Immingham Green Energy Terminal

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Volume 7

7.3 Without Prejudice Report to inform Habitats Regulations Assessment (HRA) Derogation

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Regulation 5(2)(q)

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The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (as amended)

Immingham Green Energy Terminal

Development Consent Order 2023

7.3 Without Prejudice Report to inform Habitats Regulations Assessment (HRA) Derogation

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Executive Summary

The Shadow HRA Stage 2 Appropriate Assessment **[TR030008/APP/7.6]** ~~concluded~~concludes that the Project will not result in Adverse Effect on Integrity ("AEOI") for any European sites, receptors or pathways in view of the sites conservation objectives either alone or in-combination with other plans or projects and consequently the derogation stage of the habitats regulations assessment process is not engaged.

An impact pathway identified by the Shadow HRA Stage 2 assessment anticipates potential for 0.~~03ha~~03158ha of permanent intertidal habitat loss as a result of the Project; and concludes that such a minimal habitat loss would not result in an AEOI in view of the sites conservation objectives (alone or in-combination with other plans or projects).

At this stage the appropriate statutory nature conservation body has not formed a view on whether an AEOI on the European sites from the Project can be ruled out. As such this document has been produced, without prejudice to the conclusions of the Shadow HRA, to address the position in the event that the Secretary of State's Appropriate Assessment of the effects of the Project on the European Sites produces a negative assessment (i.e. an AEOI cannot be ruled out).

The report informs the three legal derogation tests (alternatives, Imperative Reasons of Overriding Public Interest ("IROPI") and compensation) required under Article 6(4) of the Habitats Directive (Regulations 64 and 68 of the Habitats Regulations).

The assessment of alternatives demonstrates that there are no other feasible alternatives for the Project that meet the project objectives. Three design alternatives do exist, however they fail to result in lesser environmental effects.

The assessment of IROPI demonstrates an imperative need for the Project, essential to increasing port capacity in support of the UK Government commitments to achieving net zero by 2050. The Project is very strongly in the public interest, supporting long term economic growth and transformative employment opportunities within the Humber. It is concluded that the imperative public interest reasons for the Project to proceed are so substantial as to clearly outweigh and thus override the highly precautionary assessment of the anticipated environmental effect of the Project on the European Sites.

Compensatory habitat has been identified to ensure that the functioning and integrity of the -European sites are maintained and that the overall coherence of the national site network is protected, should the Secretary of State conclude that an AEOI -on the European Sites cannot be ruled out. In total 0.~~162~~132 hectare (3x the predicted loss of intertidal habitat from the Project in-combination with other projects) of intertidal mudflat would- be allocated at the Outstrays to Skeffling managed realignment site (OtSMRS). OtSMRS has been designed specifically as compensatory habitat for port related infrastructure development within the Humber estuary and as such is considered suitable for the purposes of the Project. OtSMRS- is currently undergoing construction and is expected to be functional upon commencement of the Project, resulting in no net loss of functional habitat to the European Sites.

1 Introduction

1.1 Overview

1.1.1 The Immingham Green Energy Terminal ("IGET") (hereafter the "Project") is a proposal by Associated British Ports ("ABP") (hereafter the "Applicant") to construct and facilitate the operation by multiple users of a multi-user liquid bulk jetty, which would be located on the eastern side of the Port of Immingham (hereafter the "Port"). The Project is a Nationally Significant Infrastructure Project ("NSIP") and will therefore require submission of an application for a Development Consent Order ("DCO").

1.1.2 A Shadow Habitats Regulations Assessment ("Shadow HRA") has been undertaken by the Applicant as required pursuant to the Conservation of Habitats and Species Regulations 2017 (the "Habitats Regulations") (Ref 1-1) which ~~has concluded~~concludes that the Project would not have an AEOI of any European site (**Shadow HRA [TR030008/APP/7.6]**). Since submission of the DCO application the Shadow HRA has been updated to assess the in-combination effects of the Project together with the Immingham Eastern Ro-Ro Terminal project as varied. The updated Shadow HRA reaches a conclusion of no AEOI on the European Sites.

1.1.3 The Shadow HRA ~~concluded~~concludes that for the majority of pathways there is no potential for an adverse effect on site integrity or any potential for the predicted effects to compromise any of the conservation objectives of the European sites, alone or in-combination with other plans or projects. However, for three pathways an effect is anticipated as a result of the Project which has required further consideration. These are:

a. The potential effects of airborne noise and visual disturbance during construction on qualifying species of coastal waterbirds within the SPA/Ramsar boundary.

b. The potential effects of underwater noise and vibration during marine piling on qualifying species of fish and marine mammals.

c. The potential effects of the direct and indirect loss of qualifying intertidal habitat.

1.1.4 In relation to the first impact pathway identified above of disturbance, the Shadow HRA ~~concluded~~concludes that the probability of noise and visual disturbance occurring during construction is likely to be high but that the foreshore in the vicinity of the approach jetty is generally used by relatively low numbers of waterbirds compared to other parts of the estuary. Mitigation has nevertheless been identified to avoid an AEOI of the European Sites and this is set out in paragraph 4.10.30 Shadow HRA and will be secured by conditions on the deemed marine licence included in Schedule 3 of the DCO.

1.1.5 In relation to the second impact pathway identified above of underwater noise, the Shadow HRA ~~concluded~~concludes that whilst the effect of underwater noise and vibration from marine piling works is temporary and of short duration, there is uncertainty with respect to the timing of the works which could in the worst case scenario (a) result in temporary hearing loss and behavioural avoidance of the

estuary in grey seals and (b) coincide with the migration periods of river and sea lamprey. Mitigation has been identified to avoid an AEOI of the European Sites and this is set out in paragraph 4.11.43 of the Shadow HRA and will be secured by conditions on the deemed marine licence included in Schedule 3 of the DCO.

1.1.6 With the Applicant's commitment to mitigation secured by the DCO, it is concluded that there will be no adverse effects on integrity from the effects of airborne noise and visual disturbance or the effects of underwater noise on the Humber SAC, Humber SPA, Humber Ramsar and the Wash and North Norfolk Coast SAC**.**

1.1.7 The third impact pathway identified by the Shadow HRA Stage 2 assessment anticipates potential for a small amount of permanent intertidal habitat loss as a result of the Project and concludes that such a minimal habitat loss would be:

a. Highly localised.

b. *de minimis* in extent.

c. Considered to be a magnitude that will not change the overall structure or functioning of the nearby mudflats within the Port of Immingham area or more widely in the Humber Estuary.

d. As such would not result in an AEOI at the site level (alone or in-combination with other plans or projects).

1.1.8 This Shadow HRA Derogation Report has been prepared without prejudice to those conclusions. It considers only the third pathway identified above relating to loss of intertidal habitat because this is an effect which is anticipated a result of the Project, for which no mitigation is identified or proposed. By contrast, the potential effects deriving from the first and second pathways can, and will be, fully mitigated**.** Whilst this anticipated effect does not in the Applicant's view constitute an AEOI on the European Sites, Natural England's view on the Shadow HRA has not yet been received**.**

1.1.9 Given the conclusion reached by the Applicant in the Shadow HRA of no AEOI of the European Sites, it is the Applicant's view that this Derogation Report is not required. However, this Shadow HRA Derogation Report is submitted in accordance with paragraph 3.22 of Planning Inspectorate *Advice Note Ten: Habitats Regulations Assessment relevant to nationally significant infrastructure projects* (Aug 2022) (Ref 1-2) on a 'without prejudice' basis to the finding of the Shadow HRA of no AEOI and the Secretary of State for Transport's ("Secretary of State") final decision on whether derogation would be required.

1.2 The Project

1.2.1 A detailed description of the Project is set out in **Chapter 2: The Project [TR030008/APP/6.2].** The Project would comprise the alteration of a harbour facility for the construction, operation and maintenance of a multi-user green energy terminal to facilitate the import and export of liquid bulks associated with the energy sector, together with associated development. The terminal includes a jetty and associated loading/ unloading infrastructure and pipelines**.**

1.2.2 Initially, the terminal would be used for the import and export of green ammonia to be converted to green hydrogen. To facilitate this, a hydrogen production

facility, comprising associated ammonia handling equipment, storage and processing units would be constructed as part of the Project. Other proposed uses for the green energy terminal will come forward in due course and separate applications for landside works for transfer and or storage of other liquid bulks will be submitted as required. It is anticipated that a future use of the terminal will be the import of liquefied carbon dioxide to connect to adjacent carbon transport and storage networks for sequestration in the North Sea**.**

1.2.3 The works which comprise the Project are defined in **Schedule 1: Authorised Project** of the **draft DCO [TR030008/APP/2.1]** which provides the full description of all elements of each Works No. The locations of Work No. 1 through to Work No. 10 within the Site are shown on the **Works Plans [TR030008/APP/4.2]**). The following is a summary of the main elements of each of Work Nos 1-10:

a. The Nationally Significant Infrastructure project ("NSIP"), **Work No. 1**, comprising:

   i. On the marine side, a Terminal for liquid bulks: comprising:

      A jetty (defined by **Work No. 1a**) including a loading platform, associated dolphins, fenders and walkways, topside infrastructure but not limited to control rooms, marine loading arms, pipe-racks, pipelines and other infrastructure.

      A single berth, with a berthing pocket with a depth of up to 14.5m below chart datum.

   ii. Related landside infrastructure including, but not limited to, a jetty access ramp, a flood defence access ramp and works to raise the seawall locally under the jetty access ramp.

b. Associated Development on the landside, comprising:

   i. A corridor between the new jetty and Laporte Road which would support a private road (the 'jetty access road'), pipe-racks, pipelines to enable the ammonia import to the East Site, as well as security gates, a security building, a power distribution building and associated utilities – (**Work No. 2**).

   ii. 'East Site – Ammonia Storage' (**Work No. 3**) on which an ammonia storage tank and related plant including an ammonia tank flare stack would be constructed (**Work No. 3a**) as well as additional buildings (including welfare building, power distribution building and a process instrumentation building), pipe-racks, pipelines, pipes, cable-racks, utilities and other infrastructure.

   iii. Construction of a culvert (**Work No. 4**) under Laporte Road for pipelines, pipes and cables and other conducting media linking the two parts of the East Site.

iv. 'East Site – Hydrogen Production Facility' (**Work No. 5**) on which up to three hydrogen production units and associated plant including flue gas stacks and flare stacks would be constructed (**Work No. 5a**) together with additional buildings (including process control building, power distribution buildings, process instrumentation buildings, analyser shelters), pipe-racks, pipelines, pipes, utilities and other infrastructure.

v. Underground pipelines, pipes, cables and other conducting media (**Work No. 6**), between the East and West Sites, for the transfer of ammonia, hydrogen, nitrogen and utilities, with cathodic protection against saline corrosion.

vi. 'West Site' (**Work No. 7**) involving the construction of up to three hydrogen production units with associated flue gas stacks and flare stacks and up to four liquefier units (**Work No. 7a** and **Work No. 7b** combined); hydrogen storage tanks, hydrogen trailer filling stations, a hydrogen vent stack and associated process equipment (**Work No. 7c**); and hydrogen vehicle and trailer filling stations, hydrogen compressors and associated process equipment (**Work No. 7d**). Also additional buildings (including but not limited to control room and workshop building, security and visitor building, contractor building, warehouse, driver administration building, safe haven building, electrical substation and metering station, power distribution buildings, process instrumentation buildings, analyser buildings and additional temporary buildings during construction), process and utility plant including cooling towers and pumps, fire water tank, instrument air equipment, pipe-racks, pipelines, pipes, cable-racks, utilities and other infrastructure.

vii. Formation of temporary construction and laydown areas on Queens Road (**Work No. 8**) and off Laporte Road (**Work No. 9**).

viii. Temporary removal of street furniture and modification of overhead cables on Kings Road (**Work No. 10**) associated with the transport of large construction components from the Port to the Site**.**

1.3 The Habitats Regulations Assessment Process.

1.3.1 The HRA process follows a three-stage approach, as detailed in the PINS Advice Note 10 (Ref 1-2):

a. Stage 1: Screening for Likely Significant Effect ("LSE")

b. Stage 2: Appropriate Assessment ("AA")

c. Stage 3: Test 1 - Assessment of Alternatives

d. Stage 3: Test 2 - Consideration of ROPI

e. Stage 3: Test 3 - Compensation.

1.3.2 This section of the Shadow Derogation Report summarises the outcome of the Project's Shadow HRA Stages 1 and 2 and introduces the Stage 3 assessment.

Shadow HRA: Stage 1 Likely Significant Effect

1.3.3 The Shadow HRA Stage 1 (Screening) assessment considered how the Project might affect ~~five~~four European sites in its vicinity: Shadow HRA **[TR030008/APP/7.6]**. Stage 1 ~~concluded~~concludes that LSE could not be discounted with respect to four European sites, all with coincident boundaries:

a. Humber Estuary Special Area of Conservation ("SAC").
b. Humber Estuary Special Protection Area ("SPA").
c. Humber Estuary Ramsar site.
d. Wash and North Norfolk Coast SAC together the "European sites".

1.3.4 LSE were discounted for qualifying interests of the Greater Wash SPA.

1.3.5 The following impact pathways were screened into the Shadow HRA Stage 2:

a. Physical loss of habitat and associated species.
b. Physical damage through disturbance and/or smothering of habitat.
c. Physical loss or damage of habitat through alterations in physical processes.
d. Direct changes to qualifying habitats beneath marine infrastructure due to shading.
e. Physical change to habitats resulting from the deposition of airborne pollutants.
f. Non-toxic contamination through elevated Suspended Sediment Concentrations ("SSC").
g. Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases.
h. Airborne noise and visual disturbance.
i. Disturbance through underwater noise and vibration.
j. Biological disturbance due to potential introduction and spread of non-native species.

Shadow HRA: Stage 2 Appropriate Assessment

1.3.6 The Shadow HRA Stage 2 Appropriate Assessment ~~concluded~~conclude that for the majority of pathways there is no potential for an AEOI or any potential for the predicted effects to compromise any of the conservation objectives of the European sites **[TR030008/APP/7.6]**. This includes the third potential impact pathway; direct and indirect loss of intertidal habitat described in **Section 1.1.7.** However, for two pathways there was uncertainty in this conclusion either due to limitations in the evidence base or related to uncertainties in timing of construction (e.g., in relation to sensitive migration periods) (**Section 5.1.5**, **[TR030008/APP/7.6])**. This was relevant to the following pathways, for which mitigation was provided:

a. The potential effects of airborne noise and visual disturbance during construction and operation on qualifying species (relevant to the Humber SPA and Ramsar).

b. The potential effects of underwater noise and vibration during piling on qualifying species (relevant to the Humber SAC, Humber Ramsar and the Wash and North Norfolk Coast SAC).

