibration emissions have the potential to impact on sensitive receptors. Once operational, the main sources of noise associated with the project will be from site activities, including road traffic, vessel movements and mechanical plant. Operational site activities at the proposed development will be similar to the existing and surrounding land uses. Nevertheless, an assessment of operational noise is scoped into the EIA.

Scoped in

6.10.12 The airborne noise and vibration ES chapter will set out the assessment of the likely changes to be generated by the Immingham Eastern Ro-Ro Terminal, both beneficial and adverse during construction and operation.

6.10.13 The potential impact pathways during the construction phase are as follows:

- Potential noise and vibration impacts associated with construction activities; and
- Potential noise impacts associated with traffic movements during construction.

6.10.14 The potential impact pathways during the operational phase are as follows:

- Potential noise impacts associated with traffic movements during operation; and
- Potential noise impacts associated with vessel movements, other site activities and mechanical plant.

6.10.15 Potential cumulative noise and vibration effects could arise as a result of other developments in the area, as well as ongoing activities. These will be considered as part of the cumulative and in-combination assessment (Section 5.2).

Scoped out

6.10.16 The following pathways are proposed to be scoped out of the EIA:

- **Vibration emissions from the construction and operation of the proposed development**: the closest identified NSR is at least 270 m from the proposed development site. At this distance, vibration emissions from the construction and operation of the proposed development are likely to be imperceptible. Assessments of construction and operational vibration are, therefore, proposed to be scoped out of the EIA.

Further assessment work required

6.10.17 The impact assessment will consider effects predicted to occur during both the construction and operational phase of the Immingham Eastern Ro-Ro Terminal and will have regard to whether the predicted effects are temporary or permanent.

Noise

6.10.18 An understanding of the existing noise climate across the site of the proposed development and its surroundings will be developed through noise measurements, traffic count data and review of details of the historic use of the site together with topographical information. This information will be used as a baseline to assess noise during all relevant aspects of construction (including piling operations), construction traffic, dredging, plant noise, and operational noise associated with the proposed development.

6.10.19 Noise generating activities associated with the construction works will be calculated and assessed using the data and procedures provided in BS 5228-1 (BSI, 2014a). The ABC method will be used as a basis to define criteria that constitutes a potential significant effect at residential receptors. Receptors with low existing ambient noise levels (Category A) have a lower threshold than those with high existing ambient noise levels (Category C). Higher thresholds are set for normal daytime construction working hours, compared to the more sensitive evening, weekend and night-time periods. The ABC method is presented in Table 14.

6.10.20 Noise emissions from the operation of the Immingham Eastern Ro-Ro Terminal will be predicted using sound propagation modelling software, based on information on the operating conditions and the levels of noise generated by the plant and on site activities.

6.10.21 The IEMA 'Guidelines for Environmental Noise Impact Assessment' (2014) will be used to assess the impact of changes in ambient noise level at NSRs due to the operation of the proposed development. On the impact of noise level changes, they state that "*For broad band sounds which are very similar in all but magnitude, a change or difference in noise level of 1 dB is just perceptible under laboratory conditions, 3 dB is perceptible under most normal conditions, and a 10 dB increase generally appears to be twice as*

loud. These broad principles may not apply where the change in noise level is due to the introduction of a noise with different frequency and/or temporal characteristics compared to sounds making up the existing noise climate. In which case, changes of less than 1 dB may be perceptible under some circumstances."

Table 14. BS5228-1 ABC Method

Assessment category and threshold value period	Threshold values in dB $L_{Aeq,T}$		
	Category A A)	Category B B)	Category C C)
Night-time (23:00-07:00)	45	50	55
Evening and weekends D)	55	60	65
Daytime (07:00-19:00) and Saturdays (07:00-13:00)	65	70	75
NOTE 1 A potential significant effect is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level. 2 If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq,T}$ noise level for the period increases by more than 3 dB due to site noise. 3 Applied to residential receptors only.			
A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values. B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values. C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values. D) 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.			

6.10.22 The IEMA Guidelines (2014) provide criteria for magnitude of impacts due to noise level changes from a project, as shown in Table 15.

Table 15. Categorising the magnitude of the Basic Noise Change

Noise Change, dB	Impact
0	Very low
0.1 to 2.9	Low
3 to 4.9	Medium
5 to 9.9	High

6.10.23 Any change in road traffic noise levels as a result of either the construction or operation of the proposed development, at a selection of relevant NSRs, will be predicted using the standard methodology outlined in the CRTN.

6.10.24 The assessment of construction and operational traffic noise will consider the following scenarios:

- Existing Baseline;
- Future Baseline without the Immingham Eastern Ro-Ro Terminal;
- Construction Phase of the Immingham Eastern Ro-Ro Terminal; and
- Operational Phase of the Immingham Eastern Ro-Ro Terminal.

6.10.25 The impact of changes in road traffic noise levels will be assessed based on guidance within the 'Design Manual for Roads and Bridges (DMRB) LA111 Revision 2 – Noise and Vibration' (Highways England, 2020). The assessment will be based on the short-term magnitude of impact criteria from Table 3.54a of the DMRB, as reproduced in Table 16.

Table 16. DMRB Criteria for Determining Magnitude of Change in the Short-Term

Magnitude of impact	Short-term noise change (dB $L_{A10,18h}$)
Major	Greater than or equal to 5.0
Moderate	3.0 to 4.9
Minor	1.0 to 2.9
Negligible	less than 1.0

6.10.26 Where predictions indicate a potential adverse impact due to noise, appropriate mitigation measures will be identified.

Determining significance of effects

6.10.27 The Noise Policy Statement for England (NPSE) (Defra, 2010) sets out the long-term vision of the government's noise policy, which is to "*promote good health and a good quality of life through the effective management of noise within the context of policy on sustainable development*" (page 3, Defra, 2010).

6.10.28 The 'Explanatory Note' within the NPSE (Defra, 2010) provides further guidance on defining 'significant adverse effects' and 'adverse effects' using the following concepts:

- No Observed Effect Level (NOEL) - the level below which no effect can be detected. Below this level no detectable effect on health and quality of life due to sound can be established;
- Lowest Observable Adverse Effect Level (LOAEL) - the level above which adverse effects on health and quality of life can be detected; and

- Significant Observed Adverse Effect Level (SOAEL) - the level above which significant adverse effects on health and quality of life occur.

6.10.29 In March 2014, the Department for Communities and Local Government (DCLG; now MHCLG) released its Planning Practice Guidance (PPG) web-based resource to support the NPPF. This planning practice guidance included a section on 'Noise' and introduced the additional concepts of NOAEL (No Observed Adverse Effect Level), and UAEL (Unacceptable Adverse Effect Level) (MHCLG, 2019a).

6.10.30 The NPSE (Defra, 2010) recognises that it is not possible to have single objective noise-based measures that define the SOAEL, LOAEL and NOEL that is applicable to all sources of noise in all situations. The levels are likely to be different for different sound sources, receptors and at different times of the day.

6.10.31 Once baseline noise measurements have been carried out, numeric values specific to the Immingham Eastern Ro-Ro Terminal will be assigned to the thresholds identified in the PPG and NPSE for use in the assessments. These will be based on the assessment criteria outlined above for determining impacts of the different noise sources associated with the proposed development. Different specific values will be given to different receptor types depending on their sensitivity, and for different areas of the assessment (e.g. construction phase assessment, operational phase assessment).

6.10.32 Consultation will be undertaken with North East Lincolnshire Council's Environmental Health department as necessary to inform the noise and vibration assessment and the sensitive receptors identified in accordance with best practice.

6.10.33 The ES noise and vibration chapter will include an explanation of any consultation undertaken, along with the outcome of such consultation and how it has influenced the noise and vibration assessment of the Immingham Eastern Ro-Ro Terminal.

6.11 Marine archaeology

6.11.1 This section sets out the proposed scope of the Immingham Eastern Ro-Ro Terminal ES chapter that will report the findings of the marine archaeology assessment of the proposed development.

Legislation, policy and guidance position

6.11.2 The potential effects of the proposed development on marine archaeology will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- The Marine and Coastal Access Act 2009;
- Ancient Monuments and Archaeological Areas Act 1979;
- Merchant Shipping Act 1995;
- Protection of Wrecks Act 1973;
- Protection of Military Remains Act 1986;
- NPSfP (DfT, 2012);
- UK Marine Policy Statement (HM Government, 2011) as required by Section 44 of the Marine and Coastal Access Act 2009;
- National Planning Policy Framework (MHCLG, 2021);
- East Inshore Marine Plan; and
- Relevant local policy.

Description of the existing environment

Data sources

6.11.3 A desk-based study will be undertaken to inform the baseline characterisation on which the impact assessment will be based. This will include the following key data sources:

- United Kingdom Hydrographic Office (UKHO) wreck database (acquired 28 July 2021);
- North East Lincolnshire Historic Environment Records (HER) (acquired 09 April 2020); and
- National Record of the Historic Environment (NRHE) maintained by Historic England.

Study area

6.11.4 The study area is the area over which potential direct and indirect effects of the Immingham Eastern Ro-Ro Terminal may occur during construction and operation. The direct effects on physical processes are those confined to within the footprint of the proposed development, i.e. the piers, dredge and disposal of dredge material. Indirect effects are those that may arise due to wider changes in the estuary flow and sedimentary regime and any change to the estuary morphology as a result of the proposed development.

6.11.5 The study area for the marine archaeology topic comprises the marine works associated proposed development and a 500 m buffer zone. This will be used to capture the relevant data on designated and non-designated marine archaeological assets, and to provide the necessary context for understanding archaeological potential and heritage significance of assets that may be affected by the proposed development.

6.11.6 The marine archaeology ES chapter will, through further desk-based analysis and assessment, refine the study area for the purposes of the impact assessment.

Marine heritage receptors

6.11.7 Marine archaeological and cultural heritage receptors located within the marine works associated proposed development can be characterised as comprising four fundamental categories:

- Seabed prehistory;
- Maritime archaeology;
- Aviation archaeology; and
- Intertidal heritage receptors.

6.11.8 The marine archaeological and cultural heritage receptors located within the marine works associated with the proposed development and a 500 m buffer zone are listed in Table 17. They are shown on Figure 14.

Table 17. Marine heritage features

WA ID	External References	Type	Description	BNG Easting	BNG Northing
2001	UKHO 65126; HER MNL1473	Obstruction	Octagonal obstruction shown on aerial photography	520,762.27	415,966.25
2002	UKHO 65127; HER MNL1473	Obstruction	Octagonal obstruction shown on aerial photography	520,785.70	416,013.10
2003	UKHO 8576	Wreck	Listed as dead in 2004	520,809.12	415,997.49
2004	UKHO 65124	Obstruction	Rectangular obstruction shown on aerial photography	520,820.05	415,903.78
2005	UKHO 65128; HER MNL1473	Obstruction	Octagonal obstruction shown on aerial photography	520,827.86	415,994.36
2006	UKHO 73629	Wreck	Shown on Humber 8, April 2009 Edition.	520,834.11	416,005.29
2007	UKHO 65125	Obstruction	Cigar shaped obstruction shown on aerial photography	520,835.67	415,903.78
2008	UKHO 8505	Foul Ground	Remains of a Dolphin	520,885.65	416,594.08

WA ID	External References	Type	Description	BNG Easting	BNG Northing
2009	UKHO 67016	Dolphins / Poles / Posts / Piles	Lifted in 1975	520,918.45	416,595.65
2010	UKHO 66974	Wreck	No.9 (Clay Huts) Light Float. A light float sunk in 1929 and lifted in 1929.	521,038.70	417,065.74
2011	UKHO 79895	Foul ground	Observed in bathymetry in 2013. Measures 2 x 1 m with a height of 0.5 m.	521,180.82	416,809.61
2012	UKHO 8508	Mound/foul ground	A submerged obstruction that was struck by a vessel in 1957. Measured 17.5 m by 10.7 m and 1 m in height. Amended dead in 2013.	521,227.68	416,776.81
2013	HER MNL2430	Jetty	Western Jetty, Immingham Docks. Twentieth century jetty	Polygon	Polygon
2014	HER MNL2430	Jetty	Eastern Jetty, Immingham Docks. Twentieth century jetty	Polygon	Polygon
2015	HER MNL1800	Coast Light and Jetty	Newsham Booth Lights. Post Medieval Coast Light and Jetty	Polygon	Polygon
WA = Wessex Archaeology					

