Immingham Green Energy Terminal

TR030008

Volume 6

6.2 Environmental Statement

Chapter 2: The Project (Clean)

Planning Act 2008

Regulation 5(2)(a)

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

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Immingham Green Energy Terminal

Development Consent Order 2023

6.2 Environmental Statement

Chapter 2: The Project

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2 The Project

2.1 Overview of the Project

2.1.1 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.

2.1.2 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 and export of liquefied carbon dioxide to connect to adjacent carbon transport and storage networks for sequestration in the North Sea.

2.2 Purpose and Objectives

2.2.1 The objectives of the Project are:

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.

b. To provide capacity to support the 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.

b. 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.

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

d. 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.

2.2.2 An overview of the green hydrogen production process is provided in **Appendix 2.C [APP-174]**.

2.3 Project Site Description

2.3.1 The following sections describe the location, nearest sensitive receptors, features and elements associated with the Project Site (the 'Site') and the surrounding environment as illustrated on **Figure 2.1 [TR030008/APP/6.3 (3)]**.

Project Location

2.3.2 The Site is located in North East Lincolnshire on the south bank of the Humber Estuary to the east of the Port. **Figure 1.1 [TR030008/APP/6.3 (3)]** illustrates the Project's location, which is approximately centred on National Grid Reference ("NGR") E520783 N415271. The Site includes a marine area within the Humber which would support the multi-user green energy Terminal and adjacent terrestrial areas which would support the landside infrastructure forming part of the Terminal and related associated development, including the hydrogen production facility, which would be developed across two main sites (the 'East Site', and the 'West Site'), which are first referenced in **Chapter 1: Introduction [APP-043]**.

2.3.3 The land-side works fall within the administrative boundary of North East Lincolnshire Council ("NELC"), as illustrated on **Figure 2.2 [TR030008/APP/6.3 (3)]**. The marine-side works, that extend seaward and fall beyond the local authority's boundary, would take place in the bed of the Humber Estuary, which is owned by the Crown Estate and over which the Applicant has the benefit of a long lease. The Project in its entirety covers an area of approximately 121ha.

2.3.4 The Order Limits, as represented in **Figure 1.1 [TR030008/APP/6.3 (3)]** by the Site Boundary, have been refined through ongoing studies and taking into account the responses to the Applicant's consultation.

2.3.5 The Site is situated to the east of the Port and largely outside of the operational area of the Port. The area surrounding the Port is industrial in nature, being dominated by chemical manufacturing, oil processing and power generation facilities. Residential and commercial properties are present to the south of the Port on Queens Road and lie within, and adjacent to, the Site Boundary. Beyond the industrial facilities, the wider area is largely agricultural. The nearest residential area is on the eastern edge of the town of Immingham approximately 460m from the western edge of the Site.

2.3.6 The Port lies immediately adjacent to the main deep-water shipping channel which serves the Humber Estuary, thereby enabling access to the Port by some of the largest vessels afloat. The Port has good access for road haulage to the M180 Motorway and from there to the M1 Motorway or the A1, via the M18 Motorway. In addition, the Port has its own rail terminal, with some 25% of all rail freight in the UK originating from the Port. This primarily connects to local power stations and steel works moving circa 10 million tonnes of cargo per annum by rail.

History of Site and Surroundings

2.3.7 Available historical maps from the Groundsure Report (0) for the Site have been studied to determine the previous land uses within the area of the Site and immediately surrounding the Site Boundary. The mapping shows no notable development on the Site until 1930–31 when residential housing is shown on Queens Road adjacent to the Site boundary. In addition, the L.N.E.R Grimsby District Electric Light Railway is shown through the centre of the Site. A sewage works was established by 1922 adjacent to south of the Site boundary and is still present.

2.3.8 No notable land use changes occurred at the Site until the period 1951–56. At this time a Gypsum Disposal Bed is shown as being present adjacent to the Site Boundary at the south-western extent. Buildings and railway lines associated with a Chemical Factory were shown as being established approximately 350m south-east of the Site Boundary.