1.3.7 Mitigation has been identified in the Shadow HRA in relation to the effects of airborne noise and visual disturbance during construction and decommissioning which includes restrictions on working over winter in certain locations, acoustic barriers and visual screens, noise suppression of piling and cold weather restrictions to be secured by conditions on the deemed marine licence. Based on the distribution of birds, the likely level of disturbance and the Applicant's commitment to mitigation, it ~~was~~is concluded that there will be no AEOI of either the Humber Estuary SPA or Ramsar from the effects of airborne noise and visual disturbance.

1.3.8 Mitigation has been identified in the Shadow HRA in relation to the effects of underwater noise and vibration during piling which includes soft-start piling, vibro-piling where possible, seasonal piling restrictions, night-time piling restrictions and use of Marine Mammal Observers to be secured by conditions on the deemed marine licence. Based on the assessment of effects on qualifying species (river and sea lamprey and grey seal), the likely level of disturbance and the Applicant's commitment to mitigation, it is considered that there will be no AEOI on the Humber Estuary SAC or Ramsar from the effects of underwater noise and vibration during piling. There is also considered to be no AEOI of The Wash and North Norfolk Coast SAC (as a result of underwater noise and vibration during piling on the common seal qualifying feature), based on the Applicant's commitment to mitigation.

1.3.9 No mitigation was identified in the **Shadow HRA [TR030008/APP/7.6]** for the loss of intertidal habitat loss. As described in **Section 1.1.7**, intertidal habitat loss is predicted to be highly localised and of a magnitude that will not change the structure or function of the intertidal habitats in the Humber Estuary.

1.3.10 A review in the Shadow HRA of other plans and projects that could contribute to effects has established that significant adverse in-combination effects on site integrity with other plans and projects can be ruled out from all pathways, adopting a precautionary approach (Table 35,t **[TR030008/APP/7.6]**).

1.3.11 The applicant concludes that the Project will not result in AEOI for any European sites, receptors or pathways in view of the sites conservation objectives either alone or in-combination with other plans or projects.

Provision of a 'without prejudice' derogation case

1.3.12 At this stage Natural England, as the appropriate statutory nature conservation body ("ANCB") has not formed a view on whether an AEOI on the European sites from the Project either alone or in-combination can be ruled out (see section 1.1.7 - 1.1.9). This Shadow HRA Derogation Report has been prepared pursuant to Regulation 64 of the Conservation of Habitats and Species Regulations (2017) on a without prejudice basis to the overall conclusions of the Shadow HRA stage 2 assessment and the final decision of the Secretary of State in the Appropriate Assessment of the effects of the Project.

1.3.13 The following UK and European Commission (EC) guidelines address Regulation 64 of the Habitats Regulations, and this derogation report has been prepared in accordance with this guidance:

a. DEFRA. (2021). Habitats regulations assessments: protecting a European site (Ref 1-3).

b. The Planning Inspectorate. (2017). The Planning Inspectorate (PINS) Note 10: Habitats Regulations Assessment relevant to Nationally Significant Infrastructure Projects. (Ref 1-1)

c. European Commission. (2018). Managing Natura 2000 sites – the provisions of Article 6(3) of the 'Habitats' directive 92/42/EEC. (Ref 1-4)

d. European Commission. (2012). Guidance document on Article 6(4) of the Habitats Direction 92/43/EEC. Clarification of the concepts of Alternative solutions imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the Commission. (Ref 1-5)

e. European Commission. (2001). Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC. (Ref 1-6)

1.3.14 As such this document has been produced, without prejudice to the conclusions of the Shadow HRA, to address the position in the event that the Secretary of State's Appropriate Assessment of the effects of the Project on the European Sites produces a negative assessment (i.e. an AEOI cannot be ruled out).

1.4 Shadow HRA: Stage 3 of the HRA

1.4.1 Regulation 64 of the Habitats Regulations (Ref 1-1) makes provision for a project to proceed where a negative assessment of the implications for a European site are recorded (i.e. where AEOI of European site(s) cannot be ruled out, despite any proposed avoidance or reduction (mitigation) measures). To proceed, a Project must be assessed against three tests, each test must be passed sequentially before proceeding to the next.

Shadow HRA: Stage 3 Test 1 Assessment of Alternatives

1.4.2 The Stage 3 Assessment of Alternatives (Section 2 of this document) considers the feasibility of 'alternative solutions' to meeting the Project Objectives. If an alternative solution (one which meets the project objectives) is identified that results in a lesser effect on the integrity of the European site, then the Project in its current form cannot proceed.

Shadow HRA: Stage 3 Test 2 Imperative Reasons for Overriding Public Interest (IROPI)

1.4.3 Defra (2021) states *"If there are no feasible alternative solutions, you must next be able to show that there are imperative reasons of overriding public interest why the proposal must go ahead. These must justify the proposal, despite the damage it will or could cause to the European site."* (Ref 1-3). The assessment of IROPI is presented in Section 3 of this document.

Shadow HRA: Stage 3 Test 3 Compensatory measures

1.4.4 Where the IROPI test has been satisfied, the HRA process requires that appropriate compensatory measures are provided by the applicant and "*the appropriate authority must secure that any necessary compensatory measures are taken to ensure that the overall coherence of Natura 2000 is protected*" (Ref 1-1).

1.4.5 **Section 4** of this document provides detailed information on the proposed compensation site that has been identified to ensure coherence of the affected European sites are maintained. This compensation has been identified without prejudice to the Shadow HRA Stage 2 Appropriate Assessment conclusion that the Project will not have an AEOI on the European sites either alone or in combination with other plans or projects.

1.5 Report Structure

1.5.1 This Shadow HRA Derogation Report (submitted on a without prejudice basis) has been prepared to support an application for development consent for the construction, operation and maintenance of a multi-user liquid bulk terminal, which would be located on the eastern side of the Port of Immingham, as well as associated development. A part of the associated development is the construction and operation of a green hydrogen production facility for the production of green hydrogen from imported ammonia on site by Air Products BR Ltd. ("Air Products").

1.5.2 The following information (**paragraph 1.5.2**) is provided to inform a stage 3 derogation assessment should the Secretary of State's Stage 2 Appropriate Assessment conclude that an AEOI on the European Sites cannot be ruled out**.** The report addresses the three legal derogation tests (alternatives, IROPI and compensation) required under Article 6(4) of the Habitats Directive (Regulations 64 and 68 of the Habitats Regulations)**.**

1.5.3 This report has been structured as follows:

a. **Section 1**: Introduction provides a brief description of the Project and an overview of the need for a Shadow HRA Derogation Report.

b. **Section 2**: Assessment of Alternative Solutions – provides an assessment of alternative solutions, concluding that there are no alternatives to the Project (i.e. feasible alternatives which meet the need for and the objectives of the Project).

c. **Section 3**: IROPI - sets out why there are imperative reasons of overriding public interest for the Project to proceed despite an AEOI of the European Sites (where one cannot be ruled out).

d. **Section 4**: Compensatory Measures – identifies the proposed compensation which shall be secured (if required) to ensure that any AEOI is compensated for and the coherence of the national site network is maintained.

2 Shadow HRA Stage 3 (Test 1): Assessment of Alternative Solutions

2.1 Introduction

2.1.1 The methodology adopted to assess alternative solutions has been developed based upon guidance from a range of sources (Ref 1-2, Ref 1-3, Ref 1-4, Ref 1-5, Ref 1-6).

2.1.2 In accordance with Ref 1-6 the methodology adopted here uses the following steps to identify whether a feasible alternative exists (i.e. one which meets the objectives for the Project):

a. Step 1 – Understand the Project need and the project objectives to meet that need.

b. Step 2 – identify the potential AEOI from the Project on the European Sites which the derogation assessment is responding to (in this case the Shadow HRA does not identify an AEOI but Natural England's view on the Shadow HRA is awaited).

c. Step 3 – identify potential alternative solutions and screen to determine which alternative solutions (if any) meet the project objectives.

d. Step 4 – consider whether out of the alternative solutions identified through step 3 - are any of these alternatives legally, technically and financially feasible?

e. Step 5 – consider whether the feasible alternative solutions identified in step 4 (if any) would have lesser environmental effects on the integrity of the European Sites?

2.2 Step 1: Understanding the Need for the Project, and the Project Objectives to Meet that Need.

2.2.1 The need for the Project is described in **Chapter 3: Needs and Alternatives [TR030008/APP/6.3]**, and considered further in **Section 3** of this document in relation to identifying IROPI for the Project to proceed. The needs case has been summarised below.

2.2.2 The National Policy Statement for Ports (NPSfP) (Ref 1-7) establishes that there is a "compelling need for substantial additional port capacity" over the next 20–30 years (i.e. to 2032 - 2042), to be met by a combination of consented and new development (paragraph 3.4.16). The need for the specific infrastructure comprising the Project derives from the following inter-related factors:

a. The national need to provide port capacity.

b. The need for port capacity to serve the energy sector in the Humber.

c. The need to achieve energy security through a diversity of technologies.

d. The urgent need to scale up hydrogen production capability.

e. The urgent need for carbon capture and storage technologies.

2.2.3 The Project has been brought forward to respond to an urgent national need to provide increased deep water port capacity for the import of bulk liquid energy products (driven by the UK Government strategy to meet binding net zero targets), and a regional need for decarbonisation of the Humber industrial area.

2.2.4 The provision of port infrastructure to increase capacity and resilience in response to an identified need aligns with National Policy Statement for Ports ("NPSfP") (section 3.1.5) (Ref 1-7).

"Ports have a vital role in the import and export of energy supplies, including oil, liquefied natural gas and biomass, in the construction and servicing of offshore energy installations and in supporting terminals for oil and gas pipelines. Port handling needs for energy can be expected to change as the mix of our energy supplies changes and particularly as renewables play an increasingly important part as an energy source. Ensuring security of energy supplies through our ports will be an important consideration, and ports will need to be responsive both to changes in different types of energy supplies needed (and to the need for facilities to support the development and maintenance of offshore renewable sites) and to possible changes in the geographical pattern of demand for fuel, including with the development of power stations fuelled by biomass within port perimeters."

2.2.5 As noted in the paragraph above, the NPSfP, recognises that *"Ensuring security of energy supplies through our ports will be an important consideration" (paragraph 3.1.5)*. The Government wishes to see port developments supporting sustainable development by providing additional capacity for the development of renewable energy (paragraph 3.3.5). (Ref 1-7). Ports will therefore play an important role in industrial decarbonisation through the provision of enabling infrastructure, allowing the technologies and measures needed for a transition to net zero to be deployed.

2.2.6 The Humber is one of the UKs main industrial clusters, emitting more carbon dioxide (CO_2) than any region in the UK. The Humber is well located for the import of hydrogen due to the close proximity to the strategic road network and potential industrial customers nearby. The location of the Project will meet the needs of the first user, and will have capacity for future cargoes related to CO_2 and new technologies expected to emerge which require the import and export of liquid bulks which ports need to stand ready to facilitate.

2.2.7 The Project objectives also address the need for infrastructure to serve the UK's largest industrial cluster in the Humber and to respond to the Humber Industrial Cluster Plan[1] and the vision set by the Humber Energy Board[2] to deliver decarbonisation. It does this through creating capacity and resilience within the UK's largest port cluster and therefore facilitating the import/export of liquid bulk energy products that will be used to generate green hydrogen and future CO_2 storage/sequestration. As such the Project will make a contribution to the

[1] The Humber Industrial Cluster plan was set up in January 2021 with local industry partners to plan for decarbonisation for the Humber Cluster by 2040.
[2] The Humber Energy Board was convened by two Local Enterprise Partnerships across the region (the Hull and East Yorkshire Local Enterprise Partnership (LEP) and the Greater Lincolnshire LEP) to act as a single voice on climate change matters.

Government's strategy to meet the legally binding net zero obligations, and support the requirements of national and local planning policy as set out in the National Policy Statements for ports and energy, the National Planning Policy Framework (Ref 1-8) and the North East Lincolnshire Local Plan (Ref 1-9).

2.2.8 The objectives for the Project are as follows:

a. To provide essential port infrastructure, capacity and resilience to support the growth and changing strategic needs of the energy sector to support decarbonisation within the Humber Industrial Cluster and the Humber Enterprise Zone[3].

b. To provide capacity to support import and export of a range of liquid bulk energy products including (i) ammonia (NH_3) (to produce green hydrogen) to support the decarbonisation of industrial activities and in particular the heavy transport sector and (ii) carbon dioxide (CO_2), to facilitate carbon capture and storage, both of which will assist in the UK's transition towards net zero.

c. To deliver and operate new port infrastructure, and its first user's hydrogen production facility, in a safe, efficient and sustainable manner by making effective use of available land, water, transport and utility connections which exist in and around the Port of Immingham.

d. To minimise adverse impacts on the environment and safeguard the health, safety and amenity of the surrounding community.

e. To enhance both the local and regional economy through direct investment in and around the Port of Immingham and by partnering with the supply chain, provide opportunities for training, upskilling, apprenticeships and local employment.

2.2.9 In order to facilitate the import and export of liquid bulk energy products including ammonia, the Project must be capable of receiving and discharging vessels of a variety of sizes and in particular will need to be able to accommodate very large gas carriers ("VLGCs"). The dimensions of the largest vessels, very large gas carriers which are expected to be used to transport ammonia to and from the jetty would be approximately 250m in length, 45m beam and 12.8m draught. Accordingly, access to a deep-water port is required. These larger ships are required to optimise the shipping logistics and reduce the environmental impact of shipping.

2.3 Step 2: Identify the Potential AEOI from the Project which the Shadow HRA Derogation Report is Responding to

2.3.1 Intertidal habitat loss (mudflats and sandflats not covered by seawater at low tide) was identified in the Shadow HRA Stage 2 Appropriate Assessment as being a pathway to effect for all four screened in European sites within the Humber estuary. Whilst an effect on the European Sites was identified from loss of the intertidal habitat (alone or in combination with other plans or projects), the

[3] The Humber Enterprise Zones support growth in ports, logistics and renewables and is a key tool in achieving the regions ambition to become a leading national and international centre for low carbon energy.

residual effect was assessed as ecologically inconsequential, with no AEOI of the European Sites in view of those sites' conservation objectives.