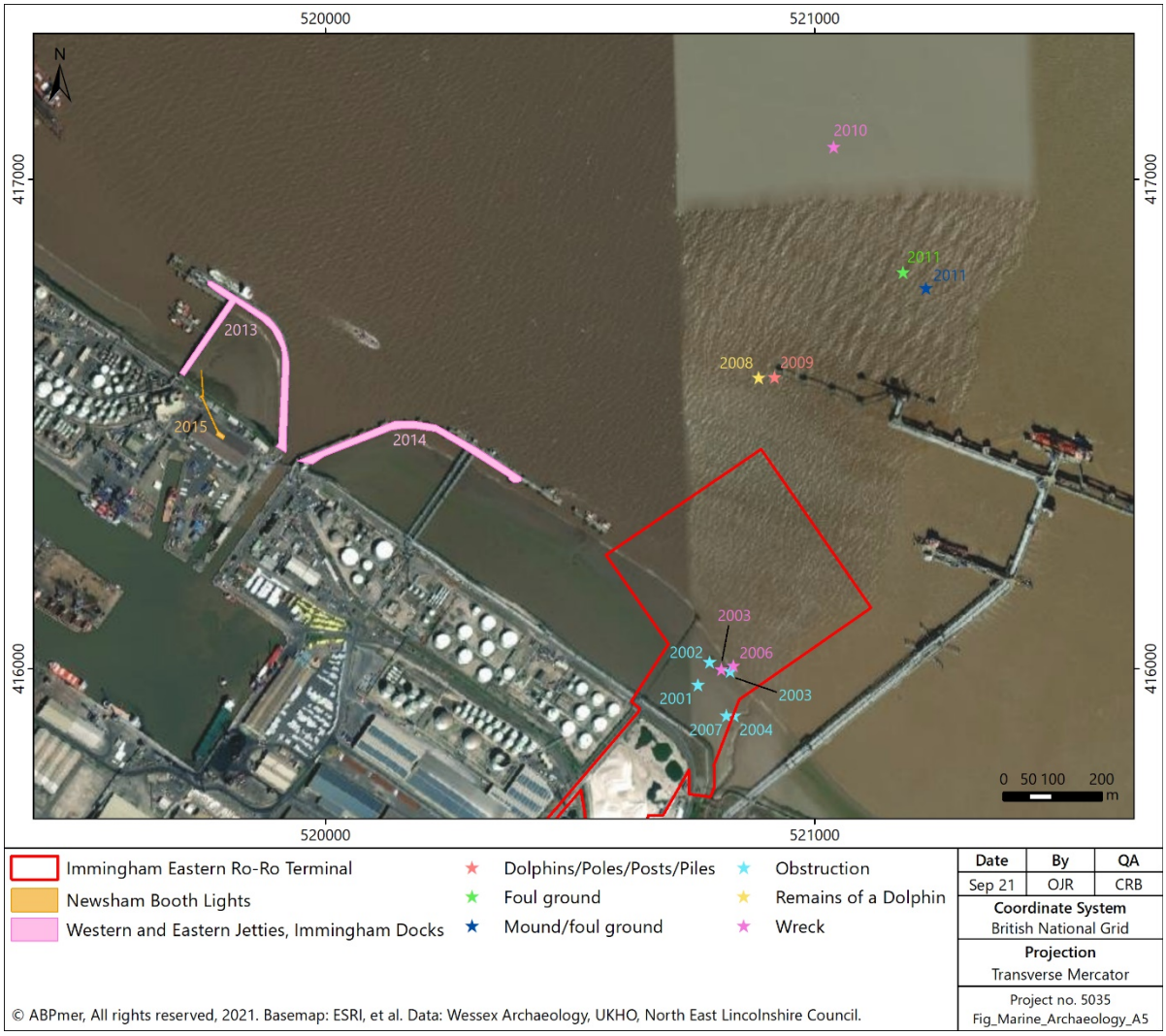


Figure 14. Marine heritage features

6.11.9 Maritime archaeological sites can be considered to comprise two broad categories; the remains of vessels that have been lost as a result of stranding, foundering, collision, enemy action and other causes, and those sites that consist of vessel-related material. Wreck related debris includes (but is not limited to) equipment lost overboard or deliberately jettisoned such as fishing gear, ammunition and anchors or the only surviving remains of a vessel such as its cargo or a ballast mound. Shipwrecks on the seabed provide an insight on the types of vessels used in the past, the nature of shipping activity in the wider area and the changing usage of the marine environment through different periods. Such remains are considered more likely in sediments which promote the preservation of wreck sites (e.g. finer grained sediments that are not subject to high levels of mobility), particularly where such sediments have seen limited, recent disturbance.

6.11.10 There are three records of wrecks in the proposed development marine works and 500 m buffer zone. WA **2003** was a wreck that was listed as dead in 2004, i.e. it has not detected by repeated surveys, although wreck material still may exist at this location. WA **2006** is an unknown wreck. WA

2010 was a light float that was sunk and lifted in 1929, and therefore there is possibly no wreck material at this location. There is the potential for further unknown wreck material to exist. However, the Port of Immingham was constructed in the early 20th century. This suggests that there is lower potential for pre-20th century wreck material to survive within the proposed development area, both due to a relatively smaller level of maritime activity prior to the construction of the port and due to the extensive dredging that has taken place on the adjacent seabed both during construction and since.

6.11.11 Intertidal heritage receptors comprise of other heritage assets located below MHWS and above MLWS. Examples of these include the jetties and dolphins associated with the 20th century port, although these are not all located in the intertidal zone (WA **2008, 2009, 2013** and **2014**), and the location of a post medieval coastal light and jetty (WA **2015**).

6.11.12 There are also a number of anomalies in the area that are as yet unidentified. WA **2011** is an anomaly that was observed in bathymetry in 2013 and measures 2 m by 1 m with a height of 0.5 m. WA **2012** consists of a submerged obstruction that was struck by a vessel in 1957. This measured 17.5 m by 10.7 m with 1 m in height, but was amended to dead in 2013, although archaeological material still may exist at this location. WA **2001, 2002, 2004, 2005** and **2007** are anomalies seen on aerial photography, that are possibly further jetty and dolphin remains.

6.11.13 Marine aviation archaeology receptors comprise the remains or associated remains of military and civilian aircraft that have been lost at sea. Evidence is divided into three primary time periods based on major technological advances in aircraft design: Pre-1939; 1939-1945; and post-1945. Although there are currently no known aircraft crash sites located within the study area, there is the potential for the discovery of previously unknown aircraft material. There is particularly high potential for the discovery aircraft from 1939-1945. There were numerous airfields in the vicinity of the proposed development during the Second World War, with Royal Air Force (RAF) Goxhill and RAF North Killingholme being particularly proximate. Further, the RAF Air Sea Rescue Services are known to have attempted numerous rescues of aircrew from crashed aircraft in the Humber Estuary during the Second World War (Wessex Archaeology, 2008). The remains of crashed military aircraft are protected under the Protection of Military Remains Act 1986, and cannot be disturbed without a licence.

Future baseline

6.11.14 In the absence of the proposed development, baseline conditions for marine archaeology assets are anticipated to remain unchanged. The proposed development site has been in use as a commercial port since the early 20th century and would continue in use as an operational port.

Possible environmental impacts

6.11.15 The proposed development has the potential to affect marine archaeology assets or deposits of archaeological importance during both construction and operation. The marine archaeology ES chapter will set out the assessment of the likely changes to be generated by the Immingham Eastern Ro-Ro Terminal, both beneficial and adverse and during both the construction and operational phases.

Scoped in

6.11.16 The potential impact pathways during the construction phase are as follows:

- Direct impacts to known and potential marine archaeology assets and deposits of archaeological importance as a result of the piling and capital dredge.

6.11.17 The potential impact pathways during the operational phase are as follows:

- Indirect impacts to known and potential marine archaeology assets and deposits of archaeological importance due to changes in physical processes as a result of the piling and capital dredge.

6.11.18 Potential cumulative effects on marine archaeology assets and deposits of archaeological importance could arise as a result of other coastal and marine developments in the area, as well as ongoing activities. These will be considered as part of the cumulative and in-combination assessment (Section 5.2).

Scoped out

6.11.19 The following pathways are proposed to be scoped out of the EIA:

- **Setting of marine archaeological and cultural heritage receptors**: It is unlikely, given the existing industrial character of the site, for there to be any material additional impacts on the setting of known and unknown heritage receptors during construction or operation of the proposed development. A Setting Assessment is, therefore, proposed to be scoped out of the EIA.

Further assessment work required

6.11.20 A Desk-Based Assessment (DBA) will be prepared in accordance with industry standards and best practice guidelines, namely the Assessment and Management of Marine Archaeology in Port and Harbour Development (Cooper and Gane, 2016) and the CIfA Standard and Guidance for Historic Environment Desk-Based Assessment (CIfA, 2014, updated 2020), and any responses received as part of the scoping phase and consultation on the Immingham Eastern Ro-Ro Terminal. The DBA will form an appendix to the

Immingham Eastern Ro-Ro Terminal ES and will inform the marine archaeology ES chapter.

6.11.21 The EIA documents would be prepared following standard industry practice and guidance for marine archaeology including but not limited to the following:

- The Assessment and Management of Marine Archaeology in Port and Harbour Development (Cooper and Gane 2016);
- Dredging and Port Construction: Interactions with Features of Archaeological or Heritage Interest (PIANC 2014);
- Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment (English Heritage, 2008);
- Our Seas – A shared resource: High level marine objectives (Defra, 2009);
- Model Clauses for Archaeological Written Schemes of Investigations (The Crown Estate and Wessex Archaeology, 2010, draft 2020); and
- Ships and Boats: Prehistory to Present: Designation Selection Guide (English Heritage (now Historic England), 2012).

6.11.22 Relevant stakeholders will include the MMO, The Crown Estate, Historic England (HE) and North East Lincolnshire Council.

6.11.23 To inform the DBA, the following data sources will be consulted:

- Updated North East Lincolnshire HER for known maritime and aircraft wrecks, coastal installations, archaeological sites, and events records;
- NRHE terrestrial and marine cultural heritage assets maintained by Historic England;
- The UKHO for information regarding live wrecks, salvaged wrecks and dead wrecks;
- Various online resources including the British Geological Survey (BGS) Geology of Britain Viewer and the local planning portal for the Local Plan and other planning information;
- Published and unpublished literature (including a detailed review of reports for previous fieldwork carried out within the proximity to the proposed development boundary);
- Existing geotechnical, geophysical and geoarchaeological data; and
- Available Light Detection and Ranging (LiDAR) and aerial photography.

6.11.24 The study area for the DBA will be confined to the area of the proposed footprint of the development, with a 500 m buffer zone as the search area.

6.11.25 The baseline summary for Seabed Prehistory will be based on a review of geological mapping of seabed sediments, solid geology and bathymetry from published BGS sources. This will be enhanced by review of existing geotechnical, geophysical and geoarchaeological data.

6.12 Socio-economic receptors

6.12.1 This section sets out the proposed scope of the Immingham Eastern Ro-Ro Terminal ES chapter that will report the findings of the socio-economic assessment of the proposed development.

Legislation, policy and guidance position

6.12.2 The potential effects of the Immingham Eastern Ro-Ro Terminal on socio-economic receptors will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- The NPSfP (DfT, 2012);
- The UK Marine Policy Statement (HM Government, 2011);
- National Planning Policy Framework (MHCLG, 2021);
- East Inshore and East Offshore Marine Plan (Defra, 2014); and
- Relevant local policy including:
- North East Lincolnshire Local Plan 2013-2032 (North East Lincolnshire Council, 2018);
- North East Lincolnshire Economic Strategy (2016);
- North East Lincolnshire Economic Recovery Plan (North East Lincolnshire Council, 2021); and
- Greater Lincolnshire Local Enterprise Partnership (LEP) Strategic Economic Plan 2014-2032 (Greater Lincolnshire Local Enterprise Partnership, 2016).

Description of the existing environment

Data sources

6.12.3 A desk-based study will be undertaken to inform the baseline characterisation on which the impact assessment will be based. This will include the following key data sources:

- Office of National Statistics (ONS) Labour Force and Neighbourhood Statistics;
- Business Register and Employment Survey;
- Annual Population Survey;
- Census 2011; and
- Travel to Work Data.

Study area

6.12.4 The study area is the area over which potential direct and indirect effects of the Immingham Eastern Ro-Ro Terminal may occur during construction and operation.

6.12.5 The vast majority of the proposed development site falls within Lower Super Output Area (LSOA) North East Lincolnshire 001A (the 'Direct Impact Area'). LSOAs are small geographic areas defined by the ONS. There are 34,753 LSOAs across England and Wales with a minimum population of 1,000 and a maximum of 3,000.