2.3.9 By 1964, the Port had developed more extensively, including the establishment of jetties within the Humber, to the west of the area proposed for the Immingham Green Energy Terminal ("IGET"). By this time a number of small buildings are mapped as present on the western part of the Site, whilst electricity lines run through the East Site. No notable changes have occurred within the Site since this period other than further electricity pylons which were erected across the western part of the Site and also pipelines on the northern boundary of the Site which were established during the period 1969–72.

2.3.10 Multiple changes have occurred between 1964 and the present day in areas within 500m of the Site Boundary. The industrial landscape has continued to develop, including but not limited to the establishment of an Oil Storage Depot and associated infrastructure, further structures associated with the sewage works (now an Anglian Water operational facility), pipelines, and most recently, by 2010 the establishment of a Recycling Centre.

2.3.11 Some of the mapped infrastructure including the mapped Chemical Works and associated railway lines have become disused between 1969 and the present day.

Existing Environment and Land Use

2.3.12 The proposed Terminal would extend seawards into the Humber Estuary and the jetty would be located to the east of the existing Immingham Oil Terminal jetty. This area falls within the boundaries of the Humber Estuary Special Area of Conservation ("SAC"), Special Protection Area ("SPA") and Ramsar Site, which collectively form the Humber European Marine Site ("EMS").

2.3.13 The corridor which links the proposed Terminal to the East Site includes a section of woodland known as 'Long Strip' between Laporte Road and the Humber Estuary that is subject to a Tree Preservation Order ("TPO"). A bridleway, Bridleway 36, runs through the eastern edge of the Long Strip, connecting users from Laporte Road to the coastal path that follows the Humber Estuary east to Grimsby as shown in **Figure 2.1 [TR030008/APP/6.3 (3)]**.

2.3.14 The East Site itself comprises two parcels of land, which are bisected by Laporte Road. The first parcel of land consists of an area of hardstanding to the north of Laporte Road which is currently in use by the Applicant as a storage area. The second parcel of land is a triangular shaped area of brownfield land that is currently covered by gravel and various stockpiles, which is accessed via Queens Road (A1173) and lies to the south of Laporte Road. The Associated Petroleum Terminal works complex is situated to the north/north-east of the East Site, whilst to the south are various industrial facilities. To the west and north-west is the Port and associated industrial facilities and the 'Immingham Dock East Gate' Port entry point from Queens Road. To the south-east of the East Site is the Long Strip woodland described above and the Anglian Water Sewage Treatment Works (accessed via a private road off Queens Road) noted in **Paragraph 2.3.7**.

2.3.15 The West Site currently comprises three agricultural fields, which are bounded by linear hedgerows and drainage ditches. An electrical sub-station and a gas-fired power generator installation are situated to the north-west. The north-west and western boundaries of the West Site are defined by Kings Road and the A1173, including the Grimsby to Immingham 'Cycle Superhighway' which runs along the A1173 between the Kings Road and Kiln Lane roundabouts. A landfill is located to the south separated by a landscape buffer strip. Queens Road forms the north-eastern boundary of the West Site with a number of residential and mixed residential / commercial properties located within the Site Boundary. The east and south-eastern boundary is adjacent to another gas fired power generator installation, a community recycling centre and a large waste gypsum landfill. A short tarmac access road has been constructed from Kings Road into the West Site, associated with an extant planning consent. A series of overhead power cables run across the middle and southern boundaries of the West Site, with a buried mains water and a buried high-pressure gas pipeline present along the southern boundary. The existing utilities, as currently known, are detailed within the **Utilities Statement [APP-239]**.

2.3.16 A proposed Pipeline Corridor would connect the West Site to the East Site. It would run through an area that has been impacted by industrial development alongside Queens Road and Laporte Road, and would also run underneath the Grimsby Docks Branch Line.