2.3.2 The Shadow HRA assessed the loss in intertidal habitat as "*de minimis in extent and considered negligible in the context of the amount of similar habitat in the region (and as a proportion of the SAC/Ramsar site). On this basis any change to the 'extent and distribution of qualifying natural habitats' conservation objective is considered ecologically inconsequential. A loss on this scale is also considered to be insignificant in terms of 'the structure and function (including typical species) of qualifying natural habitats' conservation objective."* (Table 7. **[TR030008/APP/7.6])**

2.3.3 This Shadow HRA Derogation Report considers only the third impact pathway identified above relating to loss of intertidal habitat because this is an effect which is anticipated as a result of the Project for which no mitigation is identified or proposed. Whilst this anticipated effect does not in the Applicant's view give rise to an AEOI on the European Sites, Natural England's view on the Shadow HRA has not yet been received. Assessed alone, the Project is predicted to result in 0.00158ha of intertidal habitat being directly lost under the footprint of piling associated with the approach jetty. A further 0.03ha of intertidal habitat is predicted as indirect loss, from ~~changes in~~ hydrological changes (erosion and scour) as a result of the presence of the jetty piles throughout the lifetime of the Project.

2.3.4 The Shadow HRA Stage 2 Appropriate Assessment ~~concluded~~concludes that the loss during construction and operation of 0.~~033ha~~032ha of mudflats and sandflats not covered by seawater at low tide cannot be fully mitigated.

2.3.5 This represents an ecologically inconsequential proportion (<0.0006%) of the total habitat available within the SAC, SPA and Ramsar. A reduction of this magnitude was not considered sufficient to result in a change in ecological function or the integrity of intertidal habitats within any of the designated sites.

2.3.6 The potential for an in-combination effect on intertidal habitat loss with the adjacent Immingham Eastern RoRo Terminal ("IERRT") project was identified. IERRT predicts intertidal habitat loss of 0.~~022ha~~032ha. When considered in combination with the Project, combined habitat loss is 0.~~054~~044 ha. This represents 0.~~000575~~000469% of the mudflat features within the Humber SAC, and 0.~~000847%~~000690% of the mudflat features of the SPA/Ramsar. The in-combination assessment identified that these habitat losses are considered ecologically inconsequential and will not result in a change in ecological function or the overall integrity of the intertidal habitat or species they support.

2.3.7 No other plans or projects were assessed as having a cumulative or in-combination effect on the European sites with the Project (Section 4.14: In-combination assessment of the **Shadow HRA [TR030008/APP/7.6]**.

2.3.8 Therefore, the Shadow HRA concludes that whilst there is likely to be an adverse effect on the European Sites as a result of the small loss of intertidal habitat, this is not sufficient to constitute an AEOI of the European Sites. Nevertheless, on the basis that Natural England's views on this finding of the Shadow HRA are not yet known, this anticipated effect is taken through this Shadow HRA Derogation Assessment on a without prejudice basis.

2.4 Step 3: Are there Alternative solutions?

2.4.1 For an alternative solution to be acceptable it must achieve the same overall objective as the original proposal and meet the identified need.

2.4.2 Therefore, all alternative options must first be assessed against the Project need and objectives to ensure that they are compliant. Alternatives that do not deliver the overall objectives (described in **Section 2.2.8**) can be rejected as alternatives.

2.4.3 The steps involved in the consideration of alternatives are as follows:

a. Consideration of the broad options, i.e., whether to build or not to build the Project in the Humber.

b. Consideration of other port locations in the Humber Estuary.

c. Consideration of the appropriate location for the Project within the Port of Immingham.

d. Design refinement, taking into account site constraints and the need to minimise harm to the extent appropriate.

2.4.4 The first stage of the assessment of alternatives considers the broad options, either to do nothing or to develop the Project outside of the Humber.

Do nothing

2.4.5 If the Project were not constructed, potential AEOI on the European Sites within the Humber would not occur.

2.4.6 If the Project were not constructed, the consequence would be that the need and objectives of the Project (specifically relating to the provision of new capacity for the import and export of liquid bulk energy products by the provision of new port infrastructure to provide resilience within the Humber and address the need for decarbonisation within the Humber) would not be met. Do nothing is therefore not an alternative which meets the project objectives.

The Location of the Project: Outside of the Humber

2.4.7 The construction of the Project in an alternative UK port would not result in an AEOI on the Humber European Sites, however construction of the Project in another location nationally outside the Humber would not meet the locationally specific need for a facility within the Humber to provide additional capacity specifically for the decarbonisation of the Humber Industrial Cluster.

2.4.8 The requirement for a central UK location supporting decarbonisation within the Humber Industrial Cluster and Humber Enterprise Zone is a key project objective. The development of the Project at locations outside of the Humber Estuary is not and cannot be an alternative solution to the identified need, as the identified need for the Project is the provision of additional capacity within the Humber. A location outside the Humber is not therefore an alternative solution to the Project.

2.4.9 In considering the options above, the do nothing option and development of this Project outside of the Humber option would not meet the need and objectives of

the Project. Therefore, the only solution to meet the need and objectives is development of the Project within the Humber Estuary.

Location of the Project: Humber ports

2.4.10 The next stage in the assessment of alternatives is identifying a list of potential solutions which meet the Project objectives of providing port infrastructure, capacity and resilience within the Humber estuary. Specifically, capacity and resilience is required to support the growth and changing strategic needs of the energy sector within the Humber Industrial Cluster and Humber Enterprise Zone. Additional port capacity is required to support the import and export of liquid bulk energy products, requiring additional berthing capacity and landside storage and processing.

2.4.11 All port developments within the Humber Estuary will be constructed within the European sites and therefore have the potential to have an adverse effect upon designated features. However, the first step is to consider whether there are any alternative solutions which meet the project objectives before comparing the likely environmental effects of the options.

2.4.12 Ports on the Humber Estuary include the Port of Immingham, the Port of Hull and the Port of Grimsby and the smaller port of Killingholme. Site selection for the Project has focussed on port locations around the Humber Estuary capable of berthing VLGCs as noted above. (overall length 250m, beam 45m, draught 12.8m).

2.4.13 None of the 'in dock' port areas along the Humber Estuary (located at the ports of Grimsby, Immingham and Hull) are able physically to accommodate the berthing requirements of the VLGCs described above. The lock entrances into these in dock areas are not big enough to accommodate such a vessel. On this basis, additional berth capacity able to accommodate the design vessel would need to be located at an 'in river' lock free location.

2.4.14 Having regard to the vessel design parameters, a berth pocket of around 14m below Chart Datum is required to keep these vessels afloat at low water. Movements would be tidally restricted with the Humber's main fairways only navigable for deep-sea shipping at high water periods – given its 6-7m tidal range. Given the need for the Terminal to operate at all hours and receive a large number of vessel calls, this factor is important, particularly for the CO_2 transfer operation.

2.4.15 New 'in river' port facilities use approach jetties to span intertidal and shallow subtidal areas immediately adjacent to the shoreline so that berthing heads can be located in stable deep water. The alternative would be to dredge an access channel through intertidal and subtidal sediments. This would be environmentally harmful and hard to keep clear from subsequent sediment build-up. The presence of natural and stable deep-water channels has therefore historically dictated the locations where port facilities have been developed on the Humber.

2.4.16 Substantial capital and maintenance dredging would be required to deepen and maintain access to existing berthing facilities at other ports within the Humber. The scale of capital and maintenance dredging and disposal required to create sufficient draught for VLGCs would result in significant environmental effects far

greater than those assessed as likely to result from the Project. Due to sediment deposition rates within the Humber estuary, berth pockets out with the deepwater navigation channel (which will scour or 'self-clean' due to tidal action) are likely to require very frequent dredging to ensure berthing depths are maintained.

2.4.17 Of the existing ports located on the Humber Estuary, only the Port of Immingham currently provides sufficient navigational access and safe berthing opportunity to deep-sea for VLGCs, with only a small capital dredge required to create a naturally scoured section of the port's approach channel. None of port locations within the Humber Estuary currently meet the Projects' operational berthing depth requirements for VLGCs (dredge pocket approximately 14.5m below Chart Datum). The dredge requirements to create sufficient berth pockets at the Port of Immingham – in particular on its eastern side where the scoured channel is at its deepest - are considered to be minor in comparison to other locations.

2.4.18 Landside space is a constraint at all port facilities in the Humber Estuary **(Chapter 3: Alternative and Needs [TR030008/APP/6.2]**).

2.4.19 For the first customer of the jetty, Air Products require the bulk liquid berth capacity to be supported by landside connections and tankage located as close as possible to the berths to enable efficient and effective transfer and storage of the cargo under cryogenic conditions. If the tankage is located too far from the berth and/or separated from other related operational areas by other uses, then the transfer of cargo under the requisite cryogenic conditions to the storage tank becomes infeasible.

2.4.20 Sufficient land is also required for the construction of the hydrogen production plant in close proximity to the ammonia storage, to minimise transport of the product to the process infrastructure for reasons of safety. The new berth would need to be supported by at least approximately 8 hectares (circa 20 acres) of land for storage, and a further 8 hectares for hydrogen production operations and administrative activities. That land must be in close proximity to the jetty.

2.4.21 Insufficient appropriately located landside space is reported from assessment of the Port of Hull, Port of Grimsby and Port of Killingholme (Section 3.7 - **Chapter 3: Need and Alternatives [TR030008/APP/6.2]**).

2.4.22 Therefore, other existing port sites within the Humber estuary do not represent feasible alternatives to accommodate the Project.

Location of the Project: Utilisation of existing pier heads

2.4.23 Options to reduce environmental impact through repurposing existing jetty heads for the Project were considered. There is no spare capacity on the existing deep water jetties to facilitate the Project and existing deep water jetties in the Humber do not have the minimum 50 year design life required to meet the project objectives.

2.4.24 The use therefore of repurposed existing facilities is not considered a feasible alternative to the Project.

Location of the Project: Port of Immingham jetty

2.4.25 All alternative jetty locations at Immingham would lead to an effect on the European sites.

2.4.26 Development within the current operational boundaries of the port is heavily constrained by existing infrastructure, including on the marine side by existing jetties and on the landside by both operational buildings and structures and an extensive network of pipelines and other services, both above and below ground.

2.4.27 Given the lack of capacity in the Humber for VLGCs, it is necessary to locate a new jetty outside of the existing operational port site, but as close to it as possible to benefit from the existing supporting infrastructure and port services, whilst also with sufficient land to support the establishment of a new pipeline corridor and terrestrial storage and production facilities.

2.4.28 Placing new marine infrastructure further to the west of the Port of Immingham – for example, to the west of the Immingham Oil Terminal - would not be feasible. The subtidal area is shallow meaning that the provision of any marine infrastructure would require either a longer jetty approach to reach the deeper water (which would increase environmental impact and technical complexity, and present challenges relating to navigation and associated operations of adjacent facilities), or a large capital dredging programme in order to berth vessels closer to the shoreline (which would have significant, adverse environmental consequences).

2.4.29 Any new jetty capacity therefore needs to be situated close to the eastern extent of the Port of Immingham as the deep-water channel extends further away from the south bank of the estuary further east of this point. Alternative jetty locations further east would be required to significantly extend further into the estuary, increasing the length of the approach jetty crossing the intertidal mudflats and shallow subtidal estuary bed to reach the deep water channel.

2.4.30 Alternative jetty locations located substantially to the east would be technically infeasible due to the distance to the landside infrastructure and in any event would not reduce the environmental effects on the European Sites.

2.4.31 Alternative jetty locations for the Project at the Port of Immingham were discounted.

Consideration of alternative jetty design

2.4.32 Having identified no feasible alternatives within the Humber Estuary, and identifying the Port of Immingham as the only feasible location for the Project within the Humber, jetty design has also been considered for feasible alternatives.

2.4.33 The jetty design has been informed by a number of studies (Navigational Simulation and ShipFit) which have evolved over the design stage of the Project. Initial designs identified that there was an underlying basic arrangement of the jetty which would be required and incorporated across all options; the requirement for a 1.1 to 1.2km approach jetty that crosses the southern shore of the Humber to a jetty head situated in, or adjacent to the natural deep water channel of the Humber Estuary.

2.4.34 With the location of the jetty head confirmed there was a review of the jetty approach within the envelope of the works area (Work No. 1). The alignment of the jetty is defined on the marine side within relatively narrow parameters (Work 1a) because the design of the jetty has been developed such that it minimises the impacts on the intertidal habitats of the Humber and modelling indicates that there is relatively little tolerance in the possible alignment. Various options were considered for the approach jetty, with respect to alignment, pile size and diameter and deck span. Alternative approach jetty designs have been tested, with estuarine flow modelling undertaken to assess the direct and indirect loss of intertidal habitats (**Table 1**). This was used to identify the approach jetty parameters that would result in the smallest environmental impact on the European Marine Site (Model option 1Fd, see **Table 1**).

2.4.35 The jetty design assessment identified potential alternatives that may meet the project need and objectives. Design alternatives are considered below in step 4.

2.5 Step 4 Are any of the Alternative Solutions Identified through Step 3 Legally, Technically and Financially Feasible?

2.5.1 The project objectives are described in **Section 2** and **Chapter 3: Needs and Alternatives [TR030008/APP/6.3]** and each alternative has been assessed against these objectives. Where an alternative solution does not meet the project objectives, the alternative is not considered as a feasible alternative and is discounted. It is not an alternative solution to the Project as it does not meet the need which the Project is required to meet.

2.5.2 A feasible alternative to the Project may or may not result in a lesser environmental effect on the European Sites. Modelling of direct and indirect habitat loss (**Chapter 16: Physical Processes [TR030008/APP/6.2]**) has been undertaken to identify the habitat loss for design options (see step 5, Section 2.6). Alternatives that result in a greater impact than the Project will be discounted at Step 5. Where environmental effects are the same for different options, the Project has adopted the preferred technical feasible solutions.

2.5.3 ~~**Table 1** lists the alternatives considered for a jetty design for the Project (situated in the Port of Immingham) during the design stage. As such variants and alternatives~~The original jetty design presented at the first round of statutory consultation was for a two berth jetty design . Following the first round of Statutory Consultation the Project requirements changed from a double berth to single berth jetty and the jetty was redesigned accordingly.

2.5.4 The design for the jetty was then refined to test different pile layouts and orientations, as summarised in **Table 1**. As explained in the first column of Table 1, various different design options for the jetty were considered taking into account:

a. Number of piles;

b. Pile diameter

c. Number of pile bents;

d. Position of control building; and

e. Span distance between the pile bents.