6.12.6 As well as understanding the socio-economic conditions immediately surrounding the proposed development (as per the LSOA analysis), the socio-economic assessment also takes into account the principal labour market catchment area of the travel to work area (TTWA). TTWAs contain at least 75 % of the area's workforce that both live and work in the area. TTWAs have populations of at least 3,500 people. The proposed development falls within the Grimsby TTWA (the 'Wider Impact Area').

6.12.7 The socio-economic ES chapter will, through further desk-based analysis and assessment, refine the study area for the purposes of the impact assessment.

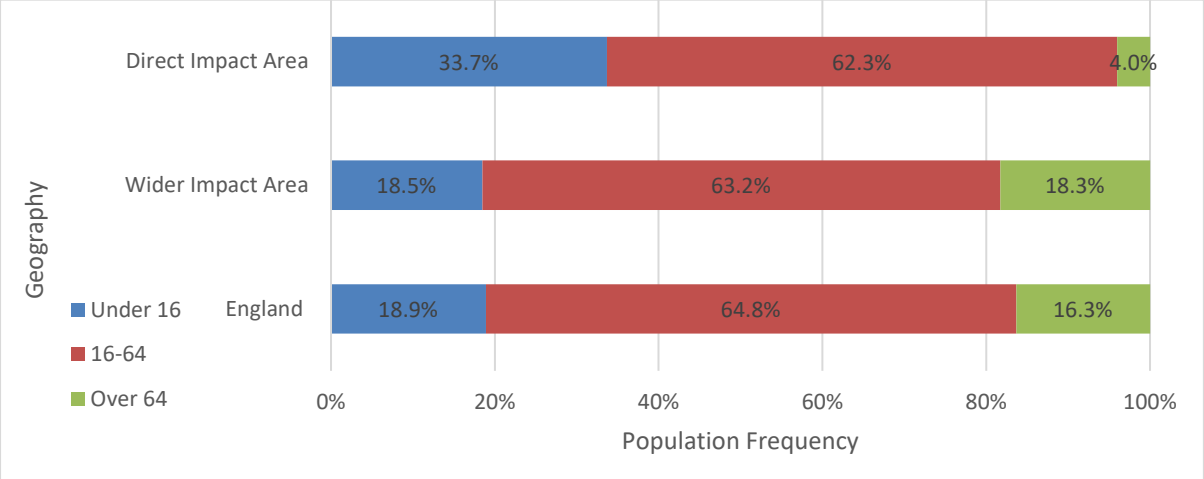
Socio-economic receptors

6.12.8 This section outlines the socio-economic context of the relevant geographies and makes comparisons to the whole of England. Key indicators include population and labour force; skills and unemployment; industry and the economy.

6.12.9 The local population and labour market are the main receptors in the assessment for employment effects. The baseline conditions help to determine the impact of employment generated by the proposed development, and the impact of the proposed development on tourism, amenity and other local businesses. The impact is mostly influenced by the size of the labour market and whether it has the relevant skills, occupations and sector strengths to access employment opportunities.

Demographic profile

6.12.10 The 2011 Census data shows that the Direct Impact Area had a population of 1,462 while the wider impact area had a population of 187,068. Figure 15 below shows that the Direct Impact Area had a larger proportion of young people (aged 0 to 15) than the Wider Impact Area and England. Both the Direct Impact Area and Wider Impact Area contain less people of working age (aged 16 to 64) than the national average. There is a lower proportion of residents aged over 64 in the Direct Impact Area than in both the wider impact area and England.



Source: Census (ONS, 2011)

Figure 15. Age breakdown of population

Economic activity

6.12.11 The Direct Impact Area has a lower proportion of residents who are economically active (61.2 %) than the Wider Impact Area (68.3 %) and England (69.9 %). The Direct Impact Area also has a smaller proportion of residents in employment (49.4%) than both the Wider Impact Area (59.7 %) and England (62.1 %). It also has a far higher unemployment rate (11.9 %) than the Wider Impact Area (5.9 %) and England (4.4 %). The Direct Impact Area does however have a higher proportion of students than in both the Wider Impact Area and England. Table 18 presents a breakdown the economic activity for the study area in comparison with England as a whole.

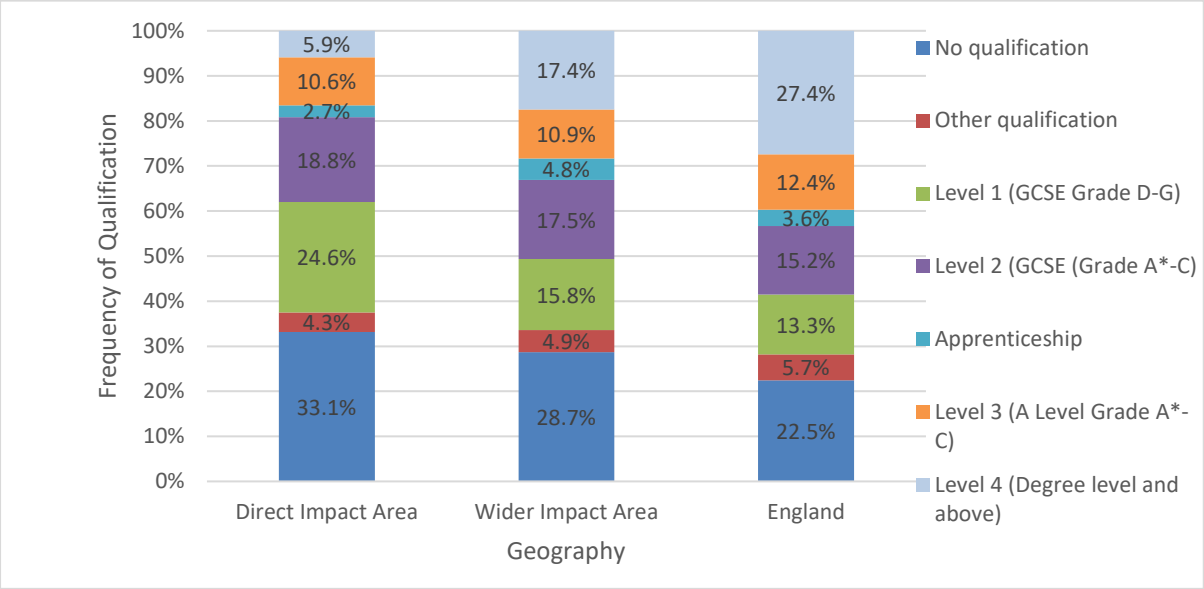
Table 18. Economic Activity

Activity	Direct Impact Area	Wider Impact Area	England
Economically active	62.1 %	68.3 %	69.9 %
Employees - part-time	16.1 %	16.2 %	13.7 %
Employees - full-time	30.3 %	36.3 %	38.6 %
Self-employed	3.0 %	7.2 %	9.8 %
Unemployed	11.9 %	5.9 %	4.4 %
Full-time Student	3.6 %	2.6 %	3.4 %
Economically Inactive	35.2 %	31.7 %	30.1 %

Source: Census (ONS, 2011)

Qualifications

6.12.12 The Direct Impact Area has a much lower proportion of residents qualified to Level 4 or above (greater than A-level and equivalent qualifications) at 5.9 %, compared to both the Wider Impact Area (17.4 %) and England (27.4 %). The Direct Impact Area also has a greater proportion of residents qualified to Level 1 and Level 2 than the Wider Impact Area and England. At the other end of the spectrum the Direct Impact Area has a greater proportion of residents with no qualifications (33.1 %) when compared to the Wider Impact Area (28.7 %) and England (22.5 %). This is illustrated in Figure 16 below.

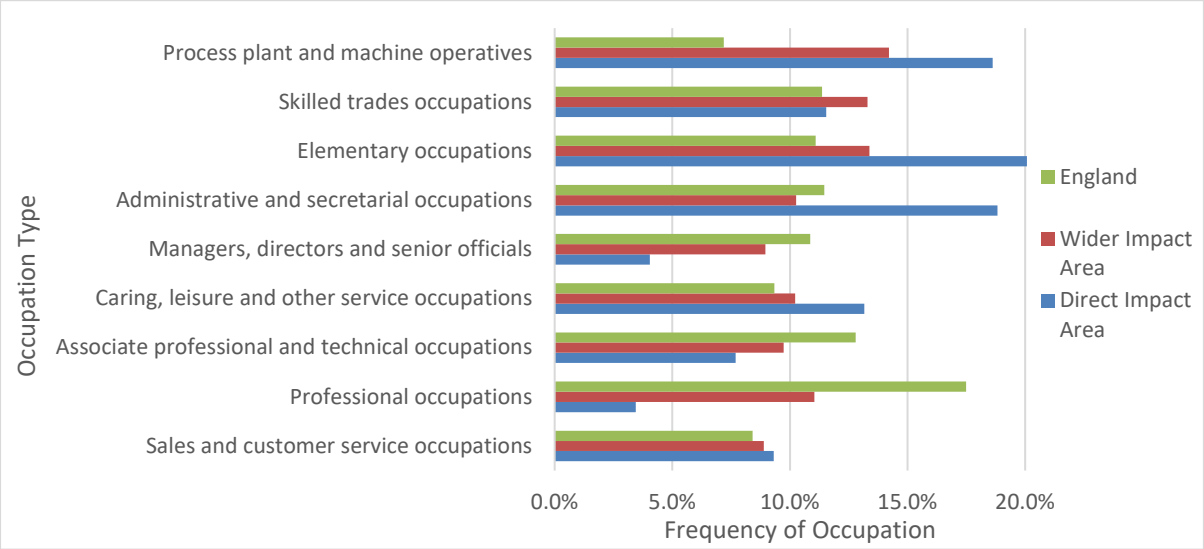


Source: Census (ONS, 2011)

Figure 16. Highest Level of qualification of residents

Occupations

6.12.13 The most common occupation type in the Direct Impact Area is 'Elementary occupations' (26.1 %), far higher than in the Wider Impact Area (13.4 %) and England (11.1 %). The next largest occupation type in the Direct Impact Area is 'Administrative and secretarial occupations' (18.8 %), followed closely by 'process, plant and machine operatives' (18.6 %). This is illustrated in Figure 17.



Source: Census (ONS, 2011)

Figure 17. Workforce occupations

Employment by sector

6.12.14 The largest employment sector in the Direct Impact Area wholesale and retail trade; and repair of motor vehicles and motorcycles (18.0 %), followed by Transport and Storage (15.4 %). The Direct Impact Area also has a greater proportion of people employed in Human health and social work activities (14.4 %) compared to the Wider Impact Area (13.0 %) and England (12.4 %). Employment in manufacturing is also greater in the Direct Impact Area (13.8 %) is lower than in the Wider Impact Area (15.2 %) but greater than in England as a whole (8.8 %).

Future baseline

6.12.15 In addition to describing the existing baseline environment, the socio-economic assessment chapter of the Immingham Eastern Ro-Ro Terminal ES will seek to explain what the environmental change, in socio-economic terms, would likely be if the Immingham Eastern Ro-Ro Terminal were not to go ahead.

Possible environmental impacts

6.12.16 The proposed development has the potential to affect socio-economic receptors during both construction and operation. The socio-economic receptors ES chapter will set out the assessment of the likely changes to be generated by the Immingham Eastern Ro-Ro Terminal, both beneficial and adverse and during both the construction and operational phases.

Scoped in

6.12.17 The potential impact pathways during the construction phase are as follows:

- Creation of jobs and training opportunities during construction;
- Impact on local services and local infrastructure during construction;
- The impact of a changing influx of workers during the different construction phase – social cohesion;
- The impact of a changing influx of workers during the different construction phases – local facilities;
- Effects on other existing businesses and activities during construction – fishing;
- Effects on other existing businesses and activities - other existing activities within the Port of Immingham during construction; and
- Other existing businesses and activities within the local area, outside of the Port of Immingham during construction.

6.12.18 The potential impact pathways during the operational phase are as follows:

- Creation of jobs and training opportunities during operation;
- Impact on local services and local infrastructure during operation;
- The impact of a changing influx of workers during the different operation phase – social cohesion;
- The impact of a changing influx of workers during the different operation phases – local facilities;
- Effects on other existing businesses and activities during operation – fishing;
- Effects on other existing businesses and activities - other existing activities within the Port of Immingham during operation;
- Other existing businesses and activities within the local area, outside of the Port of Immingham during operation; and
- Impacts on the achievement of policy objectives during operation.

6.12.19 Potential cumulative effects on socio-economic receptors could arise as a result of other coastal and marine developments in the area, as well as ongoing activities. These will be considered as part of the cumulative and in-combination assessment (Section 5.2).