Potential Sensitivities/Receptors in the vicinity of the Site

Properties

Residential Receptors

2.3.17 The closest residential receptors to the Site include:

a. A total of ten residential properties located on the west side of Queens Road as follows:

   i. Houses at Numbers 1-5 and 31 Queens Road (six houses in total).

   ii. Number 6 Queens Road (two flats in total).

iii. Numbers 7-8 (one flat) and 18 Queens Road (one flat), with these flats on the upper floors above commercial interests on the ground floors (two flats in total).

b. These properties have been included within the Site Boundary as their continued residential use presents an impediment to the obtaining of hazardous substances consent in connection with the operation of the proposed hydrogen production facility and hydrogen storage on the West Site (see **Section 2.4.7** of this chapter and **Chapter 22: Major Accidents and Disasters [APP-064]** for further information).

c. Residential properties on the eastern edge of Immingham, including Somerton Road, Worsley Road, Dunster Walk, Ings Lane, Oakham Walk, Kendal Road, Chestnut Avenue, Waterworks Street and Spring Street, which at the closest point are located between approximately 460m and 480m west of the West Site.

d. Mauxhall Farm off Stallingborough Road, located approximately 1km south-west of the West Site.

2.3.18 Other settlements nearby include: Grimsby (approximately 5km) to the south-east; Healing (approximately 3.5km) and Great Coates (approximately 5.5km) to the south-east; Stallingborough (approximately 2.5km) to the south; Keelby (approximately 5km) to the south-west; and Habrough (approximately 4.5km) to the west.

Business/Commercial Receptors

2.3.19 As noted in **Paragraph 2.3.17**, Numbers 7-8 and 18 Queens Road are located within the Site Boundary as they contain residential uses at first floor level. Numbers 7-8 Queens Road contains vacant commercial premises at ground floor level. The ground floor at 18 Queens Road is understood to be used by the owner for storage. Acquisition of these properties is being sought, given that their use is, in part, residential as described in **Paragraph 2.3.17**. There are a number of other business/commercial receptors adjacent to the Site Boundary in the vicinity of Queens Road. It is considered that the continued use of these business / commercial properties would be compatible with the operation of the hydrogen production facility following assessments undertaken on behalf of Air Products. The relationship between land uses will also be considered by the Health and Safety Executive ("HSE") in connection with the application for Hazardous Substances Consent.

Consultation with Owners and Occupiers

2.3.20 Discussions with the owners and occupiers of the residential and commercial properties directly impacted by the Project are ongoing.

2.3.21 Discussions with the landowners/occupiers of the residential and part residential properties on Queens Road referred to above are ongoing with a view to negotiating their acquisition. At present one residential property has been acquired. Where it is not possible to acquire those properties through negotiation, acquisition powers for these properties will be sought through the Development Consent Order ("DCO").

2.3.22 In addition to requiring Hazardous Substances Consent, the hydrogen production facility will be regulated by the Control of Major Accident Hazards ("COMAH") Regulations 2015 (as are certain existing premises in the Port). Discussions with any likely affected landowners and occupiers in terms of any implications for the safety planning of their operations in connection with COMAH requirements have taken place and will be ongoing.

Air Quality Receptors

2.3.23 There are no Air Quality Management Areas ("AQMA") within the Site or surrounding area. Immingham itself has historically had an AQMA, close to the Port on Kings Road, due to elevated concentrations of PM_{10} concentrations that are now well below the relevant air quality objectives.

Ecological Receptors

2.3.24 That part of the Site boundary within the Humber is within the boundary of the Humber Estuary EMS, which is a statutory designated site that encompasses the Humber Estuary SPA, SAC, RAMSAR and Site of Special Scientific Interest ("SSSI") designations.

2.3.25 Laporte Road Brownfield Site Local Wildlife Site ("LWS") is located approximately 150m south-east of the Site.

2.3.26 The mature broad-leaved deciduous woodland of Long Strip is described in **Paragraph 2.3.13** above. This area is subject to a TPO which applies to the whole woodland belt, including the area on the south side of Laporte Road. A veteran ash tree is present in the north-east corner of the woodland as shown on **Figure 2.1 [TR030008/APP/6.3 (3)]**.