~~2.5.3~~2.5.5 Alternative jetty design options that no longer meet the project objectives (for example double berth designs and set back berths) are not included ~~as they no longer represent feasible alternatives.~~in the table below as they no longer represent feasible alternatives to the Project. Column 1 of Table 1 summarises the key features of the design option considered at the application stage and column 4 of Table 1 explains why each of the various design options are either not technically feasible alternatives and/or result in a greater environmental effect than the application design (and therefore why they are discounted as alternatives).

2.5.6 It should be noted that since the application was submitted, further design work has been undertaken and it has become apparent to the Applicant that the proposed design for the jetty (namely the diameter and spacing of the piles and the number of monopiles) is not technically feasible. Consequently, and as explained at the Preliminary Meeting and in correspondence submitted by the Applicant dated 7 March 2024 [**AS-020**], a change is required to the jetty design. This derogation report is to be updated further to take into account this change in jetty design as part of the change notification application if the change is accepted.

Table 1: ~~Alternatives~~Alternative Design Options considered

Potential ~~alternative~~Design options	Technically feasible ~~alternative~~?	Alternative has lesser environment effect	Outcome at application stage
~~Option 1C~~ ~~As per Option 1B with a single berth~~ **Application Project Design** 10 x 25m bents to dogleg Operations building landward of dogleg 1.2m diameter piles on Approach jetty 2 no. monopiles at jetty head	Neutral impact on construction~~Yes~~	~~No~~ ~~Model Option 1C:~~ Application design - 0.033ha intertidal habitat loss – habitat loss minimised	Project design (as described in Chapter 2: The Project **[TR030008/APP/6.2]**~~Technically feasible alternative but this combination of pile numbers, pile bent spacing and pile diameters results in greater impact on hydrodynamics and increased habitat loss than the Project~~
~~Add piled wall to approach jetty to prevent intertidal piling scour effects~~	~~No – does not meet the technical requirements of the project~~	-	~~Not a feasible alternative as this design results in sedimentation and scour impacts on Anglian Water outfalls and Environment Agency flood defence. There are additional complications with tie in and potential for localised scour and potential to undermine the existing revetment and any new structure~~
~~Variant~~**Fewer bents to dogleg of** ~~Option 1C:~~**approach jetty (x5)** 5 x 25m bents ~~in initial section~~to dogleg Operations building seaward of dogleg	Yes	No ~~Model Option 1D:~~ Greater habitat loss predicted than application design	Technically feasible alternative but this combination of pile numbers, pile bent spacing and pile diameters results in greater impact on hydrodynamics and increased habitat loss than the Project

Potential ~~alternative~~Design options	Technically feasible ~~alternative~~?	Alternative has lesser environment effect	Outcome at application stage
1.2m diameter piles on Approach jetty			
~~10 x 25m bents. 1.2m piles~~	~~Neutral impact on construction~~	~~Model Option 1F: 0.033ha intertidal habitat loss~~	~~No lesser environmental impact~~
~~Variant of Option 1F:~~ **Fewer bents to dogleg of approach jetty (x8)** 8 x 25m bents~~.~~ to dogleg Operations building landward of dogleg 1.2m diameter piles on Approach jetty	Neutral impact on construction	No ~~Model Option 1Fa:~~ Greater habitat loss predicted than application design	Technically feasible alternative but this combination of pile numbers, pile bent spacing and pile diameters results in greater impact on hydrodynamics and increased habitat loss than the Project
~~Variant of Option 1F:~~ **Greater bents to dogleg of approach jetty (x12)** 12 x 25m bents~~.~~ to dogleg Operations building landward of dogleg 1.2m diameter piles on Approach jetty	Neutral impact on construction	~~Model Option 1Fb: 0.033ha intertidal habitat loss~~Same as Application Design	No lesser environmental impact
~~Variant of Option 1F:~~	Neutral impact on construction	~~Model Option 1Fc: 0.033ha intertidal~~	No lesser environmental impact

Potential ~~alternative~~Design options	Technically feasible ~~alternative~~?	Alternative has lesser environment effect	Outcome at application stage
10 x 25m bents~~,~~ to dogleg with revised corner detail~~.~~ Operations building landward of dogleg 1.2m diameter piles on Approach jetty		~~habitat loss~~Same as Application Design	
Fewer bents to dogleg of approach jetty, with variable spacing (x6) 3 x 25m bents to dogleg with revised corner detail and 1.2m diameter pile. 3 x 50m ~~span in intertidal,~~bents to dogleg with 1.5m diameter pile. Operations building landward of dogleg. 1.2m diameter piles on Approach jetty.	Negative impact on construction but feasible design	No ~~Model Option 1J: Greater habitat loss predicted than application design~~	Technically feasible alternative but this combination of pile numbers, pile bent spacing and pile diameters results in greater impact on hydrodynamics and increased habitat loss than the Project
~~Variation of Option 1F with increased pile size in intertidal~~ **Different pile sizes to application design** 10 x 25m bents to dogleg with 1.5m diameter piles	Large piles in immediate approach, smaller piles for remainder of approach and larger piles for jetty head. Increased complexity for construction owing	~~Model Option 1H: 0.033ha intertidal habitat loss~~Same as Application Design	No lesser environmental impact

Potential ~~alternative~~Design options	Technically feasible ~~alternative~~?	Alternative has lesser environment effect	Outcome at application stage
Operations building landward of dogleg 1.2m diameter piles on remainder of Approach jetty	to different pile sizes (minor adverse effect on construction)		
~~Variation~~**Application design (but no monopiles)** 10 x 25m bents to dogleg Operations building landward of ~~Option 1Fc with 2 x 2.3m~~dogleg 1.2m diameter piles ~~at~~on Approach jetty ~~head~~	No – does not meet the technical requirements of the Project ~~Neutral impact on construction~~	~~Model Option 1Fd 0.033ha intertidal habitat loss~~	No lesser environmental impact however, absence of monopiles at jetty head which are needed for fender system. ~~Project design (as described in Chapter 2: The Project **[TR030008/APP/6.2]**~~
Decrease pile diameter (increase pile number)	No – does not meet the technical requirements of the Project		Not a feasible alternative as this design is technically unfeasible. Smaller piles may not be able to be driven due to ground conditions. Smaller piles would need to be assessed from a drivability perspective, and a greater number required to meet safety standards. This would increase logistics movements and overall piling durations (minor adverse on construction).
Add piled wall to approach jetty to prevent intertidal piling scour effects	No – does not meet the technical requirements of the project		Not a feasible alternative as this design results in sedimentation and scour impacts on Anglian Water outfalls and Environment Agency flood defence. There are additional complications with tie in and potential for localised scour and potential to undermine the existing revetment and any new structure

Potential ~~alternative~~Design options	Technically feasible ~~alternative~~?	Alternative has lesser environment effect	Outcome at application stage
Increase span (increase pile diameter, structural depth increase for concrete deck)	No – does not meet the technical requirements of the Project		Not a feasible alternative as this design would require significant amendments to deck and also influence of wave topping. This design would require significantly larger construction vessels to install piles/crossheads/beams with additional construction and environmental impacts. A larger spanned structure would also require additional maintenance access/egress
Increase span in perpendicular section only	No – does not meet the technical requirements of the Project		Not a feasible alternative as this design would require a design shift to using concrete spans. These could not be lifted into place and therefore construction of a temporary causeway would be required across the intertidal area to install the concrete spans.
Change alignment of outfalls/bridge over outfall	No – does not meet the technical requirements of the Project		Not a feasible alternative as this design results in a misalignment of the jetty orientation to the predominant river flow. This will increase indirect habitat loss from scour effects.
Skew piles	No – does not meet the technical requirements of the Project		Not a feasible alternative as this would represent a non-standard construction practice on a Nationally Significant Infrastructure Project for which there is no precedent globally. This would introduce unacceptable levels of risk to the design, construction and operation of the jetty.
Relocate control room passing bay further offshore	Yes	No ~~Model Option 1C~~Greater habitat loss predicted than application design	Technically feasible alternative but this combination of pile numbers, pile bent spacing and pile diameters results in greater impact on hydrodynamics and increased habitat loss than the Project

2.6 Step 5: Are there Alternative Solutions with Lesser Environmental Effects?

2.6.1 The adverse effect ~~on~~of intertidal mudflat loss is driven by the footprint of the piles and scour effects from the landward section of the approach jetty. Design changes to the jetty, jetty head and berth in the subtidal environment do not influence scour effect on the designated intertidal habitats.

2.6.2 Four factors were identified that determine the potential for intertidal mudflat scour associated with the Project:

a. Number of piles in intertidal area (determined by deck spans and width, location of topside infrastructure).

b. Size of piles (determined by industry good practice, required deck size, ground conditions and preferred construction materials).

c. Orientation of piles to tidal flows (determined by buildability and site constraints).

d. Shoreline flow dynamics.

2.6.3 Estuarine flow modelling was undertaken to quantify ~~direct and~~ indirect habitat loss from the jetty design (**Chapter 16: Physical Processes [TR030008/APP/6.2]**). The output of the ~~hydrological~~hydrodynamic modelling indicates that the Project (as described by the design parameters in **Chapter 2: The Project [TR030008/APP/6.2]**) will result in loss of 0.~~033ha of intertidal mudflat.~~03ha of intertidal mudflat. Direct losses of indirect mudflat as a result of the Project (as described by the design parameters in **Chapter 2: The Project [TRO300008/APP/6.2]**) are calculated as 0.00158ha. This results in a total loss (including direct and indirect losses) of 0.032ha of intertidal mudflat. This is assessed as being the minimum environmental effect of the Project on the intertidal habitat of the designated site out of the technically feasible alternative design options.

2.6.4 A number of variants on the approach jetty design, based upon the preferred design, have been subject to sensitivity testing (**Table 1**). Three of these alternative variants, which all lie within the Projects design parameters ~~(model runs 1F, 1Fb and lFc)~~ result in the same loss of intertidal habitat as the Project and therefore could be assessed as being feasible design alternatives.

2.6.5 A single alternative ~~(model run 1H),~~ utilising larger pile diameters than the Project design parameters, was modelled and demonstrated the same habitat loss (0.033ha) as those within the design parameters. ~~This option was~~

~~2.6.5~~2.6.6 These options are discounted as ~~an alternative~~alternatives as ~~it~~these options did not lessen the environmental effect of the Project.

~~2.6.6~~2.6.7 Therefore, there are no alternative solutions with lesser environmental effects.

2.7 Conclusion of the Assessment of Alternatives

2.7.1 Alternatives to the Project have been assessed taking cognisance of the Project Objectives and associated project requirements (see **Section 2**).

2.7.2 The alternative assessment identified three feasible design variants that lie within the project design parameters for the jetty but none that result in a lesser environmental effect.

2.7.3 As such, it has been demonstrated that there are no other feasible alternatives to the Project, and where design alternatives do exist, they fail to result in lesser environmental effects. Therefore test 1 of the Shadow Derogation assessment is passed and test 2 requiring IROPI to be demonstrated can be assessed.

3 Shadow HRA Stage 3 (Test 2): Imperative Reasons of Overriding Public Interest (IROPI)

3.1 Introduction

3.1.1 Where the Secretary of State is satisfied that there are no alternative solutions to the Project, the second derogation test which must be satisfied is whether the Project meets the IROPI test.

3.1.2 PINS advice note 10 (Ref 1-2) provides that where harm (or risk of harm) to the integrity of the European Sites has been identified and "*it can be demonstrated that there are no feasible alternative solutions to the Proposed Development that would have a lesser effect or avoid an adverse effect on the integrity of the European site(s), the Proposed Development may still be carried out if the Competent Authority is satisfied that it must be carried out for IROPI*".

3.1.3 When identifying IROPI such reasons should be:

a. Imperative – essential that the project must be required/indispensable/ essential for public reason interests.

b. Be in the public interest – it has benefits for the public (on a national, regional or local level) as opposed to a solely private benefit and benefits should be long term.

c. Overriding – the public interest demonstrably outweighs the harm, or risk of harm, to the integrity of the European site that is predicted by the appropriate assessment.

3.1.4 Regulation 64(1) of the Habitats Regulations state that the IROPI may be of a social or economic nature unless the site hosts a priority natural habitat type, or priority species. Intertidal mud and sandbanks exposed at low water are not a priority natural habitat type under the Habitats Directive, and therefore Regulation 64(1) applies to this IROPI case. No priority habitats or species are affected by the Project.

3.1.5 Defra guidance (Ref 1-3) states: *"In practice, plans and projects which enact or are consistent with national strategic plans or policies, may be more likely than others to show IROPI – e.g. those covered by or consistent with a National Policy Statement or identified within the National Infrastructure Plan, especially if the plan itself has been assessed using the Habitats Regulations."* Therefore, a key component of outlining the IROPI case of the project is a review of relevant national strategic plans and policies.

3.1.6 This IROPI case is based upon the national need for substantial additional port capacity as established in the National Policy Statement for Ports ("NPSfP") and the national need for new port capacity to support green energy supply and energy security, and the regional need to decarbonise the Humber region to meet net zero targets. The Project brings forward a solution that meets these urgent needs and will deliver substantial long term national, regional and local public interest benefits which are imperative and override the highly precautionary assessment of harm to the European Sites.

3.1.7 In summary the IROPI for the Project to proceed are:

a. Its human health and public safety benefits through increasing the availability of port capacity and through increasing the security of energy supplies by delivering capacity for the import and export of liquid bulk energy products. With increasing annual energy demand, set against a back drop of the UK's dependence on international imports and vulnerability to international energy prices together with the target of achieving net zero there is a substantial public interest in the availability, affordability, sustainability and reliability of energy supplies and increased port capacity for future green energy industries;

b. The significant environmental benefits resulting from the support the Project will give to the decarbonisation of the Humber industrial cluster, one of the heaviest emitters of CO_2 in the country, which is of national and regional public interest, given the need for urgent action to tackle climate change. It will enable the port to import and export of a range of bulk liquid energy products which will assist the country in the transition towards net zero; and

c. its social and economic benefits from facilitating economic growth (including in respect of the provision of additional port capacity that will contribute to the need that is established in the NPSfP) in the region and locally and encouraging new investment in the area. The Project will deliver significant local benefits with increased employment and training (including highly skilled job opportunities) through the construction and operation of the new terminal and hydrogen production facility.