Scoped out

6.12.20 No aspects of socio-economic assessment have been scoped out at this stage.

Further assessment work required

6.12.21 The NPSfP (DfT, 2012) forms part of the planning system established under The Planning Act 2008 to deal with NSIPs and is a relevant consideration for PINS in making decisions of NSIP port developments such as the Immingham Eastern Ro-Ro Terminal. Section 5.14 of the NPSfP (DfT, 2012) provides some advice to applicants on the approach to be adopted to the consideration of socio-economic effects, and due regard to this policy guidance will be taken in defining the methodology to be used in respect of the Immingham Eastern Ro-Ro Terminal socio-economic assessment.

6.12.22 Paragraph 5.14.13 of the NPSfP (DfT, 2012) identifies the following matters which an applicant may wish to include in their assessment:

- The creation of jobs and training opportunities;
- The provision of additional local services and improvements to local infrastructure, including the provision of educational and visitor facilities;
- Effects on tourism;
- The impact of a changing influx of workers during the different construction, operation and decommissioning phases of the marine infrastructure; and
- Cumulative effects.

6.12.23 The socio-economic impact assessment to be undertaken of the proposed development will, therefore, consider these matters as appropriate to determine whether any significant socio-economic effects will likely be generated by the proposed development during the construction and operational phases.

6.12.24 The socio-economic impact assessment will be undertaken having regard to the existing baseline conditions of the study area which will be established from a range of socio-economic indicators such as:

- Demography;
- Deprivation;
- Qualification levels; and
- Economic activity, structure and employment levels.

6.12.25 The baseline conditions will be established through conducting a desk based study, reviewing publicly available information sources, such as:

- English Indices of Deprivation;
- UK ONS Census Information and other relevant information; and
- Appropriate Business Register and Employment Surveys.

6.12.26 The socio-economic impact assessment will consider these matters to identify whether any significant socio-economic effects will likely be generated by the proposed development in comparison to the scenario where the proposed development does not go ahead.

6.12.27 The socio-economic impact assessment will consider effects predicted to occur during both the construction and operation phase of the proposed development and will have regard to whether the predicted effects are:

- Direct or Indirect;
- Beneficial or Adverse; and
- Temporary or Permanent.

6.12.28 Direct effects are those which directly affect socio-economic baseline conditions. Indirect effects are those where the direct changes in baseline conditions in turn affects other activities in respect of baseline conditions. Temporary effects are those which occur solely for the duration of the impact causing the effect. Permanent effects are those which continue to occur even after the impact initially causing the effects has ceased.

6.12.29 There is no definitive guidance on determining the significance of socio-economic effects. The methodology proposed to be used, therefore, draws on standard industry best practice and has regard to the magnitude of impact being generated (either Major, Moderate, Minor or Negligible) and the sensitivity / value of the receptor being impacted upon (either High, Medium or Low). This assessment methodology differs slightly from that set out in Section 4.2 and will be set out in detail in the socio-economic ES chapter.

6.12.30 The assessment will also consider if any measures are required to mitigate the impact of effects arising as a result of the proposed development. The socio-economic ES chapter will conclude by identifying the significance of residential impacts and draw conclusions from the assessment undertaken.

6.13 Traffic and transport

6.13.1 This section sets out the proposed scope of the Immingham Eastern Ro-Ro Terminal ES chapter that will report the findings of the traffic and transport assessment of the proposed development.

Legislation, policy and guidance position

6.13.2 The potential effects of the proposed development on traffic and transport will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- NPSfP (DfT, 2012);
- National Planning Policy Framework (MHCLG, 2021);

- Institute of Environmental Assessment Guidance Note No 1 “Guidelines for the Environmental Assessment of Road Traffic” (Institute of Environmental Assessment, 1993) (the ‘IEA Guidelines’);
- ‘Travel Plans, Transport Assessment and Statements in decision-taking’ Planning Practice Guidance (DCLG, 2014);
- DfT Circular 02/2013 – ‘Strategic road network and the delivery of sustainable development’ (Highways Agency and DfT, 2013).; and
- Relevant local policy.

Description of the existing environment

Data sources

6.13.3 A desk-based study will be undertaken to inform the baseline characterisation on which the impact assessment will be based. This will include the following key data sources:

- Surveys of existing operational port uses at Immingham and on the local highway network;
- Highway Accident and safety records;
- Modelling data from the Local Highway Authority and National Highways; and
- Any relevant data from Transport Assessments (TAs) relating to committed developments included in the assessment.

Study area

6.13.4 The study area is the area over which potential direct and indirect effects of the Immingham Eastern Ro-Ro Terminal may occur during construction and operation.

6.13.5 The study area that has been considered is the public highway network where any transport related impacts may occur, typically where there is a material change in traffic flows or characteristics of the road.

6.13.6 The traffic and transport ES chapter will, through further desk-based analysis and assessment, refine the study area for the purposes of the impact assessment.

Summary of the baseline environment

6.13.7 The Port of Immingham is currently served by two principal access points, Humber Road to the west and Queens Road to the east.

6.13.8 Humber Road becomes the A160 to the west of the priority junction via a 5-arm roundabout junction. The Humber Road runs in an east-west direction. The A1173 Manby Road junction forms the south-eastern arm of the junction. The remaining arms are private access points to third party warehouses.

6.13.9 To the west of this roundabout, the A160 Humber Road links with the A180 via a grade separated junction. The A1173 Manby Road continues south-east also linking with the A180 to the south-east of the town of Immingham. The A180 is a dual carriageway providing access to Grimsby to the south-west and the M180 at Junction 5 to the west.

6.13.10 To the east, Queens Road connects to the A1173 and which in turn then provides access via a grade separated junction to the A180.

Future baseline

6.13.11 In terms of traffic movements on the wider network it is assumed that in the absence of the proposed development, there will be economic growth both on the proposed development site and in the wider area which will result in increases in traffic movements.

6.13.12 The site of the proposed development forms part of the operational Port of Immingham and has been in active use for port purposes for a number of decades. The current use of the site is for bulk cargo, steel sections, lorry and automotive storage. In the absence of the Immingham Eastern Ro-Ro Terminal, the site would continue to be utilised for port activity.

6.13.13 Whilst there are understood to be no material physical changes to the baseline (in terms of highway works or infrastructure improvements), the local network will experience growth in traffic over the assessment period. This will include growth from other port related activities and growth from other economic development in the area. This will be assessed once the committed and cumulative developments are agreed and the future year baseline will set out those changes. For the Trunk Road network, the future year baseline will be a) year of opening and b) 10 years after year of opening (in accordance with Circular 02/13).

Possible environmental impacts

6.13.14 The proposed development has the potential to affect traffic and transport receptors during both construction and operation. The traffic and transport ES chapter will set out the assessment of the likely changes to be generated by the Immingham Eastern Ro-Ro Terminal, both beneficial and adverse and during both the construction and operational phases.

6.13.15 The IEA Guidance Note No 1 ‘Guidelines for the Environmental Assessment of Road Traffic’ (1993) (the ‘IEA Guidelines’) set out when traffic related environmental impacts can be scoped out for further assessment. It notes that:

> *“To assist the assessor it is suggested that two broad rules of thumb could be used as a screening process to delimit the scale and extent of the assessment. The rules are described and justified in the following paragraphs:*

- Rule 1 include highway links where traffic flows will increase by more than 30% (or the number or heavy goods vehicles will increase by more than 30%)
- Rule 2 include any other specifically sensitive areas where traffic flows have increased by 10% or more."

Scoped in

6.13.16 The potential impact pathways during both the construction and operational phase of the proposed development are related to impacts arising from a change in traffic flows on the affected highway network.

6.13.17 The assessment will provide a breakdown of changes in flows on all routes within the study area which experience an increase in traffic of more than 30 %. The potential impact pathways are as follows and are in line with Table 2.1 of the IEA Guidelines (in light of those changes in flows):

- Severance;
- Driver delay;
- Pedestrian delay;
- Pedestrian amenity;
- Accidents and safety; and
- Hazardous loads.

Scoped out

6.13.18 The following pathways are proposed to be scoped out of the EIA:

- **Any route or road where the increase in flows as a result of the proposed development is less than 30 %**: This is in line with the IEA Guidelines that sets out when traffic related environmental impacts can be scoped out of further assessment.

Further assessment work required

6.13.19 Chapter 5 of the NPSfP (DfT, 2012) states that if a project is likely to have significant transport implications, the applicant's ES should include a Transport Assessment (TA). A TA will, therefore, be prepared alongside the DCO application for the proposed development and provided as an appendix to the ES. The EIA traffic and transport chapter will then be informed by the outcome of the TA.

6.13.20 The detailed operational characteristics of the development are still under review. The scope of the TA will be discussed with the relevant highway authorities and this will inform ongoing progression of the EIA.

6.13.21 The assessment of the traffic generated by the proposed development will be considered in accordance with the IEA Guidelines.

6.13.22 This guidance states that if a project is likely to have significant transport implications, the applicant's ES should include a transport assessment, using the WebTAG methodology stipulated in Department for Transport guidance. In accordance with the guidance, National Highways and/or the relevant highway authorities will be consulted to agree the scope of the TA.

6.14 Landscape/seascape and visual impact

6.14.1 This section sets out the proposed scope of the Immingham Eastern Ro-Ro Terminal ES in relation to landscape/seascape and visual impacts of the proposed development.

Legislation, policy and guidance position

6.14.2 The following policy, legislation and guidance is likely to be relevant in assessing the potential effects of the proposed development with respect to landscape/seascape and visual impacts:

- The NPSfP (DfT, 2012);
- The National Planning Policy Framework (MHCLG, 2021);
- The National Planning Practice Guidance: Sections on Design and the Natural Environment (MHCLG, 2019a); and
- North East Lincolnshire Local Plan (2018), Policy 22: Good design in new developments, and Policy 42: Landscape.

Description of the existing environment

Data sources

6.14.3 An initial desk-based study has been undertaken to gain an understanding of the landscape/ seascape and visual baseline. Key data sources included:

- Ordnance Survey mapping and aerial photography;
- National Character Area profiles (Natural England, 2013);
- Regional and local landscape character assessments:
  - North Lincolnshire Landscape Character Assessment, Sensitivity and Capacity Study (North Lincolnshire Council, 1999);
  - North East Lincolnshire Landscape Character Assessment (North East Lincolnshire Council, 2015b); and
- Seascape character area assessment East Inshore and East Offshore marine plan areas (MMO, 2012).

Study area

6.14.4 The study area is the area over which potential direct and indirect effects of the Immingham Eastern Ro-Ro Terminal may occur during construction and operation.

6.14.5 A study area of 1 km from the outer extent of the proposed development was identified for the initial landscape/seascape and visual impact review.

The extent of the study area was informed by an understanding of the likely maximum parameters of the proposed development and consideration of the existing land use and context.

Summary of existing baseline environment

6.14.6 The existing landscape, seascape and visual baseline is heavily influenced by the existing port and other adjacent large-scale industrial development.

6.14.7 The proposed development is located within an area characterised as an industrial landscape type. The generally flat topography and relatively open nature of the landscape further emphasises the influence of development on the character and views.

6.14.8 The seascape of the Humber varies in quality and character along its length, with expansive areas of tidal mudflats and saltmarsh contrasting with more developed and industrial areas. The site and immediate context are of an industrial seascape character, heavily influenced by the exiting large scale port and movement of large ships.

6.14.9 Visual receptors are relatively limited, with the main concentration being residents in the nearby settlement of Immingham. Existing views from most locations include the structures and infrastructure associated with the working port and other adjacent industrial development.

Future baseline

6.14.10 The site of the proposed development forms a part of the operational Port of Immingham and has been in active use for port purposes for a number of decades. The current use of the site is for bulk cargo, steel sections, lorry and automotive storage. In the absence of the Immingham Eastern Ro-Ro Terminal, the site would continue to be utilised for port activity.

Possible environmental impacts

6.14.11 The existing port infrastructure and other adjacent industrial development has a strong influence of the existing landscape/seascape character and views. Potential change from the Immingham Eastern Ro-Ro Terminal is anticipated to be limited and largely consistent with existing port operations. While new structures and features will be added these will be within the existing port area and will be similar to existing elements already present.

6.14.12 Due to the existing context and limited nature of change it is considered that there is little potential for any significant effects and, therefore, it is proposed that landscape/seascape and visual impacts are scoped out of the EIA.