Traffic and Transport Receptors

2.3.27 Access to the West Site would use new accesses off Kings Road and a new access onto the A1173. Access to the East Site would be off a private road off Queens Road and Laporte Road. Queens Road is a single carriageway road providing a link from the Port, crossing the Grimsby Docks Branch Line on a bridge and runs towards the A1173, where it becomes Kings Road. Kings Road is also a single carriageway, which forms a three-arm roundabout junction with the A1173, where Kings Road then continues to the north to form a link into Immingham and then to the A160 to the north. The A160 heads west and connects with the A180. Temporary access points would be required during Project construction, including access for the Temporary Construction Areas, from Queens Road and Laporte Road. A new permanent access point would also be provided off Laporte Road for the jetty access road. The speed limit on Laporte Road varies at present between national speed limit and 40mph. A

permanent reduction to the speed limit on Laporte Road has been determined to be necessary to ensure the safety of road users. The proposed permanent speed limit reductions would introduce a new section with a speed limit of 30mph from the junction with Queens Road and an additional section with a 40mph speed limit along Laporte Road to the existing limit on Laporte Road which changes from 60mph. This change is supported, in principle, by NELC. Further details on Site access and traffic management proposals are set out in **Sections 2.5** and **2.6**.

2.3.28 From the three-arm roundabout junction with Kings Road, the A1173 continues south as a single carriageway to form a three-arm roundabout with Kiln Lane before continuing south to form a grade separated junction with the A180. The A180 is part of the strategic road network ("SRN") and is maintained by National Highways. The A180 heads east to Grimsby and west towards the closest motorway (M180) and provides the link from the local area to the wider highway network within the region.

2.3.29 Public Right of Way Bridleway 36, described above, runs through the eastern edge of the strip of woodland known as 'Long Strip', and connects to the coastal path along the Humber. The coastal path forms part of the proposed route for the improvements proposed by Natural England to the England Coast Path between the Humber Bridge and Easington (to the north of the Humber) and Mablethorpe to Humber Bridge (to the south of the Humber). Part of the proposed upgraded route is located within the Site. The bridleway would be temporarily diverted during the first phase of construction of the Project, but it would be re-opened during the Project's operational phase.

2.3.30 Pedestrian facilities are limited on the local road network in the vicinity of the Site, with a footway along one side of Queens Road and along the north side of the A1173 King Road providing a link into Immingham.

2.3.31 Some parts of the Site, which are currently unfenced but are not Public Rights of Way, are currently accessed informally by a small number of local walkers and recreational sea anglers (on the sea wall). The informal access along the existing sea wall between the Associated Petroleum Terminal ("APT") Jetty to the north-west of the Site and at the point at which the Bridleway 36 meets the sea wall would need to be stopped up and removed permanently to enable construction and operation of the new Terminal. Informal access through the southern part of Long Strip woodland, south of Laporte Road, would also be stopped up temporarily during construction. This is considered in detail in **Chapter 23: Socio-economics [APP-065]**.

Cultural Heritage Receptors

2.3.32 There are no World Heritage Sites, Scheduled Monuments, Grade I and II* listed buildings, conservation areas, registered parks and gardens, registered battlefields, or protected wreck sites within 2km of the Site. There is one Grade II listed building located within 2km of the Site, this being the Immingham War Memorial (NHLE 1455139). A further two Grade II listed buildings, Churchfield Manor (NHLE 1161630) and the Iron Bungalow (NHLE 1391349), are located slightly further away than 2km from the Site.