3.2 Imperative Public Interest Benefits

3.2.1 As noted in this report above, the NPSfP (Ref 1-7 establishes that there is a "*compelling need for substantial additional port capacity*" over the next 20–30 years (i.e. to 2032 - 2042), to be met by a combination of consented and new development (paragraph 3.4.16). The need for the specific infrastructure comprising the Project derives from the following inter-related factors~~:~~, which are summarised further in the paragraphs that follow:

a. The national need to provide port capacity.

b. The need for port capacity to serve the energy sector in the Humber.

c. The need to achieve energy security through a diversity of technologies.

d. The urgent need to scale up hydrogen production capability.

e. The urgent need for carbon capture and storage technologies**.**

The national need to provide port capacity

3.2.2 The Government encourages sustainable port development to cater for long-term forecast growth in volumes of imports and exports by sea with a competitive and efficient port industry capable of meeting the needs of importers and exporters cost effectively and in a timely manner, thus contributing to long-term economic growth and prosperity (Ref 1-7, paragraph 3.3.1). Furthermore, the NPSfP, following the identification that there is a compelling need for substantial

additional port capacity, states that excluding the possibility of providing additional capacity would be to accept limits on economic growth and the price, availability and choice of goods imported as well as limit the local and regional benefits that new development might bring. Spare capacity also helps to assure the resilience of the national infrastructure (Ref 1-7, paragraph 3.4.15).

3.2.3 The Government recognises at paragraph 3.4.1 of the NPSfP in respect of its assessment of the need for new infrastructure that the total need for port infrastructure depends not only on overall demand for port capacity, but also on the need to retain the flexibility that ensures that port capacity is located where it is required and~~,~~ on the need to ensure effective competition and resilience in port operations. Paragraph 3.4.2 of the NPSfP states that *"over time and notwithstanding temporary economic downturns, increased trade in goods and, to a lesser extent in commodities, can be expected as a direct consequence of the Government's policies to support sustainable economic growth and to achieve rising prosperity".* With the movement of 95% of all goods in and out of the UK being by sea, and very limited alternatives being available, the majority of this increase will need to be through ports around the coast of the United Kingdom.

3.2.4 The Project will provide capacity for liquid bulk users of the jetty in the Humber. It is anticipated that the first user of the jetty (AP) will use ~~3%~~a minority of the annual theoretical jetty capacity of approximately 292 ship calls per year. The remaining jetty capacity provides substantial flexibility for any expansion by AP or use by other liquid bulk users in the locality, including the carbon capture sector.

3.2.5 Other proposed uses for the green energy terminal will come forward in due course and separate applications for consent submitted as required. It is anticipated that a future use of the terminal will be the import of liquefied carbon dioxide to connect to adjacent carbon transport and storage networks for sequestration in the North Sea. The Applicant – entirely in accordance with fundamental policy contained within the NPSfP – has made a judgement to promote the Project in this respect based on commercial factors operating within a free market environment.

3.2.6 ~~Future capacity should~~The need for future capacity which the NPSfP makes clear the decision maker should accept includes, amongst other things, the need for future capacity to take full account of both the potential contribution port developments might make to regional and local economies (Ref 1-7, paragraph 3.~~4~~5.1, bullet 5). The Project would deliver further public interest benefits through facilitating the economic growth of North East Lincolnshire harnessing the opportunities presented by the ~~Districts~~District's location on the Humber. This provides an opportunity to develop upon and grow existing capability and capacity within port and logistics, chemicals and food processing and provides increased opportunities to further develop renewable energy and projects for CCS and the transition to net zero within the area.

3.2.7 The Project provides future capacity for a number of the other specific objectives that are set out in paragraph 3.5.1 of the NPSfP which the decision maker is told to accept the need for. The need for the Project, in terms of the provision of additional port capacity, is, therefore, established by the NPSfP, which further makes clear (in paragraph 3.5.2) that given the level and urgency of need for

infrastructure of the types indicated in the policy (which includes the type being provided by the Project) the decision maker should start with a presumption in favour of granting consent to applications for ports development.

~~3.2.7~~3.2.8 Paragraph 3.1.7 of the NPSfP highlights that by bringing together groups of related businesses within and around the estate, ports create a cluster effect, which supports economic growth by encouraging innovation and the creation and development of new business opportunities. New investment, embodying latest technology and meeting current needs, will tend to increase the overall sector productivity and provide local public interest benefits.

3.2.9 In terms of economic impacts, the NPSfP (at paragraph 4.3.5) further makes it clear that the decision maker should give *"substantial weight to the positive impacts associated with economic development…".*

~~3.2.8~~3.2.10 Ports will play an important role in industrial decarbonisation through the provision of enabling infrastructure, allowing the technologies and measures needed for a transition to net zero to be deployed. Increasing capacity for the import and export of liquid bulks is critical to the decarbonisation of UK industry. As such, there is a compelling need to develop a range of infrastructure including specific port infrastructure, both landside and within the marine area, to meet the growing and changing nature of demand from the energy sector as the transition to net zero gains momentum. The provision of port infrastructure to increase capacity and resilience in response to an identified need aligns with Government policy guidance set out in the NPSfP (Ref 1-7, section 3.1.5).

~~3.2.9~~3.2.11 The Project will provide additional capacity at the Port of Immingham close to existing industries seeking to decarbonise and customers within the energy sector, thereby increasing the resilience of port infrastructure on the Humber. The need to upscale infrastructure quickly to cater for the changing needs of the energy sector is well recognised in Government policy and the Project is responding directly to this need.

The need for port capacity to serve the energy sector in the Humber

~~3.2.10~~3.2.12 There is an imperative need for port infrastructure to provide capacity to serve the energy sector, for import and export of liquid bulks relating to hydrogen and CO_2, to help achieve the 2050 legally binding net zero target.

~~3.2.11~~3.2.13 However, the Humber does not have the port capacity to meet the emerging demand from the green energy sector, as there is insufficient infrastructure designed for that purpose. The provision of port infrastructure to increase capacity and resilience in response to an identified need aligns with Government policy guidance set out in the NPSfP (Ref 1-7, section 3.1.5).

~~3.2.12~~3.2.14 There is a particular need for additional port infrastructure on the Humber, (one of the major industrial areas in the country, an important contributor to the national and regional economy and a major emitter of CO_2) to support decarbonisation in the region, to support the provision of alternative sources of clean energy locally (and to contribute to the national need) and to contribute to the regional and local economy. As shipping provides the most effective way to move hydrogen in the form of refrigerated ammonia in and out of the UK, sufficient port and landside infrastructure is required for ammonia storage and

processing. Shipping of CO_2 also helps maximise the use of carbon capture and storage infrastructure.

~~3.2.13~~3.2.15 The role that ports play in the energy market is recognised at paragraph 3.1.5 of the NPSfP (Ref 1-7) which explains that '*Ports have a vital role in the import and export of energy supplies'* and that '*port handling needs for energy can be expected to change as the mix of our energy supplies changes and particularly as renewables play an increasingly important part as an energy source".* The NPSfP explains that the Government wishes to see port developments supporting sustainable development by providing additional capacity for the development of renewable energy (paragraph 3.3.5).

~~3.2.14~~3.2.16 As at the time of writing of the NPSfP in 2012, there was a strong emphasis on port development supporting offshore wind developments, considering the Government's renewables targets and policies set out in the Renewable Energy NPS (EN-3) (Ref 1-10). Since 2012, legislation and policy has advanced rapidly, alongside the development of technologies. In 2019, the Government adopted legally binding targets requiring the UK to bring all greenhouse gas emissions to net zero by 2050. Net zero means that any emissions would be balanced by schemes to offset an equivalent amount of greenhouse gases from the atmosphere, such as planting trees or using technology like carbon capture and storage. The target reflects the urgency of tackling climate change**.**

~~3.2.15~~3.2.17 There are a number of important Government documents that set out the Government's strategy to decarbonise industry to achieve net zero and the 2050 target. 'Powering Up Britain' (March 2023) (Ref 1-11) sets out the Government's approach to energy security and net zero and acts as an introduction to 'Powering Up Britain: Energy Security Plan' (March 2023) (Ref 1-12), and 'Powering Up Britain: Net Zero Growth Plan' (March 2023) (Ref 1-13), both of which are complementary and should be read alongside each other. The **Planning Statement** of this application **[TR030008/APP/7.1]** provides a summary of these documents and other relevant Government policy documents relating to net zero**.**

~~3.2.16~~3.2.18 The Humber is one of the UK's main industrial clusters and home to well-established industries including oil refineries, steelworks, chemicals clusters and other manufacturing plants. The Humber industrial cluster emits more CO_2 than any other in the country and therefore decarbonising this region is essential to achieve net zero. At the same time, the region is a significant contributor to the UK's economy - £18bn is generated in the Humber each year with 360,000 jobs supported in industries such as refining, petrochemicals, manufacturing and power generation and through their associated supply chains. The Humber also contains one of the UK's largest port complexes, ~~comprising~~that includes the ABP ports of Immingham, Grimsby, Hull and Goole. The Port of Immingham is the UK's largest port by tonnage, handling over 46 million tonnes of cargo every year**.**

~~3.2.17~~3.2.19 The importance of tackling decarbonisation of the Humber is recognised in Government policy related to net zero. In 'Powering Up Britain: Energy Security Plan' (March 2023) (Ref 1-12), the Government has proposed to select additional carbon capture and storage ("CCS") projects to connect into the East Coast Cluster, including the Humber and their associated stores, as they become

viable. The East Coast Cluster is one of the first two CCS clusters taken forward by the Government. It is a collaboration between Zero Carbon Humber, Net Zero Teesside and Northern Endurance Partnership with the aim of removing 50% of the UK's industrial cluster CO_2 emissions, protecting thousands of jobs and establishing the region as a globally competitive climate-friendly hub for industry and innovation. The Cluster includes a diverse mix of low carbon projects including industrial carbon capture, low-carbon hydrogen production, negative emissions power, and power with carbon capture.

~~3.2.18~~3.2.20 In the Levelling Up White Paper (February 2022) (Ref 1-14), the Government proposes the creation of a private sector board to provide strategic leadership and drive development and delivery of the Humber economic priorities including the Humber Net Zero Cluster. The White Paper further states that "*The Humber is the UK's largest trading estuary and has the capacity to make significant inroads into decarbonisation and the application of new and related technologies.*" The Levelling Up White Paper also states *"The Humber is playing a key role in energy. Through its natural geography and* emerging *cluster, the Humber will help to ensure that offshore wind, industrial decarbonisation, carbon capture, and other technologies will sustain key industries and create high quality jobs at scale for years to come."*

~~3.2.19~~3.2.21 The importance of tackling decarbonisation of the Humber is also recognised locally. The Humber Industrial Cluster plan was set up in January 2021 with local industry partners to plan for decarbonisation of the Humber Cluster by 2040. The Humber Energy Board was convened by two Local Enterprise Partnerships across the region (the Hull and East Yorkshire Local Enterprise Partnership ("LEP") and the Greater Lincolnshire LEP) to act as a single voice on climate change matters and to deliver decarbonisation.

~~3.2.20~~3.2.22 The creation of additional capacity at the Port of Immingham, within the Humber industrial cluster, will enable it to support wider decarbonisation initiatives, and in particular the delivery of CCS projects. The Committee on Climate Change state CCS is a necessity, not an option for the UK to realise its net zero targets (NPS EN1, section 3.5.2). As such it is considered advantageous to locate new low carbon hydrogen infrastructure in known green energy hubs supporting CCS (Ref 1-15).

~~3.2.21~~3.2.23 In October 2022 Harbour Energy, the UK's largest independent oil and gas producer, and ABP announced an exclusive commercial relationship to develop a CO_2 import terminal (utilising the marine infrastructure that forms the Project) at the Port of Immingham which will link to the Viking CCS CO_2 transport and storage network ("the Viking CCS Project"). The Viking CCS Project proposes a 55km pipeline that will transport up to 10 million tonnes of CO_2 a year from Immingham to the former Theddlethorpe Gas Terminal and then on to join an existing offshore pipeline to the former Viking gas fields in the UK southern North Sea, where the CO_2 will be injected into depleted gas reservoirs 2.7km beneath the seabed. The project plans to permanently store 10 million tonnes of CO_2 a year by 2030. Viking CCS has been selected as a Track 2 development within the UK Government's cluster sequencing process, which aims to establish two additional CCUS clusters, that combined with the two Track 1 clusters, intends to deliver 30 million tonnes per annum of CO_2 storage by 2030.

~~3.2.22~~3.2.24 The construction of the Project provides an opportunity for the discharge of liquefied CO_2 cargoes from vessels at the Terminal into the Viking CCS transport and storage network. This would provide a method of transporting CO_2 captured at other dispersed industrial and power generation locations by ship to Immingham for onwards transport by pipeline and sequestration. The Viking CCS Project is anticipated to provide opportunities for shipped CO_2 from dispersed emitters elsewhere in the UK and internationally to be transported for permanent storage within the Viking fields, via the Project.

~~3.2.23~~3.2.25 To support the Government's plan to achieve net zero by 2050, sufficient infrastructure capacity is needed to enable the energy sector to deliver measures for decarbonisation. The Port of Immingham is already an established part of the supply chain for the energy sector but needs to respond to the changing needs of the energy market in this location and the requirements of various aspects of the response to Government energy policy including CCS and low-carbon hydrogen production and the Humber Industrial Cluster Plan.

~~3.2.24~~3.2.26 The energy sector in the Humber requires port infrastructure with access to deep water berths to accommodate very large vessels to import refrigerated ammonia and liquefied carbon dioxide and import or export other energy products. The port infrastructure needs to be directly proximate and have connections to associated landside infrastructure such as storage for ammonia and hydrogen, production plants to convert ammonia to hydrogen, carbon dioxide compressors and pipeline links. The Project will provide marine infrastructure and landside connections designed to meet that need, with associated infrastructure for the first user

~~3.2.25~~3.2.27 The Project will help provide resilience in the port sector through the provision of additional port capacity including a terminal with a deep water jetty, pipelines, refrigerated ammonia storage and the hydrogen production facility. As identified above, the NPSfP (Ref 1-7, sections 3.4.11-3.4.12) demonstrates the need for new port capacity to come forward in a range of locations to meet commercial demand, and also to provide flexibility, create competition, develop resilience and generate wider economic benefits.

~~3.2.26~~3.2.28 There is an imperative public interest benefit in the expansion of both port facilities and energy industries to the economy, nationally and within the Humber region.