Further assessment work required

6.14.13 No further landscape/seascape and visual assessment is anticipated to be required.

6.15 Land use planning and human health

6.15.1 This section sets out the proposed scope of the Immingham Eastern Ro-Ro Terminal ES chapter that will report the findings of the land use planning and human health assessment of the proposed development. The main issue is to ensure that workers and users of the Ro-Ro Terminal are not exposed to unacceptable levels of risk from potential major accidents at the existing major hazard sites and pipelines in the vicinity. The HSE will be responsible for advising whether these risks are at an acceptable level. Human health is also considered as part of other topic specific assessments, namely ground conditions, including land quality (Section 6.8), air quality (Section 6.9), and airborne noise and vibration (Section 6.9.19). Accidents and disasters are also considered in relation to commercial and recreation navigation, and coast protection, flood defence and drainage (including the vulnerability of the project to climate change) in Section 6.6 and Section 6.7, respectively.

Legislation, policy and guidance position

6.15.2 The HSE is a consultation body, for the purposes of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. The HSE is, therefore, a statutory consultee for all NSIPs in England.

6.15.3 The EIA Regulations (Schedule 4) requires (where relevant) an ES to include “a description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned”.

6.15.4 When an applicant requests an EIA Scoping Opinion from PINS in relation to a proposed EIA development, the HSE will be consulted and will provide their advice. This advice will be used by PINS to inform the Scoping Opinion which in turn will be used by the applicant to prepare their ES.

6.15.5 The HSE is also a statutory consultee in accordance with section 42 of the Planning Act 2008 (PA, 2008), providing public safety advice in respect of proposed NSIPs.

6.15.6 The two main considerations for HSE are:

- Does the proposed development have the potential to cause a major accident (e.g. does the development require a hazardous substances consent (HSC), and in this context, will it be within the scope of the Control of Major Accident Hazards (COMAH) Regulations (http://www.hse.gov.uk/comah/) and if not, could the development impact on a COMAH site); and
- Whether the proposed development is vulnerable to potential major accidents (e.g. is it within a consultation zone around a major hazard site or pipeline).

6.15.7 The Immingham Eastern Ro-Ro Terminal will not handle significant quantities of any hazardous substances and so will not have the potential to cause a major accident or impact on nearby COMAH sites. The main concern is that the proposed development will lie within the consultation zone of a number of major hazard sites and pipelines, and hence there is a risk to safety for those at the proposed development site.

6.15.8 When the HSE prepares its statutory advice on NSIPs, as well as providing their views on the above considerations, the HSE will also highlight as appropriate:

- Whether the proposed development is on an existing major hazard site and as such could have significant consequences for major accident hazards;
- The need to consider if an application should be made to the Hazardous Substances Authority (HSA) for a new HSC and/or whether extant HSC(s) need to be varied; and
- If there is a facility near to the proposed development where a licence exists under either the Explosive Regulations 2014 or the Dangerous Goods in Harbours Regulations (DGHAR) 2016.

6.15.9 It is incumbent upon the applicant to address all responses including those from statutory consultees in their Consultation Report to be submitted with each NSIP application. When this is not apparent and the HSE NSIP team has had no other direct contact, the HSE will contact the applicant to satisfy themselves that any outstanding issues have been addressed. This interaction will clarify if a Relevant Representation is required.

6.15.10 The HSE then uses the same criteria to consistently review all relevant documentation under section 56 of the PA 2008. However, HSE only raises a Relevant Representation if they have outstanding concerns which require further scrutiny at the Examination stage of the process.

6.15.11 HSE may also choose to participate in the Examination when there have been unresolved issues usually around those sites constrained by current consultation zones.

6.15.12 As the proposed development is not within the scope of the COMAH Regulations, the safety concerns related to any work activity will be addressed under the Health and Safety at Work (HSW), etc Act 1974 and its relevant statutory provisions. In particular, this consideration should be discharged under a management of HSW Regulations requirement to prepare a suitable and sufficient risk assessment (http://www.hse.gov.uk/risk/index.htm) for proposed activities, identifying hazards and taking appropriate measures to manage and control the risks.

Description of the existing environment

Data sources

6.15.13 A desk-based study will be undertaken to inform the baseline characterisation on which the impact assessment will be based. This will include the following key data sources:

- HSE's Land Use Planning Methodology;
- Planning Practice Guidance (Hazardous Substances) (MHCLG, 2019b);
- The latest HSE land use planning zones for all major hazard sites and pipelines in the vicinity; and
- The safeguarding zones for the explosives sites in the vicinity.

6.15.14 In addition to the above, the HSE's land use planning web application will be consulted.

6.15.15 The Health and Safety Laboratory (HSL) will also be consulted to provide more detailed pre-application advice, as suggested by the HSE in preliminary discussions.

Study area

6.15.16 The study area is the area which includes all the nearby major hazard sites, pipelines and explosives sites whose land use planning zones may encroach on any part of the proposed development.

6.15.17 The land use planning and human health ES chapter will, through further desk-based analysis and assessment, refine the study area for the purposes of the impact assessment.

Summary of existing baseline environment

6.15.18 The existing baseline environment involves all the current major hazard sites, pipelines and explosives sites where major accidents could impact on the area of the proposed development. Current major hazard sites and pipelines in the vicinity include:

- Phillips 66 Ltd – Immingham Pipeline Centre;
- Phillips 66 Ltd - Immingham Propylene Storage;
- Inter Terminal (West) – now Exolum (West);
- Inter Terminal (East) – now Exolum (East);
- ABP Immingham Bulk Park;
- Immingham Fertiliser Terminal;
- Associated British Ports Shed 2 and 3;
- Origin Fertilisers;
- ABP Port of Immingham Explosives Licenced Site;
- Immingham Storage Limited Pipeline; and
- Cadent Gas Ltd Pipeline.

6.15.19 These sites currently present a risk to staff working in the area of the proposed development. An estimate of these existing risks will be made based on the available data.

Future baseline

6.15.20 The future baseline environment will still involve all the same major hazard sites, pipelines and explosives sites where major accidents could impact on the area of the proposed development.

6.15.21 It is not expected that there will be any significant changes at any of the nearby major hazard sites, pipelines and explosives sites, and so the future baseline that would exist without the proposed development is expected to be similar to the current baseline.

Possible environmental impacts

6.15.22 The proposed development has the potential to affect land use planning and human health receptors during both construction and operation. The land use planning and human health ES chapter will set out the assessment of the likely changes to be generated by the Immingham Eastern Ro-Ro Terminal, both beneficial and adverse and during both the construction and operational phases.

Scoped in

6.15.23 The potential impact pathways during the construction and operation phases are as follows:

- Risk to workers and users of the proposed development associated with potential major accident events at nearby major hazard sites, pipelines and explosives sites.

Scoped out

6.15.24 The following issues are proposed to be scoped out of the EIA:

- Risk of activities and impact of operations at the Immingham Eastern Ro-Ro Terminal on neighbouring major hazard sites or pipelines: a risk assessment associated with the activities at the proposed development, or any consideration of operational impacts, on neighbouring major hazard sites or pipelines is not required. The rationale is that the proposed development will not handle any significant quantities of hazardous substances, or involve any activities which could impact or lead to a major accident at a nearby major hazard site or pipeline. It is envisaged that the proposed development will handle some hazardous goods in transit but since there is no storage element this falls outside of the land use planning regulatory system and becomes a matter for the Port to review under the Dangerous Goods in Harbour Areas Regulations 2016;

- **Risks to workers during construction of the proposed development**: the 'standard' construction risks (as opposed to the major hazard risks) to workers during construction of the proposed development will not be considered, as such construction risks will be appropriately managed under the requirements of the HSW Act and Construction (Design and Management) Regulations. This will include ensuring that any temporary construction buildings are located in areas of low risk.

6.15.25 There will be no consideration of the risks to human health other than those risks relating to major accidents at nearby major hazard sites, pipelines and explosives sites. Any such lesser health impacts will be considered elsewhere in the ES as noted above in the introduction to this topic (e.g. in relation to air quality (see Section 6.9)).

6.15.26 There will be no consideration of the risks to people once they are aboard a vessel. Such risks are not normally considered as part of land use planning assessments. Impact pathways relating to commercial and recreational navigation are considered in Section 6.6.

Further assessment work required

6.15.27 In order to help demonstrate that the risks to users of the proposed development are at an acceptable level, a relatively simple quantified risk assessment will be undertaken. This will include consideration of the likely number of people present in each part of the proposed development, and how long they are likely to be present. The risks will be conservatively estimated based on the HSE land use planning zones, and any other data available at the time. This will include consideration of individual and societal risks both for workers and members of the public.

6.15.28 The advice received from HSL will also be reviewed and taken account of in the assessment.

6.16 Climate change

6.16.1 This section summarises the proposed scope of the Immingham Eastern Ro-Ro Terminal ES in relation to climate change. Consideration of climate change effects is divided into three aspects:

- **Impact of the proposed development on climate (greenhouse gas (GHG) emissions):** considers the impact on the climate of GHG emissions arising from the proposed development during its lifetime, including how the proposed development will affect the ability of Government to meet its planned carbon reduction targets;
- **Climate change risk (CCR) review of the proposed development to climate change:** considers climate change risks, possible impacts to the proposed development and embedded design and mitigation measures to mitigate these risks; and

- **In-combination climate change impacts (ICCI):** an assessment of the influence of climate change on the project-related impacts to receptors in the receiving environment.

Legislation, policy and guidance position

6.16.2 A summary of the relevant policy, legislation and guidance related to this climate change assessment will be re-evaluated during the further stages of EIA process including:

- United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement (UNFCCC, 2015);
- EU Directive 2014/52/EU on the assessment of the effects of certain public and private projects on the environment;
- Climate Change Act 2008/ Climate Change Act (2050 Target Amendment) (UK Government, 2019);
- The NPSfP (DfT, 2012);
- National Planning Policy Framework (MHCLG, 2021);
- Transport Decarbonisation Plan, Decarbonising Transport: a better, greener Britain, (DfT, 2021b);
- Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA, 2017);
- Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (IEMA, 2020); and
- Relevant local policy.

Description of the existing environment

Data sources

6.16.3 A desk-based study will be undertaken to inform the baseline characterisation on which the impact assessment will be based. This will include the following key data sources:

- Project design and construction information;
- Historic climate data obtained from the Met Office;
- UK Climate Projections 2018 (UKCP18) (Met Office, 2018);
- Clean Maritime Plan (DfT, 2019); and
- ABP's Climate Change Adaptation Report (ABP, 2016).

Study area

6.16.4 The study area for the GHG assessment would include:

- Direct GHG emissions arising as a result of construction, maintenance and operational activity within the boundary of the proposed development; and
- Indirect GHG emissions occurring offsite such as embodied carbon in materials, transportation and waste disposal.

6.16.5 The study area for the CCR review will be the area of temporary and completed works within the boundary of the proposed development.

6.16.6 The study area for the ICCI assessment will be determined by the outcomes of other EIA topic assessments, as described in other chapters of the ES.

Summary of existing baseline environment

GHG emissions

6.16.7 The baseline comprises existing carbon stock and sources of GHG emissions associated with existing site activities taking place within the boundary of the proposed development.

CCR and ICCI

6.16.8 The existing baseline for the CCR review and ICCI assessment will be based upon historic climate data obtained from the Met Office recorded by the closest meteorological station to the proposed development (Cleethorpes; 8 miles from the proposed development) for the period 1981-2010 (Met Office, 2021) (Table 19).

Table 19. Historic Climate Data for climate station: Cleethorpes, 1981-2010

Climatic Variable	Month	Value
Average annual maximum daily temperature (o C)	-	13.6
Warmest month on average (o C)	July, August	20.7
Coldest month on average (o C)	January	7.4
Mean annual rainfall levels (mm)	-	587.9
Wettest month on average (mm)	November	60.2
Driest month on average (mm)	February	38

Future baseline

GHG emissions

6.16.9 The future baseline for the assessment of the impact of the proposed development on climate is a projected 'business as usual' scenario where the proposed development is not constructed.

CCR and ICCI

6.16.10 The future baseline will be based on UK Climate Projection 2018 (UKCP18) data from the Met Office for the 25 km grid square in which the proposed development is located.

Possible environmental impacts

6.16.11 The proposed development has the potential to affect the climate (and *vice versa*) during both construction and operation. The climate change ES chapter will set out the assessment of the likely changes to be generated by

the Immingham Eastern Ro-Ro Terminal, both beneficial and adverse and during both the construction and operational phases.

Scoped in

GHG emissions

6.16.12 Potential sources of GHG emissions applicable to the construction phase are as follows:

- Raw material extraction, product manufacture of construction materials, electricity use, on-site fuel use, waste disposal, and transport - the majority of emissions from this stage are expected to arise from embodied carbon in materials; other minor sources are expected from the generation of electricity used, fuel use, and waste disposal during construction.