Landscape and Visual Receptors

2.3.33 The existing landscape/seascape and visual baseline is heavily influenced by the existing industrial presence located around the Port. This includes several deep-water jetties for bulk cargo and terminals for oil and gas. The seascape of the Humber varies in quality and character along its length, with expansive areas of tidal mudflats and saltmarsh contrasting with more developed industrial areas. Sensitive visual receptors are relatively limited, with the main concentration being residents in the nearby settlement of Immingham to the west. However, there are several residential receptors located on Queens Road as described above and recreational receptors use Bridleway 36. Existing views from most locations include the structures and infrastructure associated with the working port and other adjacent industrial development.

2.3.34 Part of the Site and landscape and visual study area fall within The Humber Estuary National Character Area ("NCA"). The character area is broadly split into two components, the largest being the expanse of water associated with the Humber Estuary. The character area provides a varied landscape, with open and extensive views across remote and rural areas, contrasting with heavy industry associated with towns and ports.

2.3.35 The Site lies within Marine Character Area ("MCA") 6: Humber Water, which is the second largest coastal plain estuary in the UK and is bound by intertidal mud and sand flats and saltmarsh. These habitats provide internationally important wildlife corridors (described under Ecological Receptors above). The character area contains the UK's largest port complex and views are dominated with an extensive and complex mix of industrial, commercial, agricultural, residential and tourism land uses. Shipping traffic using the local ports provide a dominant animated feature.

2.3.36 The Site is also located within Regional Character Area ("RCA") 3: The Northern Marshes, which is defined by the industrial features along the coast clustered around the deep-water Port of Immingham. The RCA is visually dominated by large and tall structures, such as Lindsay Oil Refinery, which are linked with the Port and heavy industry.

2.3.37 The Site is also within Local Landscape Character Area ("LCA") A – Humber Estuary, as defined by the NELC Landscape Character Assessment (0). Area A – Humber Estuary is then subdivided into three Local Landscape Types ("LLTs"), which the Site and study area lie within:

a. LLT 1 Industrial Landscape

a. LLT 2 Open Farmland

b. LLT3 Wooded Open Farmland

Topography, Land Quality and Geological Receptors

2.3.38 The topography of the Site is low-lying and flat with many areas being as historically reclaimed land. An extensive network of man-made ditches provides Site drainage which flows to larger drains which are pumped to the Humber.

2.3.39 The Provisional Agricultural Land Classification ("ALC") Grade Map on MAGIC Map Application (0) indicates that the East Site and Pipeline Corridor are designated as Grade Urban, whilst most of the West Site and the eastern half of the Laporte Road Temporary Construction Area adjacent to the Humber Estuary have been designated as ALC Grade 3.The western half of the Temporary Construction Area is designated as ALC Grade Urban. An ALC survey has been undertaken within the West Site and Laporte Road Temporary Construction Area adjacent to the Humber Estuary. The results indicate the soils in the surveyed locations are ALC Grade 3b, and therefore are not considered best and most versatile ("BMV").

2.3.40 The solid geology across the entire Site is characterised by the Flamborough Chalk Formation. There are superficial deposits comprising Beach and Tidal Flat Deposits and Tidal Flat Deposits associated with the Humber Estuary. Made Ground is anticipated to be presented across the majority of the Site.

Hydrological and Flood Risk Receptors

2.3.41 The Humber Estuary includes the marine areas required for the proposed Terminal and also forms the north-eastern boundary of the Site. North Beck Drain, Middle Drain and Habrough Marsh Drain are all located in the vicinity of the Site as shown in **Figure 18.2 [TR030008/APP/6.3 (2)]**.

2.3.42 The Environment Agency Flood Map for Planning (0) identifies that the landside part of the Site is located entirely within Flood Zone 3a. However, the Site is afforded protection from tidal flood defences that are in place along the entire south bank of the Humber Estuary. These tidal flood defences provide protection against a flood event with a 0.5% chance of occurring in any year, therefore the likelihood of a flood event occurring from overtopping or failure of the defences is considered to be low due to the presence of flood defences.

2.3.43 There are no historical flood records from groundwater flooding within the Site or the wider Port of Immingham area, whilst the Site is also at very low to low risk of flooding from surface water sources.