~~3.2.27~~3.2.29 The UK Government Net Zero Strategy recognises that a transformation of the power sector to meet net zero will bring high skill and high wage job opportunities. The strategy suggests that 190,000 jobs will be created by the mid-2020s as part of a green industrial revolution, with this number rising to over 440,000 jobs by 2030. Green Energy Clusters, such as the Humber, will be early beneficiaries initially as these roles are concentrated on existing centres of expertise (Ref 1-18).

~~3.2.28~~3.2.30 The Government's Ten Point Plan (Ref 1-17) sets out the ambition for job creation in implementing measures to achieve net zero stating that "This Ten Point Plan to get there will mobilise £12 billion of government investment, and potentially three times as much from the private sector, to create and support up to 250,000 green jobs." The Ten Point Plan explains that delivering the growth of

low carbon hydrogen could deliver up to 8,000 jobs by 2030 with the potential to unlock 100,000 jobs by 2050 in a high hydrogen net zero scenario. Similarly investing in carbon capture and storage could potentially deliver 50,000 jobs by 2030. The Energy White Paper builds upon this ambition setting out the aim to "establish the UK as a world leader in the deployment of CCUS and clean hydrogen, supporting 60,000 jobs by 2030". The Project will provide an important direct contribution to achieving the public interests benefits that will come from realising this growth in employment.

~~3.2.29~~3.2.31 The Levelling Up White Paper (Ref 1-14) identifies that the UK's transition to net zero is a future factor driving the UK's economic geography. Whilst the transition to Net Zero could be disruptive for places that need to undergo the largest transition (given the level of jobs in carbon-intensive industries), it could also be transformative.

~~3.2.30~~3.2.32 The North East Lincolnshire Local Plan (Ref 1-9) aims to encourage growth and ensure the Borough becomes a sustainable location in the future. The Project is anticipated to provide an average of 645 net jobs during the construction period, with the likely peak workforce anticipated to be 1,012 jobs during Phase 1 (792 landside jobs and 220 marine jobs). During operation, the total net employment is anticipated to be 189 jobs (**Chapter 23: Socio-economics** [**TR030008/APP/6.2**]).

~~3.2.31~~3.2.33 The Project would also provide direct public interest benefits to both the local and regional economy through direct investment in and around the Port of Immingham by partnering with the supply chain, providing opportunities for training, upskilling, apprenticeships and local employment. As stated within Section 23.7 of **Chapter 23: Socio-economics [TR030008/APP/6.2]**, it is proposed that a wide variety of FTE roles will be created during construction and operation of the Project. Jobcentre Plus has also offered to support with employability and skills training to maximise the local community benefits of the Project.

~~3.2.32~~3.2.34 The Project will deliver wider economic benefits for the region. The gross value added (growth added through employment opportunities) during the construction period is £35.9 million. The construction and operation of the Terminal will therefore result in a substantial number of new roles and associated opportunities for those living locally to receive training and develop their skills**.**

~~3.2.33~~3.2.35 The Humber region therefore benefits from strong port, industrial and energy sectors, but has an urgent need to decarbonise its industry and reduce its CO_2 emissions.

~~3.2.34~~3.2.36 The evidence above demonstrates an imperative need for the Project, essential to increasing port capacity in support of the UK Government commitments to achieving net zero by 2050. The Project is very strongly in the public interest, supporting long term economic growth and transformative employment opportunities within the Humber.

The need to achieve energy security through a diversity of technologies, fuels and supply routes

~~3.2.35~~3.2.37 There is an urgent need to achieve energy security through a diversity of technologies, fuels and supply routes. The UK is vulnerable to international energy prices and dependent on imported oil and gas. Government policy including that set out in the NPSfP (Ref 1-7), the energy NPS~~'~~s (Ref 1-10, Ref 1-15~~) including the draft energy NPSs,~~), Powering up Britain 'Energy Security Plan' (Ref 1-19), demonstrates the need for new energy infrastructure including necessary import and export facilities at ports, responding to market demand and new technologies, in order to develop competition and diversity of supplies, and to help in the net zero transition. The need for energy security means that energy from a range of reliable renewable sources is required. The Government's 2050 net zero target underpins the urgency of bringing forward necessary infrastructure to facilitate the availability of clean energy as soon as possible in order to tackle climate change. In line with national policy, a range of technologies is required to be developed on the Humber to facilitate the production of low carbon hydrogen and maximise the use of carbon capture and storage (CCS), including new port infrastructure to facilitate necessary imports and exports.

~~3.2.36~~3.2.38 The NPSfP recognises the importance of ensuring security of energy supplies through ports and provides that ports will need to be responsive to changes in the different types of energy supplies needed (Ref 1-7, paragraph 3.1.5) and further at paragraph 3.3.3, the NPSfP reiterates the need to ensure that new port infrastructure should ensure security of supply.

~~3.2.37~~3.2.39 EN-1 highlights how critical it is that the UK continues to have secure and reliable supplies of energy to make the transition to a low carbon economy (Ref 1-15). ~~Paragraph 2.2.20 explains the Government's view that achieving security of supply includes the use and import of "a diverse mix of technologies and fuels, so that we do not rely on any one technology or fuel. Diversity can be achieved through the use of different technologies and multiple supply routes (for example, primary fuels imported from a wide range of countries". Paragraph 2.2.21 states that *"Developing our infrastructure … will help us maintain and improve our security and access to competitive supplies, particularly for electricity generation and gas importation and storage"*.~~ Paragraph 2.5.1 makes clear that given the vital role of energy to economic prosperity and social well-being, it is important that our supplies of energy remain secure, reliable and affordable.

~~3.2.38~~3.2.40 Of particular relevance is the British Energy Security Strategy which emphasises *"the importance of addressing our underlying vulnerability to international energy prices by reducing our dependence on imported oil and gas, improving energy efficiency, remaining open minded about our onshore reserves including shale gas, and accelerating deployment of renewables, nuclear, hydrogen, CCUS, and related network infrastructure, so as to ensure a domestic supply of clean, affordable, and secure power as we transition to net zero"*. (Ref 1-19)

~~3.2.39~~3.2.41 Low carbon power generation and CCUS clusters are integral to the delivery of net zero and further respond to public concern over the security, affordability and sustainability of the UK's energy supply. Securing additional low carbon

supplies is central to reducing uncertainly over energy prices and availability globally.

~~3.2.40~~3.2.42 Furthermore, the Government believes hydrogen can "provide reliable low-carbon flexible generation while creating a decarbonisation pathway for unabated generation; supporting our decarbonisation ambitions while maintaining security of supply" (Ref 1-11).

~~3.2.41~~3.2.43 The Project would deliver imperative public interest benefits through increasing the security of energy supplies by providing capacity for the import and export of liquid bulk energy products. With increasing annual energy demand, set against a back drop of achieving net zero there is substantial public interest in improving the availability, affordability, sustainability and reliability of energy supplies. The Project would facilitate the development of a diverse use range of technologies, fuels and supply routes to support decarbonisation, including through an established opportunity to produce low carbon hydrogen, an opportunity to maximise the potential of emerging CCS infrastructure across the UK by CO_2 shipping on the Humber and by providing capacity for future projects and energy supply routes.

~~3.2.42~~3.2.44 This Project will therefore help to secure the UK's energy security, reduce reliance on traditional, high carbon energy and provide greater confidence and resilience in energy supply to the public benefit.

The urgent need to scale up hydrogen production capability

~~3.2.43~~3.2.45 The need for the Project arises from the Government's strategy to deliver the UK's legally binding net zero obligations. The Climate Change Act 2008 (2050 Target Amendment) Order 2019 commits the UK to a net reduction in greenhouse gas emission (against the 1990 baseline) of 100% (net zero) by 2050 (Ref 1-16). This target is underpinned by UK Government strategies and policies that provide a road map to achievement. Together these set out the Government's strategy to decarbonise industry in line with the plan for achieving the UK's legally binding net zero obligations by 2050 (Ref 1-11, Ref 1-17, Ref 1-18, Ref 1-19). Set against a rising demand in energy, new and existing technologies are required to decarbonise UK industries. The net zero target is ambitious and requires substantial investment nationally to achieve. The Project will contribute to net zero through increasing the port capacity and associated infrastructure to produce green energy from liquid bulk imports and in the future, carbon capture and sequestering, all of which are required to successfully achieve net zero by 2050.

~~3.2.44~~3.2.46 As part of the need to deliver energy security and decarbonisation, there is an urgent national need to scale up low carbon hydrogen production capability as an established alternative "clean" source of energy. Low-carbon hydrogen includes "green hydrogen" (hydrogen from renewable electricity) and "blue hydrogen" (hydrogen from fossil fuels with CO_2 emissions reduced by the use of carbon CCS). Low carbon hydrogen is a vital component of ensuring future energy security (Ref 1-11) and reducing national reliance on imported energy supplies. The British Energy Security Strategy (Ref 1-19) proposes a series of policies to deliver "secure, clean and affordable British energy for the long term," echoing the wording of the Energy Bill.

~~3.2.45~~3.2.47 The UK Hydrogen Strategy (August 2021) (Ref 1-20) recognises that "*Hydrogen is one of a handful of new, low carbon solutions that would be critical for the UK's transition to net zero. As part of a deeply decarbonised, deeply renewable energy system, low carbon hydrogen could be a versatile replacement for high-carbon fuels used today - helping to bring down emissions in vital UK industrial sectors and providing flexible energy for power, heat and transport*".

~~3.2.46~~3.2.48 The UK Hydrogen Strategy (August 2021) (Ref 1-20) further recognises the scale of the challenge to increase green hydrogen production, stating in Chapter 1 "*With virtually no low carbon hydrogen produced or used currently, particularly to supply energy, this will require rapid and significant scale up from where we are today"*. Paragraph 1.2 of the Hydrogen Strategy emphasises the need for hydrogen infrastructure recognising that hydrogen can only be considered as a decarbonisation option if it is readily available. Section 2.2 of the Hydrogen Strategy outlines how hydrogen development can be delivered and scaled up, and states *"Investors, developers and companies across the length and breadth of the UK are ready to build if the policy environment is in place",* further stating at 2.4.2 that *"developing and scaling hydrogen power during the 2020s can reduce the burden on other technologies such as renewables, CCUS and nuclear".*

~~3.2.47~~3.2.49 Powering Up Britain 'The Net Zero Growth Plan' (Ref 1-13) further emphasises the key role that low carbon hydrogen can play in delivering a net zero economy as a versatile replacement for the high-carbon fuels used today**.**

~~3.2.48~~3.2.50 The British Energy Security Strategy (Ref 1-19) notes that the UK is well-placed to exploit all forms of low carbon hydrogen production and commits to 10GW of hydrogen production by 2030. The Energy Security Strategy seeks up to 1GW of electrolytic 'green' hydrogen and up to 1GW of CCS-enabled 'blue' hydrogen to be operational or in construction by 2025. It recognises that to accelerate our supply of low carbon hydrogen, it requires "*designing, by 2025, new business models for hydrogen transport and storage infrastructure, which will be essential to grow the hydrogen economy*"**.**

~~3.2.49~~3.2.51 Once fully constructed and operational, the Project could deliver the equivalent of 3% of the Government's 2030 10GW target for green hydrogen (300MW) and help meet the need for decarbonisation of industry including the heavy transportation sector. The significant, but nevertheless single figure, contribution that the Project makes to the Government target for hydrogen production demonstrates the scale of the task. To meet the Government's target, it is likely that approximately 30 further other schemes of the same scale are needed. There are some further projects in development, such as H2 Saltend promoted by Equinor, with planned production of 600MW, and a 100-MW green hydrogen facility to be built at Port of Felixstowe, promoted by Scottish Power, but it is clear that this Project and many more need to be developed urgently to meet the Government's target.

~~3.2.50~~3.2.52 The Project would provide infrastructure to facilitate decarbonisation of the Humber industrial cluster, one of the heaviest emitters of CO2 in the country. This is of national and regional public interest, given the need for urgent action to tackle climate change. It will enable the port to import and export of a range of bulk liquid energy products including (i) ammonia (NH_3) to produce green

hydrogen to help decarbonise the United Kingdom's (UK) transport sector and (ii) CO_2, to facilitate the more extensive use of carbon capture and storage, both of which will assist transition towards net zero.

~~3.2.51~~3.2.53 An additional public interest benefit is the end use of green hydrogen, particularly in the decarbonisation of heavy goods transport. The use of diesel in road transport results in the emission of approximately 94g CO_2 per MJ. By way of example, if all of the green hydrogen produced by the Project (once fully built out and operational) was to be used in road transport, it could facilitate a reduction in annual emissions of CO_2 from road traffic emissions by up to 704,634 tonnes per annum as a result of fuel switching from diesel to hydrogen. This is equivalent to 22,000 diesel lorries, or 5% of the CO_2 emitted by the industries in the Humber. A further benefit of this switch would be a reduction in emissions of other atmospheric pollutants – namely cutting emissions of particulate (PM10) (26 tonnes /year) and NOx emissions (1050 tonnes/year), based on replacing vehicles to the latest Euro VI standards. This would lead to improved air quality which would have human health and wellbeing benefits.

The urgent need for carbon capture and storage technologies

~~3.2.52~~3.2.54 There is an urgent national need for CCS technologies to support decarbonisation and therefore a need for CCS infrastructure, particularly in industrial areas such as the Humber where the need for decarbonisation is the greatest. CCS technology captures carbon dioxide from power generation, low carbon hydrogen production and industrial processes, storing it underground where it cannot enter the atmosphere. The Project would help maximise the potential of emerging CCS infrastructure in the Humber, particularly in relation to the Viking CCS project.

~~3.2.53~~3.2.55 The Government's Net Zero Strategy Build Back Greener (Ref 1-18) sets out the Government's ambition to capture 20-30 Mt of carbon dioxide per year by 2030 and at least 50Mt by the mid 2030's. The Project can facilitate the import of up to nearly 10 Mt of Carbon dioxide, or one third of this objective.

~~3.2.54~~3.2.56 ~~Draft~~ EN-1 Overarching National Policy Statement for Energy (Ref 1-15) addresses the urgent need for new nationally significant CCS infrastructure for the transition to a net zero economy (paragraph 3.5.1). In paragraph 3.5.2, ~~Draft~~ EN-1 notes the advice of the Government's Climate Change Committee that new CCS infrastructure is a "*necessity not an option" and that "CCS infrastructure will also be needed to capture and store carbon dioxide from hydrogen production from natural gas, industrial processes~~*~~, the use of bioenergy …. and from the air". …".~~

~~3.2.55~~3.2.57 ~~Draft~~ EN-1 recognises the importance of ports to enable the transfer of carbon dioxide from onshore infrastructure onto ships and that the need for CCS infrastructure set out in ~~Draft~~ EN-1 is ~~likely to be~~ a relevant consideration (Ref 1-15).