6.16.13 Potential sources of GHG emissions applicable to the operational phase of the proposed development are from the operational activities and are as follows:

- Generation of energy used, provision of potable water, and treatment of wastewater;
- Transport and disposal of waste;
- Commuter and materials transport;
- Embodied carbon in operational materials;
- Electricity and fuel use;
- Vessel emissions within UK waters and international shipping; and
- Any land-use change through landscaping.

6.16.14 The UK Government has recently passed into law the sixth carbon budget, for years 2033 to 2037 (UK Government, 2021). This budget incorporates the UK's share of international aviation and shipping emissions. GHG emissions from offshore operational activities are, therefore, also applicable to the proposed development and will be included in the scope of the assessment.

CCR

6.16.15 Potential impacts to the proposed development include damage to assets caused by climate change (i.e. by the 'climatic parameters' and the associated costs in terms of loss of time, loss of function, repairs, etc.).

6.16.16 The potential impacts for the CCR assessment will be determined based on the UKCP18 projections. Climatic parameters to be taken into account are as follows:

- Extreme weather events - the proposed development may be vulnerable to extreme weather events such as storm damage to structures and assets;

- Sea level rise and flooding - the proposed development is located in an area susceptible to sea level rise and it may be affected by sea level rises and flooding; and
- Temperature - increased temperatures may increase cooling requirements of the proposed development and could impact on structural integrity of buildings and materials.

ICCI

6.16.17 The potential impacts for the ICCI assessment will be determined based on the UKCP18 projections. Climatic parameters to be taken into account are as follow:

- Extreme weather events - the impacts of extreme weather events will be taken into account as part of the climate change allowances to be made within the coast protection, flood defence and drainage ES chapter (see Section 6.7).
- Sea level rise - the proposed development is located in an area susceptible to sea level rise. However, the in-combination influence of climate change on receptors will be sufficiently considered in other technical assessments that form part of the ES, and sea level rise will be considered as part of the coast protection, flood defence and drainage ES chapter (see Section 6.7).
- Precipitation - climate change may lead to an increase in substantial precipitation events that could lead to flash flooding, including both pluvial and fluvial flooding. Projected increases in rainfall will be taken into account as part of the coast protection, flood defence and drainage ES chapter (see Section 6.7).

Scoped out

GHG emissions

6.16.18 The following activities and/or lifecycle stages are proposed to be scoped out of the GHG emissions assessment:

- **Pre-construction**: It is anticipated that no demolition or land clearance will take place;
- **Maintenance**: Emissions from maintenance works during the operational phase are likely to be minimal in proportion to the overall proposed development GHG footprint; and
- **Decommissioning**: It is anticipated that the proposed development would be in use beyond the design life of the infrastructure. Any future decommissioning would require a separate planning submission and, therefore, is scoped out of this assessment.

CCR Review

6.16.19 The following climatic parameters are proposed to be scoped out of the CCR review:

- **Precipitation**: The impacts of precipitation on the proposed development are likely to be no worse relative to baseline conditions; and
- **Wind**: The impacts of wind on the proposed development are likely to be no worse relative to baseline conditions.

ICCI

6.16.20 The following climatic parameters are proposed to be scoped out of the ICCI assessment:

- **Temperature**: The proposed development is in an existing industrial area and will not contribute to an urban heat island, nor generate heat; and
- **Wind**: The impacts of wind on receptors in the surrounding environment are likely to be no worse relative to the baseline conditions. This parameter will be scoped into the wind microclimate assessment and will not require an additional analysis within the ICCI assessment.

6.16.21 Although some elements of ICCI are scoped into the EIA, the inclusion of ICCI has been scoped out of the climate change chapter on the basis that any identified ICCIs will be addressed in other relevant planning documents, namely the coast protection, flood defence and drainage chapter.

Further assessment work required

6.16.22 The following paragraphs provide an explanation of the further assessment work that is envisaged for the GHG emissions assessment and CCR review.

GHG Emissions

6.16.23 The lifecycle GHG impact assessment will take a project lifecycle approach that will identify GHG emissions hotspots (i.e. emissions sources likely to generate the largest amount of GHG emissions), and correspondingly enables the identification of priority areas for mitigation. This approach is consistent with the principles set out in IEMA guidance (IEMA, 2017).

6.16.24 The lifecycle GHG impact assessment will be reported as tonnes of carbon dioxide equivalent (tCO_2e), in line with the World Business Council for Sustainable Development (WBCSD) and World Resources Institute (WRI) GHG Protocol guidelines (WBCSD/ WRI, 2013), and will consider the seven Kyoto Protocol gases: Carbon dioxide (CO_2), Methane (CH_4), Nitrous oxide (N_2O), Sulphur hexafluoride (SF6), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs); and Nitrogen Trifluoride (NF_3).

6.16.25 Expected GHG emissions arising from the construction activities, embodied carbon in materials and operational emissions of the proposed development will be quantified using a calculation-based methodology as per the following equation and aligned with the GHG Protocol:

Activity data x GHG emissions factor = GHG emissions

6.16.26 The assessment will use BEIS UK emissions factors (BEIS, 2021), and embodied carbon data from the Inventory of Carbon and Energy (ICE) (University of Bath, 2019) as the source data for calculating GHG emissions.

6.16.27 The impact of GHG emissions from the proposed development on the global climate will be assessed in terms of the contribution of the emissions to the UK carbon budgets (Table 20), and if they will impact these budgets being met.

Table 20. Relevant carbon budgets

Carbon Budget	National Carbon Budget ($MtCO_2e$)
3rd (2018-2022)	2,544
4th (2023-2027)	1,950
5th (2028-2032)	1,725
6th (2033-2037)	965

6.16.28 The significance of GHG emissions will be assessed following PAS 2050 Specification (BSI, 2011) which allows emissions sources of <1 % contribution to be excluded from emission inventories, and these inventories to still be considered complete for verification purposes. Where GHG emissions from the proposed development are equal to or more than 1 % of the relevant UK Carbon Budget, the impact of the proposed development on the climate will be considered to be of major significance. Significance criteria are summarised in Table 21.

Table 21. Significance criteria for the GHG emissions impact assessment

Significance	Magnitude Criteria
Major Adverse	GHG emissions represent an increase of equal to or more than 1 % of total emissions from the relevant 5-year UK carbon budget in which they arise
Minor Adverse	GHG emissions represent an increase of less than 1 % of total emissions from the relevant 5-year UK carbon budget in which they arise
Major Beneficial	GHG emissions represent a reduction of equal to or more than 1 % of total emissions from the relevant 5-year UK carbon budget in which they arise
Minor Beneficial	GHG emissions represent a reduction of equal to or more than 1 % of total emissions from the relevant 5-year UK carbon budget which they arise

6.16.29 The scope for mitigating climate change effects from the proposed development will be determined following completion of the lifecycle GHG impact assessment. Mitigation will focus on measures for reducing GHG emissions from the construction and operation of the proposed development

to align with the UK Government's target to achieve net zero emissions by 2050. Clean Maritime Plan (DfT, 2019) will be considered when determining the mitigation measures.

CCR

6.16.30 The CCR review will qualitatively assess the resilience of the proposed development to climate change. This will be completed in liaison with the project design team and the other EIA topic leads by considering the UKCP18 projections for the geographical location and timeframe of the proposed development (from construction through to operation).

6.16.31 The risk associated with a climate variable will be evaluated through understanding the associated likely impact, the tolerable risk threshold, the sensitivity of the risk assessment; i.e. would using different climate change scenarios change the hazards, and highlight areas where risks are unacceptable.

6.16.32 Information will be included within the EIA to describe how the proposed development will be designed to improve its resilience to future climatic conditions and reduce the risk.

6.16.33 The scope for mitigating climate change effects from the proposed development will be determined following completion of the CCR review. These will focus on measures to increase the resilience of the proposed development to climate change impacts. Clean Maritime Plan (DfT, 2019), Climate Change Adaptation Report (ABP, 2016) and the next version of the adaptation report due later this year will be considered when determining the adaptation measures.

7 Summary

7.1.1 Following this scoping review, a number of environmental topics and impact pathways are proposed to be either 'scoped in' (i.e. require further assessment as part of the EIA) and/or 'scoped out' (i.e. do not require further assessment as part of the EIA). The findings for each topic and the potential impact pathways that are proposed to be scoped in and out of the EIA are summarised in Table 22.

7.1.2 The relevant environmental topic sections of the report in Section 6 provide further detail on the justification for, and approach to, the further assessment work that will be undertaken as part of the EIA.

7.1.3 In addition, potential cumulative effects of the proposed development alone and as a result of other plans, projects and ongoing activities will be assessed for each topic that has been scoped into the EIA (Section 5.2).

Table 22. Summary of 'scoped in' and 'scoped out' topics and potential impact pathways

Topic	Potential impact pathways	Scoped into EIA?
Physical processes	Increased SSC and potential sedimentation over the extent of the disturbance plume as a result of the construction of the new piers (piling) and capital dredging works during construction	Yes
	Increased SSC and potential sedimentation as a result of the deposit of capital dredge material at a licensed offshore disposal site during construction	Yes
	Changes in seabed bathymetry and composition as a result of deposition of dredged/disposal material within the area of the respective plumes during construction	Yes
	Local changes to hydrodynamic regime (flow speed and direction) as a result of the piers (piling) and capital dredging during operation	Yes
	Local changes to the wave regime, as a result of the piers (piling) and capital dredging during operation	Yes
	Associated local changes to the sediment transport pathways, as a result of localised changes to the driving hydrodynamic (and wave) forcing during operation	Yes
	Increased SSC and potential sedimentation in the area of dispersal plume as a result of maintenance dredging during operation	Yes

Topic	Potential impact pathways	Scoped into EIA?
	Increased SSC and potential sedimentation as a result of deposition of maintenance dredge material at a licensed disposal site during operation	Yes
	Changes in seabed bathymetry and composition as a result of deposition of dredged/disposed maintenance dredge material during operation	Yes
Water and sediment quality	Changes to dissolved oxygen concentrations as a result of increased SSC during piling, capital dredging and disposal activities during construction	Yes
	Changes to chemical water quality as a result of potential sediment-bound contaminants being released during piling, capital dredging and disposal activities during construction	Yes
	Redistribution of sediment-bound contaminants during piling, capital dredging and disposal activities during construction	Yes
	Changes to dissolved oxygen concentrations as a result of increased SSC during the maintenance dredging and disposal activities	Yes
	Changes to chemical water quality as a result of potential contaminants in the seabed sediment being released during maintenance dredging and disposal activities	Yes
	Redistribution of sediment-bound contaminants during maintenance dredging and disposal activities	Yes
	Changes to levels of contaminants in water (including accidental spillages) during construction and operation	No
Nature conservation and marine ecology	Benthic habits and species	
	Direct loss of intertidal habitat as a result of capital dredging during construction	Yes
	Direct loss of intertidal and subtidal habitats and species as a result of the piles during construction	Yes
	Direct changes to benthic habitats and species as a result of capital dredging and dredge disposal during construction	Yes
	Indirect changes to benthic habitats and species as a result of changes to hydrodynamic and sedimentary processes during capital dredging and dredge disposal during construction	Yes
	Changes in water and sediment quality during capital dredging and dredge disposal	Yes

Topic	Potential impact pathways	Scoped into EIA?
	Underwater noise and vibration disturbance during piling, capital dredging and dredge disposal during construction	Yes
	Introduction and spread of non-native species during construction	Yes
	Direct changes to benthic habitats and species as a result of sediment removal and deposition during operation (specifically maintenance dredging, dredge disposal and due to operational berth vessel movements)	Yes
	Indirect changes to benthic habitats and species as a result of changes to hydrodynamic and sedimentary processes during operation	Yes
	Changes in water and sediment quality during operation during operation	Yes
	Underwater noise and vibration disturbance during operation	Yes
	Introduction and spread of non-native species during operation	Yes
	Fish	
	Direct loss of intertidal habitat a result of dredging during construction	Yes
	Direct loss or changes to fish populations and habitat as a direct result of capital dredging and dredge disposal during construction	Yes
	Changes in water and sediment quality during capital dredging and dredge disposal during construction	Yes
	Underwater noise and vibration disturbance during construction	Yes
	Changes to fish populations and fish habitat during operation (as a result of maintenance dredging, dredge disposal and operational berth vessel movements)	Yes
	Changes in water and sediment quality during operation	Yes
	Underwater noise and vibration disturbance operation	Yes
	Marine mammals	
	Underwater noise and vibration disturbance during construction	Yes
	Underwater noise and vibration disturbance during operation	Yes
	Changes to marine mammal foraging habitat and prey resources during dredging and dredge	No