2.3.44 Anglian Water asset mapping shows that there is no surface water drainage infrastructure operated by them within the Site. An Anglian Water foul sewer main and the Immingham Sea Outfall are located in proximity to the Site. Surface water from hard standing areas is generally discharged directly to the adjacent watercourses and ultimately to the Humber Estuary, or directly to the Humber Estuary.

2.4 Project Description

Overview

2.4.1 The project for which development consent is sought is defined by **Schedule 1: Authorised Project** of the **draft DCO [TR030008/APP/2.1 (6)]** and the location of each Work No. within the Site is shown on **Figure 2.3 [TR030008/APP/6.3 (3)]** and on the **Works Plans [TR030008/APP/4.2 (4)]**). The design of the Project incorporates flexibility in the final dimensions and configurations of buildings and structures, notably in relation to the hydrogen production facility, to allow for future detailed design development. In contrast, less flexibility will be possible for the marine elements of the Project, as the proposed alignment, length and pile density of the jetty has been subject to extensive physical processes modelling to define a preliminary design which minimises the impacts on the habitats of the Humber Estuary. However, the design of the marine infrastructure will continue to be refined as the detailed engineering design is developed and that the final design will be approved further to the terms of the **Deemed Marine Licence** which forms Schedule 3 of the **draft DCO [TR030008/APP/2.1 (6)]**. The relevant parameters (lateral and vertical) for each part of the works and the extent to which designs have a greater degree of certainty (primarily the jetty) are covered in greater detail as relevant in subsequent paragraphs.

2.4.2 In order to ensure a robust assessment of the likely significant environmental effects of the Project, the Environmental Impact Assessment ("EIA") was undertaken adopting the principles of the 'Rochdale Envelope' approach where appropriate. This involves assessing the maximum (or where relevant, minimum) spatial and vertical parameters for each Work No.. Where this approach is being applied to the specific aspects of the EIA, this is confirmed within the relevant chapters of this Environmental Statement ("ES"). As such, the ES presents a reasonable worst-case assessment of the potential impacts of the Project. **Chapter 5: EIA Approach [APP-047]** explains further the concept of the 'Rochdale Envelope', the use of parameters and the meaning of a 'reasonable worst case' to undertake EIA.

2.4.3 The works which comprise the Project are defined in **Schedule 1: Authorised Project** of the **draft DCO [TR030008/APP/2.1 (6)]** 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 (4)]**). 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. 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.

B. 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.

2.4.4 In addition to Work No. 1 to 10 which are each spatially defined within the **Works Plans [TR030008/APP/4.2 (4)], Schedule 1: Authorised Project** of the **draft DCO [TR030008/APP/2.1 (6)]** includes 'Further associated development' and 'Ancillary Works' which both extend across the full extent of the Site.

2.4.5 In broad terms, 'Further associated development' would be the undertaking, as required, of works such as site clearance, creation of additional construction compounds, utility works, landscaping works and street works on a site wide basis.

2.4.6 'Ancillary works' constitute works that would not necessarily constitute development, such as vegetation removal, the installation of fencing and the demobilisation of construction works.

Site Boundary and Design Evolution

2.4.7 The extent of land potentially required to implement the Project, referred to as the Site Boundary, are illustrated on **Figure 1.1 [TR030008/APP/6.3 (3)]**. The Site Boundary represents the proposed Order Limits for the purposes of development consent.

2.4.8 Through consideration of the responses to two Statutory Consultations, the developing environmental assessments and through ongoing design-development and assessment, the design of the Project has evolved and a number of refinements and modifications have been made.

2.4.9 After submission of the Scoping Report, the design of the Project was developed to include up to two berths on the jetty, instead of a single berth, in order to enable a variety of vessels sizes. It has since been determined that the vessels can be accommodated on a single berth and the design has reverted to the single berth described under the description of works provided above.