~~3.2.56~~3.2.58 The Project provides an opportunity to facilitate the use of CCS infrastructure, and the wider economic opportunities, including inward investment related projects that will utilise the hydrogen and CCS infrastructure.

~~3.2.57~~3.2.59 These factors together demonstrate the compelling imperative for new energy infrastructure (including necessary import and export facilities at ports), in order to develop diversity of energy supplies to help in the net zero transition. The 2050 net zero target underpins the urgency of bringing forward necessary infrastructure as soon as possible in order to tackle climate change. There is an overriding public interest in achieving the national net zero target, and as a necessary part of that an imperative need for green energy production, in achieving greater security of energy supplies, and in delivering economic benefits regionally and locally.

Have a long term benefit

~~3.2.58~~3.2.60 The Project does not make any provision for the decommissioning of the jetty. Initial design life of the marine side infrastructure is 50 years. However once constructed, the jetty (and jetty access road) would become part of the fabric of the port estate and continue to be maintained so that it could be used for port-related activities to meet the long-term need. All plant or equipment on the jetty topside would likely remain in situ and repurposed where possible to extend its life~~.~~ (save that the plant and equipment associated with the hydrogen production facility is likely to be decommissioned when the hydrogen production facility is decommissioned).

~~3.2.59~~3.2.61 ~~The landside elements of~~Whilst the ~~Project have~~hydrogen production facility has a nominal design life of ~~up to~~ approximately 25 years, ~~although~~ the operational life ~~could~~is likely to be longer, depending on its integrity and market conditions at that time.

~~3.2.60~~3.2.62 The current net zero target is committed for 2050. Low carbon facilities will be required beyond this date to accommodate the growing demand for energy.

~~3.2.61~~3.2.63 Whilst 'long term' is not defined within the Habitats Directive, the Project demonstrates a significant investment and therefore long term commitment to expanding port capacity and resilience in support of the expanding Humber Industrial Cluster, low-carbon hydrogen production and industrial decarbonisation.

~~3.2.62~~3.2.64 The evidence provided above demonstrates that the Project is both in the public interest and would deliver substantial, wide ranging and long-term benefits to the public.

3.3 Overriding the Harm to the Protected Site

3.3.1 The national, regional and local public interest benefits that would be delivered by meeting the urgent need for increased port capacity as outlined above supporting green energy production, decarbonisation and energy security, and delivering economic benefits clearly and decisively outweighs and should thus override any harm or risk of harm to the European sites from the Project.

3.3.2 The scale of habitat loss from the Project based on a highly precautionary assessment represents a very small proportion of the habitat resources within the European sites and the Humber estuary. In total only <0.~~0009~~0007% of intertidal mudflat habitat in the Humber estuary will be affected by the Project, and that is when considered in-combination with other developments within the estuary.

3.3.3 The extent and location of the predicted loss would not lead to any significant loss of form or function of the habitats as supporting habitats to the qualifying features of the SPA / Ramsar. The habitats retained within the European site would continue to be extensive in nature and maintain all the environmental processes acting on the habitats and functionality in supporting the qualifying features.

3.3.4 By contrast, the long term public interest benefits that would arise from proceeding with the Project are very substantial. When fully operational (Phase 6 – year 10), the Project is anticipated to produce up to 300 MW of hydrogen per annum at full capacity, the equivalent of up to 9.5 billion MJ per annum. Depending on market demand it is estimated that this would meet up to the equivalent of 3% of Government's 2030 hydrogen production capacity target. By increasing the UK capacity for liquid bulk products into an established green energy hub (including the future anticipated use of the jetty for carbon capture), the Project will contribute to national net zero targets through decarbonisation of the Humber region, ~~provide~~contribute to achieving energy security and increase port capacity for future green energy industries.

3.3.5 If the Project does not proceed these environmental, human health, public interest and socioeconomic benefits will not be realised.

3.3.6 The evidence demonstrates there are imperative public interest reasons for the Project to proceed, and that these are so substantial as to clearly outweigh and thus override the anticipated environmental effect of the Project on the European Sites.

3.4 Conclusions

3.4.1 This report demonstrates that there are imperative reasons of overriding public interest for the Project to proceed despite the precautionary assessment of potential harm to the European sites. The Project will deliver substantial national, regional and local public human health and safety benefits by delivering increased capacity for the import and export of liquid bulk energy products supporting the decarbonisation of the Humber Industrial Cluster and the move to greater energy security in addition to delivering significant environmental benefits against a target of achieving net zero. The Project will also deliver significant social and economic public interest benefits by facilitating economic growth in the region and locally encouraging new investment in the area and delivering significant increased employment and training opportunities (including highly skilled jobs) through the construction and operation of the new terminal and hydrogen production facility.

3.4.2 The evidence provided demonstrates that the Project passes the second test for derogation, in that there are imperative public interest reasons which override any harm or risk of harm of the Project on the European Sites. As such test 3 of the derogation process can be undertaken.

4 Shadow HRA Stage 3 (Test 3): Compensatory Measures

4.1 Guidance on Compensatory Measures

4.1.1 If the derogations stage is engaged, the next step after demonstrating that there are no feasible alternatives to the Project and that the imperative reasons of overriding public interest test has been passed, it is necessary to undertake compensatory measures. These measures will need to be identified and secured to ensure that the overall coherence of the national site network is protected.

4.1.2 The Shadow HRA identified 0.~~054ha~~044ha of direct and indirect intertidal habitat loss resulting from the Project, in-combination with the IERRT project. Habitat loss is predicted to affect the qualifying interest of the following European sites:

a. Humber Estuary SAC: Estuaries (H1130) and Mudflats and sandflats not covered by seawater at low tide (H1140).

b. Humber Estuary Ramsar: 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.

4.2 The characteristics of Compensatory Measures

4.2.1 Compensatory measures should be (Ref 1-21):

a. Sufficiently targeted to the harm, such that the measures proposed are appropriate to the type of impact predicted.

b. Effective and feasible, with a reasonable guarantee of success.

c. Technically feasible, using best scientific knowledge and take account of the specific requirements of the ecological features to be reinstated.

d. Adequate in extent and directly related to the quantitative and qualitative aspects inherent to the elements of integrity.

e. Located in areas where they will be most effective in maintaining the overall coherence of the national site network.

f. Acceptable in timing, with respect to the implementation of the plan or project and the implementation of the compensatory measure and take into account the time required for habitats to develop.

g. Must not have a negative effect on the national network of European sites as a whole, despite the negative effects of the proposal on an individual European site.

h. Adjustable, flexible and adaptable in response to monitoring and review.

i. Implemented in the long-term with a financial and legal basis to ensure this happens.

4.3 Proposed Compensation

4.3.1 Should the Secretary of State disagree with the Applicant's conclusion of no AEOI on the European Sites from the intertidal habitat loss, compensatory habitat has been identified at the Outstrays to Skeffling Managed Realignment Scheme (OtSMRS).

4.3.2 OtSMRS lies 13.5km east of the Project, and immediately adjacent to the Humber Estuary SAC (UK0030170), Humber Estuary Ramsar (UK11031) and Humber Estuary SPA (UK9006111). OtSMRS is therefore suitably located to provide contiguous compensatory habitat for the loss of qualifying feature of the European sites.

4.3.3 The OtSMRS site is in joint ABP and Environment Agency ("EA") ownership and, on completion, is predicted to create approximately 175ha of intertidal habitat (mudflats and saltmarsh) and 75ha wet grassland linked to the outer Humber Estuary (see **Plate 1**).

4.3.4 OtSMRS is a joint initiative developed by the EA and ABP using a managed realignment approach to create new compensatory habitats for wildlife on the north bank of the Humber estuary, near Welwick and Skeffling. The EA's main objective for OtSMRS is to compensate for intertidal habitats likely to be lost in the Humber Estuary as a result of carrying out the Humber Flood Risk Management Strategy, due to coastal squeeze and construction works. ABP's objective is to create new intertidal habitat to compensate for future anticipated habitat losses at their port complexes due to coastal squeeze and construction works. ABP own approximately 80ha of the OtSMRS site. The intertidal habitats created are required to be similar to those lost.

4.3.5 OtSMRS is two adjacent managed realignment schemes, Outstrays managed realignment and the Welwick to Skeffling managed realignment, known collectively as OtSMRS. The scheme is divided into three distinct areas (**Plate 1**);

a. The western side (from Hawkins Point to Winestead pumping station, known as West 1).

b. A middle area of wet grassland habitat (above high tide levels and included in the scheme to increase the range of habitats on the site and provide the right conditions for rare species, known as West 2).

c. And the eastern site, extending up to Skeffling pumping station (known as East 1, 2 and 3). (the "Eastern Site").

4.3.6 Compensatory habitat identified for the Project lies within the Welwick to Skeffling managed realignment, in the 'East 2' block (**Plate 1**) which is in ABP ownership.

4.3.7 At the Eastern Site, an earth embankment approximately 4.5km long and 2.5-3.5m above existing ground level is being constructed along the back of East 1, 2 and 3. Once the new flood defences have been constructed, a 400m section of the existing embankment and fronting saltmarsh in East 2 will be removed to allow water to inundate the site to create approx. 175 ha of intertidal habitat. The existing embankment on either side of the breach location will be lowered down

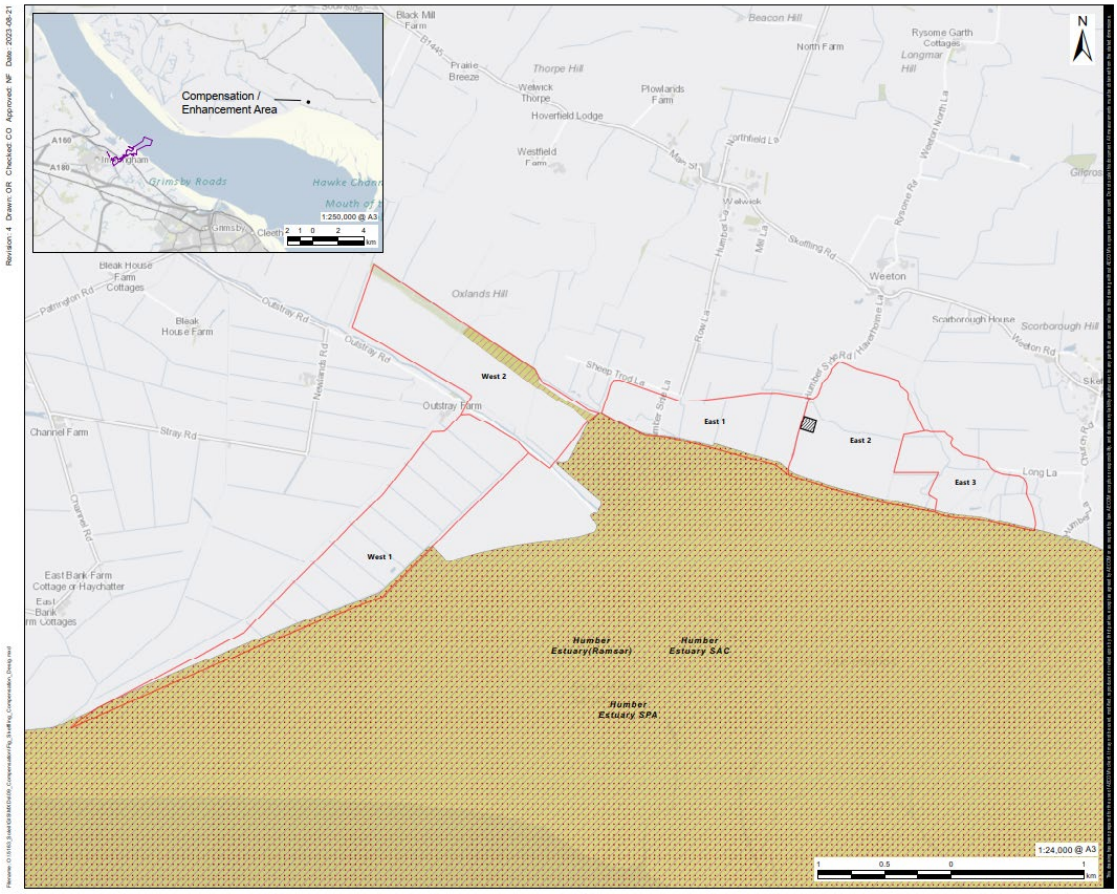
to ground level. A section of existing embankment will be retained at the western end for ecological purposes.

4.3.8 The permanent loss of intertidal habitats (0.~~054ha~~044ha) associated with the Project, in-combination with the IERRT project, will be compensated through habitat creation at a 3:1 ratio. This will require 0.~~162ha~~132ha of functional intertidal habitat to be created offsite. A 3:1 ratio for compensatory habitats is a typical requirement of Projects resulting in habitat loss from marine protected sites.

4.3.9 Given the difficulties associated with management and monitoring of small habitat parcels it is proposed that a unit of 1ha would be provided by the Project. If the Secretary of State concludes following Appropriate Assessment of the Project that compensation is required because an adverse effect on integrity on the European Sites cannot be ruled out, the compensation will be delivered out of this allocated hectare of intertidal habitat. The 0.~~838ha~~868ha of intertidal habitat which would be created in addition to the compensation ~~–~~required is appropriately to be regarded as an enhancement delivered by the Project. The compensation and enhancement allocated to the Project would together amount to one hectare of intertidal habitat in total.

4.3.10 For the avoidance of doubt, the physical delivery of the OtSMRS, including the one hectare element referred to above, does not form part of the Project as this is occurring under a separate process which has already been consented**.** An Environmental Impact Assessment (“EIA”), together with other assessments such as a Habitats Regulations Assessment (“HRA”), were undertaken to support the planning and marine licence applications for the OtSMRS.

Plate 1: Location of compensation site at OtSMRS in relation to the Project



4.4 Design of Compensation Site

4.4.1 The habitat area within East 2 identified as compensatory habitat for the Project is predicted to be a mix of intertidal mud (forming part of the intertidal creek network) and low to mid elevation saltmarsh.