Topic	Potential impact pathways	Scoped into EIA?
	disposal (both capital and maintenance) and operational berth vessel movements	
	Collison risk during construction and operation	No
	Water quality impacts during dredging and dredge disposal (both capital and maintenance) and operational berth vessel movements	No
	Coastal waterbirds	
	Direct loss of intertidal feeding and roosting habitat a result of capital dredging during construction	Yes
	Direct loss and change to feeding and roosting habitat a result of the piles during construction	Yes
	Changes to foraging and roosting habitat as a result of capital dredging and dredge disposal during construction	Yes
	Airborne noise and visual disturbance during construction	Yes
	Changes to foraging and roosting habitat during operation (as a result of maintenance dredging, dredge disposal and operational berth vessel movements)	Yes
	Airborne noise and visual disturbance during operation	Yes
	All marine ecology receptors	
	Changes to seabed habitats and species as a result of sediment deposition during piling during construction	No
	Indirect changes to seabed habitats and species as a result of changes to hydrodynamic and sedimentary processes due to the presence of the piles during construction	No
	Changes in water and sediment quality during piling during construction	No
Terrestrial ecology	Effects on terrestrial ecology receptors during construction and operation	No
Commercial and recreational navigation	Contact of works craft with Port infrastructure during construction	Yes
	Collision of passing vessels with works craft during construction	Yes
	Collision during navigation with works craft whilst transiting to/from the site or during activities within the disposal site during construction	Yes
	Collision during towage operations during construction	Yes
	Payload related incidents during construction	Yes

Topic	Potential impact pathways	Scoped into EIA?
	Collision due to increased commercial vessel movements during operation	Yes
	Collision due to increased maintenance dredging movements during operation	Yes
	Collision of vessels manoeuvring at the berth with passing traffic during operation	Yes
	Vessel contact with the quay during operation	Yes
	Mooring breakout with vessel alongside during operation	Yes
Coast protection, flood defence and drainage	Vulnerability to flood events during construction	Yes
	Changes to current and future flood risk during operation	Yes
	Adaptation to future climate change allowing operations to continue	Yes
Ground conditions, including land quality	Direct contact with/ ingestion/ inhalation of solid contaminants by human receptors during the construction phase	Yes
	Direct contact with/ ingestion/ inhalation of contaminated waters by human receptors during the construction phase	Yes
	Inhalation of ground gas/ vapours by human receptors during the construction phase	Yes
	Migration of spills e.g. fuels into the underlying shallow groundwater or lateral migration via surface water run-off in to surface water during construction	Yes
	Accumulation of explosive/ asphyxiant concentrations of ground gas during the construction phase	Yes
	Direct contact with/ ingestion/ inhalation of solid contaminants by human receptors during the operational phase	Yes
	Direct contact with/ ingestion/ inhalation of contaminated waters by human receptors during the operational phase	Yes
	Inhalation of ground gas/ vapours by human receptors during the operational phase	Yes
	Accumulation of explosive/ asphyxiant concentrations of ground gas during the operational phase	Yes
	Direct contact with services, buildings and infrastructure	Yes
	Migration of contaminants from Secondary A Aquifer to deeper Principal Aquifer, via preferential pathways created (i.e. piling activity) during operation	Yes

Topic	Potential impact pathways	Scoped into EIA?
	Migration of contaminants to adjacent sensitive ecological receptors and surface waters during operation	Yes
Air quality	Impacts to nearby resident's health and amenity, and to ecological systems as a result of fugitive emissions of dust and fine particulate matter (PM_{10}) associated with construction activities	Yes
	Impacts to nearby resident's health and to ecological systems from exhaust emissions from on-site construction plant and/or construction vehicles	Yes
	Impacts to nearby resident's health and to ecological systems due to emissions to air from vessels during construction	Yes
	Impacts to nearby resident's health and to ecological systems from changes in road traffic emissions during operation	Yes
	Impacts to nearby resident's health and to ecological systems due to emissions to air from vessels during operation	Yes
Airborne noise and vibration	Potential noise and vibration impacts associated with construction activities	Yes
	Potential noise impacts associated with traffic movements during construction	Yes
	Potential noise impacts associated with traffic movements during operation	Yes
	Potential noise impacts associated with vessel movements, other site activities and mechanical plant during operation	Yes
	Vibration emissions from the construction and operation of the proposed development	No
Marine archaeology	Direct impacts to known and potential marine archaeology assets and deposits of archaeological importance as a result of the piling and capital dredge during construction	Yes
	Indirect impacts to known and potential marine archaeology assets and deposits of archaeological importance due to changes in physical processes as a result of the piling and capital dredge during operation	Yes
	Setting of marine archaeological and cultural heritage receptors during construction and operation	No

Topic	Potential impact pathways	Scoped into EIA?
Socio-economic receptors	Creation of jobs and training opportunities during construction	Yes
	Impact on local services and local infrastructure during construction	Yes
	The impact of a changing influx of workers during the different construction phase – social cohesion	Yes
	The impact of a changing influx of workers during the different construction phases – local facilities	Yes
	Effects on other existing businesses and activities during construction – fishing	Yes
	Effects on other existing businesses and activities - other existing activities within the Port of Immingham during construction	Yes
	Other existing businesses and activities within the local area, outside of the Port of Immingham during construction	Yes
	Creation of jobs and training opportunities during operation	Yes
	Impact on local services and local infrastructure during operation	Yes
	The impact of a changing influx of workers during the different operation phase – social cohesion	Yes
	The impact of a changing influx of workers during the different operation phases – local facilities	Yes
	Effects on other existing businesses and activities during operation – fishing	Yes
	Effects on other existing businesses and activities - other existing activities within the Port of Immingham during operation	Yes
	Other existing businesses and activities within the local area, outside of the Port of Immingham during operation	Yes
	Impacts on the achievement of policy objectives during operation	Yes
Traffic and transport	Severance	Yes
	Driver delay	Yes
	Pedestrian delay	Yes
	Pedestrian amenity	Yes
	Accidents and safety	Yes
	Hazardous loads	Yes
	Any route or road where the increase in flows as a result of the proposed development is less than 30%	No
Landscape/seascape and visual impact	Landscape/seascape and visual impacts during construction and operation	No

Topic	Potential impact pathways	Scoped into EIA?
Land use planning and human health	Risk to workers and users of the proposed development associated with potential major accident events at nearby major hazard sites, pipelines and explosives sites during construction and operation	Yes
	Risk of activities and impact of operations at the Immingham Eastern Ro-Ro Terminal on neighbouring major hazard sites or pipelines	No
	Risks to workers during construction of the proposed development	No
Climate change	GHG emissions	
	Raw material extraction, product manufacture of construction materials, electricity use, on-site fuel use, waste disposal, and transport during construction	Yes
	Generation of energy used, provision of potable water, and treatment of wastewater during operation	Yes
	Transport and disposal of waste during operation	Yes
	Commuter and materials transport during operation	Yes
	Embodied carbon in operational materials during operation	Yes
	Electricity and fuel use during operation	Yes
	Vessel emissions within UK waters and international shipping during operation	Yes
	Any land-use change through landscaping during operation	Yes
	Pre-construction GHG emissions	No
	Maintenance works GHG emissions	No
	Decommissioning GHG emissions	No
	CCR	
	Extreme weather events	Yes
	Sea level rise and flooding	Yes
	Temperature	Yes
	Precipitation	No
	Wind	No
	ICCI	
	Extreme weather events (taken into account as part of the climate change allowances to be made within the coast protection, flood defence and drainage ES chapter)	Yes
	Sea level rise (considered as part of the coast protection, flood defence and drainage ES chapter)	Yes

Topic	Potential impact pathways	Scoped into EIA?
	Precipitation (taken into account as part of the climate change allowances to be made within the coast protection, flood defence and drainage ES chapter)	Yes
	Temperature	No
	Wind	No

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9 Abbreviations/Acronyms

Acronym	Definition
AA	Appropriate Assessment
ABP	Associated British Ports
ADMS-Roads	Air Pollution Model for Roads Networks
AEOI	Adverse Effect On Integrity
AIS	Automated Identification System
AL	Action Level
ALARP	As Low As Reasonably Practicable
ATL	Advance the Line
AtoN	Aids to Navigation
AWAC	Acoustic Wave and Current Profiler
BEIS	Department for Business, Energy and Industrial Strategy
bgl	Below Ground Level
BGS	British Geological Society
BNG	Biodiversity Net Gain
BP	Before Present
BPEO	Best Practical Environmental Option
BS	British Standard
BSI	British Standards Institute
BTO	British Trust for Ornithology
BWD	Bathing Water Directive
CCR	Climate Change Risk
CD	Chart Datum
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CHA	Competent Harbour Authority
CIEEM	Chartered Institute of Ecology and Environmental Management
CIfA	Chartered Institute for Archaeologists
COLREGS	Convention on the International Regulations for Preventing Collisions at Sea
COMAH	Control of Major Accident Hazards
CRoW	Countryside and Rights of Way Act
CRTN	Calculation of Road Traffic Noise
CSM	Conceptual Site Model
CTD	Conductivity-Temperature Depth
dB	Decibel

DBA	Desk-Based Assessment
DCLG	Department for Communities and Local Government
DCO	Development Consent Order
DECC	Department of Energy and Climate Change
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DGHAR	Dangerous Goods in Harbours Regulations
DHI	Danish Hydraulic Institute
DMRB	Design Manual for Roads and Bridges
DTA	David Tucker Associates
EC	European Commission
EEC	European Economic Community
EIA	Environmental Impact Assessment
EMS	European Marine Site
END	Environmental Noise Directive
EPA	Environmental Protection Act
EPUK	Environmental Protection UK
EQS	Environmental Quality Standards
ES	Environmental Statement
EU	European Union
FCM	Flamborough Chalk Formation
FM	Flexible Mesh
FOCI	Feature of Conservation Importance
FRA	Flood Risk Assessment
FSA	Formal Safety Assessment
GB	Great Britain
GHG	Greenhouse Gas
GI	Ground Investigation
GPP	Guidance for Pollution Prevention
HAT	Highest Astronomical Tide
HE	Historic England
HER	Historic Environment Records
HES	Humber Estuary Services
HFCs	Hydrofluorocarbons
Hg	Mercury
HIT	Humber International Terminal

HM	Her Majesty's
HMSO	Her Majesty's Stationery Office
HMWB	Heavily Modified Water Body
HRA	Habitats Regulations Assessment
HSA	Hazardous Substances Authority
HSC	Hazardous Substances Consent
HSE	Health and Safety Executive
HSI	Habitat Suitability Index
HSL	Health and Safety Laboratory
HSW	Health and Safety at Work
HTL	Hold The Line
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IAQM	Institute of Air Quality Management
IAS	Invasive Alien Species
ICCI	Greenhouse Gas Emissions
ICE	Inventory of Carbon and Energy
ICES	International Council for the Exploration of the Sea
ID	Identity
IEA	Institute of Environmental Assessment
IECS	The Institute of Estuarine & Coastal Studies
IEMA	Institute of Environmental Management and Assessment
IMO	International Maritime Organization
IOH	Immingham Outer Harbour
IOT	Immingham Oil Terminal
IPC	Infrastructure Planning Commission
IPCC	Intergovernmental Panel on Climate Change
IPENS	Improvement Programme for England's Natura 2000 Sites
IR	Infrared
ISPF	International Ship and Port Facility
JCP	Joint Cetacean Protocol
JNCC	In-combination Climate Change Impacts
$L_{Aeq,T}$	A-weighted L_{eq} sound level, measured over a specified period of time (T)
LAQM	Local Air Quality Management
LAT	Lowest Astronomical Tide
LEP	Local Enterprise Partnership

L_{eq}	Equivalent Continuous Sound Level
LERC	Lincolnshire Ecological Records Centre
LiDAR	Light Detection and Ranging
LLA	Local Lighthouse Authority
LLFA	Lead Local Flood Authority
LLP	Limited Liability Partnership
LNR	Local Nature Reserve
LOAEL	Lowest Observable Adverse Effect Level
LPS	Local Port Services
LSE	Likely Significant Effect
LSOA	Lower Super Output Area
LWS	Local Wildlife Site
MAC	Maximum Allowable Concentrations
MAFF	Ministry of Agriculture, Fisheries and Food
MAGIC	Multi-Agency Geographic Information for the Countryside
MAIB	Marine Accident Investigation Branch
MCA	Maritime and Coastguard Agency
MCAA	Marine and Coastal Access Act
MCZ	Marine Conservation Zone
MGN	Marine Guidance Notice
MHCLG	Ministry of Housing, Communities and Local Government
MHWN	Mean High Water Neaps
MHWS	Mean high Water Springs
MHz	Megahertz
MLWN	Mean Low Water Neaps
MLWS	Mean Low Water Springs
MMO	Marine Management Organisation
MR	Managed Realignment
MSL	Mean Sea Level
MSMS	Marine Safety Management System
$MtCO_2e$	Metric Tons of Carbon Dioxide Equivalent
NAI	No Active Intervention
NERC	Natural Environment and Rural Communities
NMBAQC	Marine Biological Analytical Quality Control
NNR	National Nature Reserve
NOAA	National Oceanic and Atmospheric Administration