4.4.2 Habitat modelling undertaken as part of the consenting process for OtSMRS has been undertaken to understand the likelihood that managed realignment will create intertidal habitat that represents appropriate compensation for habitat loss within the Humber Estuary. The modelling was based on the elevation of current intertidal habitats adjacent to the Site and the high confidence that new intertidal habitats will form at similar elevations within the Site.

4.4.3 It is proposed that natural regeneration of intertidal habitats from tidal inundation will be appropriate and the establishment of a natural equilibrium can be achieved through the breach design that forms part of the compensation site consent.

4.4.4 Using evidence from ABP's Welwick managed realignment site (undertaken in 2006), inundation frequencies from numerical modelling and the position of the site in the tidal frame, there is a high certainty of success in the creation of intertidal habitats at OtSMRS. Intertidal habitats are dynamic, and extents of mudflat and saltmarsh habitats are predicted to change post inundation. Initially 50-90ha of mudflat will be created in the Welwick to Skeffling managed

realignment, which will reduce to 10-30ha after five years, due to colonisation by pioneer and mid saltmarsh species.

4.4.5 This area of East 2 has been selected specifically to ensure that at least the 0.~~1ha~~132ha required as compensation will be retained as mudflat habitat as the site develops. As described above, the remaining 0.~~838ha~~868ha provided by the Project will be as a Project enhancement and as such is not required to be retained as mudflat habitat. The additional enhancement habitat provided is predicted to develop into important intertidal habitats typical of the Humber European Sites, and support qualifying interests of the SAC, SPA and Ramsar designations.

4.4.6 The creation of compensatory habitat at OtSMRS will replicate the habitat loss associated with the Project. The provision of three times the habitat loss will ensure a functional unit of intertidal habitat that will continue to support qualifying interest species from the adjacent European sites, and in immediate continuity with a broad range of other important habitats (intertidal saltmarsh, wetlands and grazing coastal marsh) across the managed realignment. As such, the proposed habitat creation is sufficiently targeted to compensate for the effects of the Project.

4.4.7 The compensation area within the OtSMRS will contribute to the Favourable Conservation Status of the Humber Estuary SAC and Ramsar site through increasing the overall '*extent and distribution of qualifying habitats*' and creating the '*structure and function (including typical species) of qualifying habitats*' that are Conservation Objectives for both impacted European sites. Whilst compensatory habitats lie out with the boundary of the Humber Estuary European Sites, the proposed compensation site is located immediately adjacent and therefore will provide contiguous compensatory habitat for the loss of qualifying features. Increasing the area of qualifying habitats will protect the overall coherence of the national site network.

4.5 Schedule – Programme of Works

4.5.1 OtSMRS was granted planning consent in August 2019 (application ref. 19/00786/STPLFE and 19/00783/STPLFE). Construction commenced in the summer of 2021 and breaching of the site is planned for 2024, allowing seawater to inundate the site and intertidal habitats to develop [APP-238]. The peak of marine construction works for the Project is expected to occur in Years 2025-2026 (Years 1-2). Habitat loss associated with the footprint of the piles is likely to occur over a 13 month period with peak losses occurring in 2026, once piling is complete.

~~4.5.2 Construction work for OtSMRS commenced in the summer of 2021, with ground investigations and archaeological surveys being undertaken to inform further detailed design. During 2022 the realigned flood embankment and associated drainage were constructed in the eastern areas of the site, which will be completed in 2023. Breaching of the site is proposed for 2024, allowing seawater to inundate the site.~~

~~4.5.3~~4.5.2 It is therefore predicted, with high confidence, that the ~~site~~OtSMRS will be ~~established as a managed realignment, with transition~~transitioning towards ~~full~~a

mosaic of intertidal habitats prior to the ~~commencement of the Project (assuming a 2026 start).~~losses occurring. By the time habitat loss is incurred by the Project, the ~~Welwick to Skeffling site~~ OtSMRS should be ~~fully~~ functional and as such there will be no loss of habitat associated with the Project.

4.5.3 For context, monitoring data from other managed realignment schemes on the Humber Estuary, and elsewhere around the UK, has demonstrated that where land elevations are suitable, and an appropriate tidal connection with an adjacent estuary can be made, then intertidal habitats will establish quickly and easily. Managed realignment sites can be of substantial value to birds and fish, often within a few months of a site first being inundated.

4.5.4 For example, the accretion of marine sediment started to occur immediately following the breaching of Welwick, resulting in the creation of mudflat within the site (Welwick is immediately adjacent to the OtSMRS). Within one year of the breach this mudflat supported all of the target invertebrate species that were predicted to occur at the site based on local reference conditions. Similar rapid development of such sites has also been demonstrated at Chowder Ness and Paull Holme Strays which are both managed realignments on the Humber Estuary.

4.5.5 A total of 29 different waterbird species were also counted during the September 2006 to March 2007 surveys at Welwick, the first winter post inundation. The realignment site had already developed as a major roosting and feeding site for a number of wading birds at high water throughout the 2006/2007 count season. Wildfowl species were also well represented in the realignment site, especially common Shelduck present from high to low water.

4.5.6 Given the ecologically inconsequential effect of the project on the Humber Estuary, it is therefore deemed considered that the compensatory habitat will maintain the coherence of the National Site Network, through the creation of functional intertidal bird habitat within 1 year, and this will continue to develop over the life-time of the Project.

4.6 Securing the Compensatory Measures

4.6.1 The funding to deliver the compensatory measures has been provided by the Applicant.

4.6.2 The purchase of land for the compensatory measures has been completed and construction works are underway on site. No additional funding is required to secure the compensatory habitats provided for by the Project. The 1ha of compensatory/enhancement habitat will need to be identified and allocated to the Project by the applicant, if it is confirmed as required.

4.6.3 Future monitoring requirements for the site have been budgeted for and agreed between the OtSMRS delivery partners (ABP and EA). The compensation area identified is intended to be allocated to the Project and secured through a separate legal agreement. This could take the form of a section 106 unilateral undertaking from the Applicant to the relevant planning authority for the OtSMRS site (East Riding of Yorkshire Authority) covenanting to allocate 1 hectare of intertidal habitat at the OtSMRS site to the Project, identifying its location and providing for its ongoing monitoring and management.

4.7 Responsibilities

4.7.1 The Applicant is committed to delivery and implementation of the compensatory measures as part of the continuing delivery of OtSMRS.

4.8 Monitoring and adaptive management

4.8.1 The compensation site will be monitored post construction to ensure that it is delivering on its environmental objectives. This will be in accordance with the Environmental Maintenance and Monitoring Plan for the OtSMRS project.

4.8.2 Specific targets for the Project compensatory intertidal habitat will be agreed with Natural England. This monitoring will determine any requirement for intervention works in East 2 in order to maintain the intertidal habitat.

4.8.3 The Applicant will monitor the intertidal habitat development within East 2 of the eastern site (Welwick to Skeffling managed realignment) annually for a period of five years so as to ensure that the compensation area develops properly as intended into intertidal mudflat habitat. This will be undertaken via a drone survey using an unmanned aerial vehicle (UAV) to provide aerial imagery of the site. Outputs from the UAV survey will include an orthomosaic map; imagery stitched together and geometrically corrected ('orthorectified') to produce an accurate map. The high degree of resolution within the orthomosaic map will help to define areas of intertidal habitat coverage across the OtSMRS.

4.8.4 If required (to be established through consultation with Natural England), benthic core samples can be collected to provide benthic biotope classifications. It is considered that this level of detail is not necessary to understand the establishment of compensatory habitat, but could form part of additional monitoring requirements of the wider OtSMRS Environmental Management Plan.

4.8.5 The EIA undertaken for OtSMRS recognised the potential requirement for intervention to maintain mudflat habitats within the site. The compensation area has been chosen to minimise the need for future intervention to maintain the minimum compensation area available as intertidal mudflat. Should mudflat habitats within this area evolve over time, and intervention is required, this will be undertaken as part of the wider management of the OtSMRS. Adaptive management may, if required, include the future reprofiling of sediment bathymetry to ensure mudflat habitats do not vegetate into low-mid saltmarsh.

4.8.6 In due course, however, the monitoring and management of the allocated one hectare of intertidal habitat will be assimilated within the approved management plan for the full OtSMRS that ~~is being~~will be prepared by the Environment Agency and ABP, whereupon future monitoring of the one hectare of land will be undertaken in compliance with that Plan.

4.9 Enforcement

4.9.1 Should the compensatory measures be required by the Secretary of State as part of the Appropriate Assessment of the effects of the Project, the delivery of these compensatory measures will be a Requirement of the DCO which would need to be discharged prior to the commencement of the aspects of the proposed Project which will directly impact upon the intertidal habitat loss.

4.10 Conclusions

4.10.1 If compensatory measures are required, ~~1ha of~~ intertidal habitat has been allocated to the Project at OtSMRS.

4.10.2 0.~~162ha~~132ha of mudflat habitat has been allocated to compensate for the loss of 0.~~054ha~~044ha of direct and indirect intertidal habitat from the Project (in combination). The OtSMRS is currently undergoing construction and is expected to be functional upon commencement of the Project, resulting in no net loss of functional habitat to the European Sites.

4.10.3 OtSMRS has been designed specifically as compensatory habitat for port related infrastructure development within the Humber estuary and as such is considered suitable for the purposes of the Project. The compensatory measures have been targeted to an area of OtSMRS that will form intertidal soft sediments, with the same function and structure as that lost as a result of the Project. Sufficient confidence as to the successful creation of intertidal mudflat is provided through lessons learnt at the adjacent ABP Welwick managed realignment site, inundation frequency assessment from numerical modelling, position of the site in the tidal frame and assessment of intertidal habitats at similar elevations within the Humber estuary. The compensation site will lie within the shelter of the managed realignment, therefore providing intertidal habitat that will support aquatic flora and fauna at least equivalent to the relatively disturbed habitats on the Immingham frontage. As such the proposed compensation will result in no harm or risk of harm to the European sites.

4.10.4 Long term data collection (2006-2016) from the ABP Welwick managed realignment provides high confidence in the development of intertidal habitats suitable for compensation.

4.10.5 The Applicant is committed to the long term management and monitoring of the managed realignment site, and the requirements for evidencing the successfulness of the compensation area in East 2 will form part of those longer term commitments. If required, adaptive management will be undertaken to ensure the long term security of appropriate intertidal habitats as compensation for intertidal habitat loss associated with the Project.

4.10.6 A further 0.~~838ha~~868ha of intertidal habitat is being offered by the Project as enhancement, owing to the difficulty of monitoring and managing very small compensatory land parcels in the wider site context. The enhancement habitat may be a mix of intertidal mudflat and saltmarsh habitats.

4.10.7 The provision of compensatory habitats will ensure that the functioning and integrity of the adjacent European sites are maintained and that the overall coherence of the national site network is protected.

5 References

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Appendix A: Abbreviations

AA	Appropriate Assessment
ABB	ABB Power Generation Ltd
ABP	Associated British Ports
AEOI	Adverse Effect On Integrity
AMEP	Able Marine Energy Park
APIS	Air Pollution Information System
BTO	British Trust for Ornithology
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CEMP	Construction Environmental Management Plan
CoCP	Code of Construction Practice
COVID	Coronavirus
cSAC	Candidate Special Areas of Conservation
CSIP	Cetacean Strandings Investigation Programme
dB	Decibel
dBA	A-weighted decibel
DCO	Development Consent Order
Defra	Department for Environment, Food and Rural Affairs
DNA	Deoxyribonucleic Acid
EC	European Commission
EEA	European Economic Area
EEC	European Economic Community
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMS	European Marine Site
ERM	ERM Group

ES	Environmental Statement
EU	European Union
FID	Flight Initiation Distance
GPS	Global Positioning System
HDD	Horizontal Directional Drilling
HEEs	High Energy Events
HGVs	Heavy Goods Vehicle
HIT	Humber International Terminal
HM	Her Majesty's (His Majesty's)
HRA	Habitats Regulations Assessment
IAQM	Institute of Air Quality Management
ID	Identity
IECS	Institute of Estuarine & Coastal Studies
IGET	Immingham Eastern Roll-on Roll-off Terminal
IMO	International Maritime Organisation
IOH	Immingham Outer Harbour
IOT	Immingham Oil Terminal
IROPI	Imperative Reasons of Overriding Public Interest
IUCN	International Union for Conservation of Nature
JNCC	In-combination Climate Change Impacts
LAeq	Equivalent Continuous Sound Pressure Level,
LAmax F	Maximum 'A'-weighted Sound Pressure Level (Fast Time Weighed)
Lmax.	Maximum 'A'-weighted Sound Pressure Level
LSE	Likely Significant Effect
MAGIC	Multi-Agency Geographic Information for the Countryside
MarESA	Marine Evidence based Sensitivity Assessment

MarLIN	Marine Life Information Network
MCAA	Marine and Coastal Access Act
MHWS	Mean High Water Springs
MLWN	Mean Low Water Neaps
MLWS	Mean Low Water Springs
MMO	Marine Management Organisation
MP	Mean Peak
MPA	Marine Protected Area
MPS	Marine Policy Statement
MS	Marine Straggler species
MW	Megawatt
NBN	National Biodiversity Network
NE	Natural England
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPFF	National Planning Policy Framework
NSIP	Nationally Significant Infrastructure Projects
O&M	Operation and Maintenance
OCGT	Open Cycle Gas Turbine
OtSMRS	Outstrays to Skeffling Managed Realignment Scheme
PAH	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyl
PEIR	Preliminary Environmental Information Report
PIANC	The World Association for Waterborne Transport Infrastructure
PINS	Planning Inspectorate
pSAC	Possible Special Area of Conservation

pSPA	Potential Special Protection Areas
PTS	Permanent Threshold Shifts
PW	Phocid Pinniped
Ramsar	Wetlands of international importance, designated under The Convention on Wetlands (Ramsar, Iran, 1971)
REC	Regional Environmental Characterisation
Ro-Ro	Roll On-Roll Off
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SEL	Sound Exposure Levels
SL	Source Level
SPA	Special Protection Area
SPL	Sound Pressure Levels
SSC	Suspended Sediment Concentrations
SSSI	Site of Special Scientific Interest
TBT	Tributyltin
TSHD	Trailer Suction Hopper Dredger
TTS	Temporary Threshold Shift
UK	United Kingdom
WCA	Wildlife and Countryside Act
WeBS	Wetland Bird Survey
WODA	World Organization of Dredging Associations
ZoI	Zone of Influence

Cardinal points/directions are used unless otherwise stated.

SI units are used unless otherwise stated.