NOAEL	No Observed Adverse Effect Level
NOEL	No Observed Effect Level
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NPSE	Noise Policy Statement for England
NPSfP	National Policy Statement for Ports
NRA	Navigational Risk Assessment
NRHE	National Record of the Historic Environment
NRMM	Non Road Mobile Machinery
NSIP	Nationally Significant Infrastructure Projects
NSR	Noise Sensitive Receptors
NVZ	Nitrate Vulnerable Zone
ODN	Ordnance Datum
OMH	Open Mosaic Habitat
ONS	Office of National Statistics
OREIs	Offshore Renewable Energy Installations
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
PA	Planning Act
PAH	Polycyclic Aromatic Hydrocarbons
PAS	Publicly Available Specification
PBDE	Polybrominated Diphenyl Ethers
PCB	Polychlorinated Biphenyls
PCM	Pollution Climate Mapping
PEA	Preliminary Ecological Appraisal
PEC	Pilot Exemption Certificate
PEIR	Preliminary Environmental Information Report
PFCs	Perfluorocarbons
PFOS	Perfluorooctane Sulphonate
pH	Numerical Measure of Acidity or Alkalinity of a Solution
PIANC	The World Association for Waterborne Transport Infrastructure
PINS	Planning Inspectorate
PLC	Public Limited Company
PM_{10}	Particulate Matter with diameters that are generally 10 micrometres and smaller
PMSC	Port Marine Safety Code
PPG	Planning Practice Guidance

PSA	Particle Size Analysis
RAF	Royal Air Force
Ramsar	Wetlands of international importance, designated under The Convention on Wetlands (Ramsar, Iran, 1971)
RBMP	River Basin Management Plan
RCP	Representative Concentration Pathway
RNLI	Royal National Lifeboat Institution
Ro-Ro	Roll On-Roll Off
RSPB	Royal Society for the Protection of Birds
RTPI	Royal Town Planning Institute
SAC	Special Area of Conservation
SCANS	Small Cetaceans in European Atlantic Waters and the North Sea
SCOS	Special Committee on Seals
SDC	Sunk Dredged Channel
SHA	Statutory Harbour Authority
SLR	Sea Level Rise
SMP	Shoreline Management Plans
SMRU	Sea Mammal Research Unit
SOAEL	Significant Observed Adverse Effect Level
SPA	Special Protection Area
SPL	Sound Pressure Levels
SPZ	Source Protection Zone
SSC	Suspended Sediment Concentrations
SSSI	Site of Special Scientific Interest
STCW	Standards of Training, Certification and Watchkeeping for Seafarers
SuDS	Sustainable Drainage System
TA	Transport Assessments
tCO_2e	Tonnes of Carbon Dioxide Equivalent
TG	Technical Guidance
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
TraC	Transitional and Coastal Waters
TSHD	Trailer Suction Hopper Dredger
TTWA	Travel To Work Area
UAEL	Unacceptable Adverse Effect Level
UK	United Kingdom
UKBAP	United Kingdom Biodiversity Action Plan

UKCP18	UK Climate Projections 2018
UKHO	United Kingdom Hydrographic Office
UKSO	United Kingdom Soil Observatory
UNFCCC	United Nations Framework Convention on Climate Change
UXO	Unexploded Ordnance
VTS	Vessel Traffic Service
WA	Wessex Archaeology
WACA	Wildlife and Countryside Act
WBCSD	World Business Council for Sustainable Development
WCA	Wildlife and Countryside Act
WeBS	Wetland Bird Survey
WebTAG	Web-based Transport Analysis Guidance (GOV.UK)
WFD	Water Framework Directive
WHA	Waste Hierarchy Assessment
WRI	World Resources Institute

Cardinal points/directions are used unless otherwise stated.

SI units are used unless otherwise stated.

10 Glossary

Term	Definition
No Active Intervention	A policy decision not to invest in the provision or maintenance of any defences
Advance the Line	New defences are built further out in the sea in an attempt to reduce the stress on current defences and possibly extend the coastline slightly
Amphidromic system	Large scale circular rotational pattern of tides around a central point or node
Anthropogenic pollution	Pollution as a result of human activities
Aquifer	An aquifer is a geological formation which can contain or transmit groundwater. The type of aquifer indicates how permeable it is, its capability to store/yield significant quantities of water and also whether its quality is suitable for potable water supply
Archaeology receptors and deposits	Archaeological receptors include the remains of vessels that have been lost as a result of stranding, foundering, collision, enemy action and other causes, and those sites that consist of vessel-related material. These can also include the remains or associated remains of military and civilian aircraft that have been lost at sea. Archaeological deposits can include palaeochannels and other features that contain prehistoric sediment, and derived Palaeolithic artefacts e.g. hand axes.
Baseline conditions	Existing conditions and past trends associated with the environment in which a proposed activity may take place
Bathymetry	The measurement of depth of the water
Beam trawls	Fishing net towed along the seafloor to target fish living in or on sand and muddy seabed environments
Benthic habitats	Habitats associated with the bottom of a body of water
Best Practical Environmental Option	Procedures adopted with the goal of managing waste and other environmental concerns which emphasise the protection and conservation of the environment across land, air and water
Biomass	The weight of living organisms
Chart Datum	Usually close to the lowest tide level that can occur under normal meteorological conditions and is the level to which tidal levels and predictions are measured
Coastal lagoon	A shallow body of water separated from a larger body of water by a narrow landform such as sandbars or barrier islands
Competent Harbour Authority	Harbour authorities that have been given statutory powers relating to the provision of pilotage in their waters

Conceptual analyses	Analysing concepts by their constituent parts in order to gain knowledge or a better understanding of a particular issue in which the concept is involved
Conceptual Site Model	A representation of the characteristics of the site and indicates potential source areas of contamination, pathways and receptors (including human health, groundwater, surface water, ecology and buildings / infrastructure). It is used to identify potentially complete source-pathway-receptor (S-P-R) contaminant linkages
Cumulative effects	Combined effects of multiple developments or the combined effect of individual impacts (e.g. where different project elements in different locations have a cumulative impact on a particular feature)
Dangerous substance	A substance which presents flammable, toxic or explosive hazards to people, or which is dangerous to the environment
Day grab	Two stainless bucket sections which are mounted within a stainless steel frame to collect benthic sediment samples
Demersal fish	Fish that live and feed on or near the bottom of water bodies
Diurnal inequality	The variation in height that is often observed between adjacent high waters and low waters
Ecoregion	Relatively large units of land or water containing a distinct assemblage of natural communities sharing a large majority of species, dynamics, and environmental conditions
European Marine Site	Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) that are covered by tidal waters and protect some of our most important marine and coastal habitats and species of European importance.
Fluvial	Relating to stream or river processes
Fyke nets	A fish trap consisting of a cylindrical or cone-shaped net mounted on rings or rigid structures. t has wings or leaders which guide the fish towards the entrance of the bags.
Geotechnical data	Properties of soil and/or rock which are used in engineering design
Glacial Till	Unsorted and unstratified material deposited by glacial ice
Glaciofluvial	Relating to or coming from streams deriving much or all of their water from the melting of a glacier
Greenhouse gas emissions	Total mass of greenhouse gases, which absorb and emit radiant energy causing warming, released to the atmosphere over a specific period of time.
Groundwater	Water present beneath Earth's surface in rock and soil pore spaces and in the fractures of rock formations

Hamon grab	Comprises of a stainless steel box shaped sampling scoop mounted in a triangular frame to collect benthic (generally coarse) sediment samples
Hazard	A substance, operation or piece of equipment which has the potential to cause harm to people or the environment
Hold the Line	Coastal defences are built or maintained to protect a coastline against the impacts of sea level rise and coastal erosion/flooding
Hydromorphological changes	Changes to the physical habitat and/or natural functioning of a water body
Individual risk	The likelihood of a specified level of harm occurring for a specified individual within a specified period of time
Infaunal	Aquatic animals that live in the substrate at the bottom of a body of water
Interglacial	Warmer period between two glaciations
Intertidal	The area between high and low tide also known as the foreshore or seashore
Invertebrate	Animals which lack a vertebral column / backbone
Land use planning	The approach used to ensure that proposed developments are not located in areas where the risks to people would be unacceptable
Littoral drift processes	The longshore transport of material (e.g. sand) under the action of waves and currents (movement occurring along or near the foreshore)
Made Ground	Disturbed soils which include man-made or artificial materials
Major accident	An accident resulting in significant harm to people or the environment
Major hazard pipeline	A pipeline carrying a dangerous substance which could lead to harm to people or the environment
Major hazard site	An installation where the presence of one or more dangerous substances could lead to harm to people or the environment
Managed Realignment	Process of allowing the coastline to move backwards or. forwards with management to control or limit that movement
Marl seams	Layers of calcium carbonate rich mud or mudstone
Nitrate Vulnerable Zone	Areas designated as being at risk from agricultural nitrate pollution
Nursery ground	Habitats that enhance the growth and survival of juveniles
Otter trawls	A large fishing net that is dragged behind a vessel mainly used to catch demersal fish living above the seafloor
Pelagic	The water column of coasts, open oceans and lakes
Pluvial	Relating to or characterized by rainfall
Pyrite nodules	Small rounded lumps of iron disulphide (or fool's gold)

Quantified risk assessment	A numerical assessment of the risks to people based on an assessment of the consequences/severity and likelihood of major accidents
Ramsar	Wetlands of international importance designated under the Ramsar Convention
Recoverability	The ability of a receptor to recover from disturbance or stress
Rectilinear	Contained by, consisting of, or moving in a straight line or lines
Representative Concentration Pathway	A greenhouse gas concentration (not emissions) trajectory adopted by the Intergovernmental Panel on Climate Change
Resistance	Resistance characteristics indicate whether a receptor can absorb disturbance or stress without changing character
Risk	The likelihood of a specified level of harm occurring within a specified period of time
Special Area of Conservation	A designated area protecting one or more habitats or species listed in the Habitats Directive
Salicornia	A genus of flowering plants that grow in salt marshes, on beaches, and among mangroves.
Sedimentary regime	The size, quantity, sorting, and distribution of sediments
Seine netting	A fishing net that hangs vertically in the water (with its bottom edge held down by weights and its top edge buoyed by floats) used to haul or herd fish
Semi diurnal tides	An area which experiences two high and two low tides of approximately equal size every lunar day
Special Area of Conservation	A designated area protecting habitats and species identified in Annexes I and II of the Habitats Directive
Special Protection Area	A designated area protecting one or more rare, threatened or vulnerable bird species listed in Annex I of the Birds Directive
Site of Special Scientific Interest	An area of land which is of special interest for its flora, fauna, geological, geomorphological or physiographical features
Societal risk	The relationship between frequency and the number of people suffering from a specified level of harm in a given population from the realisation of specified hazards
Statutory Harbour Authority	Statutory Bodies responsible for the management and running of a harbour
Stylolitic surfaces	Serrated surfaces within a rock mass at which mineral material has been removed by pressure dissolution
Subtidal	The area where the seabed is below the low tide water mark
Tabular and discontinuous flint bands	Localised layers of chert/silica rock within chalk

Telemetry tags	Tags which are attached to an animal to determine its location through detection of a signal from a transmitter
Tidal Flat Deposits	Soil deposits formed from mud flats in the intertidal zone
Topography	The arrangement of the natural and artificial physical features of an area
Turbidity	Turbidity is the measure of relative clarity of a liquid and is a measurement of the amount of light that is scattered by the material in the water
UK Climate Projections	Future climate projections and observed (historical) climate data for UK regions. UKCP18 provides the most up-to-date assessment of how the UK climate may change in the future.
Unproductive Strata	Soil and/or rock layers with low permeability that have negligible significance for water supply or base flow for rivers
Van Veen grab	A clamshell bucket made of stainless steel to collect benthic sediment samples
Waterbirds	Birds that live on or around water

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