2.4.10 Further consideration of the alternatives considered are provided in **Chapter 3: Need and Alternatives** of the ES **[APP-045]**.

2.4.11 Limited changes have also been made to the proposed Site Boundary since the Scoping Report and since submission of the first Statutory Consultation. The changes made to the Site Boundary since the first Statutory Consultation were consulted on during the second Statutory Consultation. Further limited changes that have been made to the Site Boundary since the second Statutory Consultation have been to reduce the extent of the area required. The main reductions were reducing the areas required for temporary works, as well as removing the solely commercial properties on Queens Road from the Site Boundary. The changes to the Site Boundary are illustrated in **Figure 2.4 [TR030008/APP/6.3 (3)]**.

Parameters

Introduction

2.4.12 The parameters detailed here, alongside Schedule 1 of the **draft DCO [TR030008/APP/2.1 (6)]** and the **Works Plans [TR030008/APP/4.2 (4)]** form the basis of the technical assessments undertaken in the EIA. The parameters are of three broad types, as follows:

a. **Lateral parameters:** The lateral parameters for each element of the development comprise the boundary for each of the defined work areas as set out in the **Works Plans [TR030008/APP/4.2 (4)]**. This approach enables the detailed design to be developed within the authorised work areas, whilst also providing spatial definition to the largest components (for example, the location of the ammonia storage tank can only take place within the area defined as Work No. 3a, rather than anywhere within Work No. 3 as a whole). The alignment of the jetty, which forms the main component of the Terminal (Work No. 1), 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. Work No. 1a is defined further by additional parameters (see below) given in **Table 2-1** and which are secured by the **Deemed Marine Licence** which forms Schedule 3 of the **draft DCO [TR030008/APP/2.1 (6)]**.

b. **Vertical parameters:** The vertical parameters for each work number are defined in **Table 2-1** (for Work No. 1a) and **Table 2-2** (for all other Work numbers). The vertical parameters define a ‘ceiling’, or upper limit, for any permanent building or structure (such as stacks) within each of the works areas. In the case of flue and flare stacks, minimum heights are also defined to ensure adequate dispersion of emissions. These vertical limits are defined for Work No. 1 alongside the other parameters which are secured by the Deemed Marine Licence which forms Schedule 3 of the **draft DCO [TR030008/APP/2.1 (6)]** and for all other work numbers, the vertical parameters are set out in the Requirements which form Schedule 2 of the **draft DCO [TR030008/APP/2.1 (6)]**. The vertical parameters are set out in **Table 2-1** below (for Work No. 1, with reference to Chart Datum) and **Table 2-2** below (for all other Works, by refence to finished ground levels (“FGL”) and Ordnance Datum).

c. **Additional parameters:** Work No. 1a is defined further by additional parameters, such as maximum pile number and maximum pile size, which underpin the modelling of the proposed layout and so are also defined in **Table 2-1.** For example, final pile numbers may vary as the design of the Project is refined but only to the extent that pile number may be less than stated, not more, and therefore the ongoing development of the jetty design does not lead to a worse adverse effect on the intertidal habitats of the Humber than that assessed in the EIA.

Marine parameters

2.4.13 The parts of Work No.1 comprising the approach jetty, the jetty head and loading platform including breasting dolphins and mooring dolphins that lie to the seaward side of the mean high water springs mark will be constructed within the parameters for Work No.1a shown on Sheets 1 to 4 of the **Works Plans [TR030008/APP/4.2 (4)]**. The dredge pocket will be located in accordance with the co-ordinates for it provided in a Condition of the Deemed Marine Licence which forms Schedule 3 of the **draft DCO [TR030008/APP/2.1 (6)]**. The details that have been used as the basis for the modelling reported in the marine chapters of this **ES [APP-051, APP-054, APP-057** and **APP-059]** and the **Shadow Habitats Regulation Assessment Report [REP4-014]** are primarily (i) the orientation of the jetty, defined by Work 1a, (ii) the number of piles and pile diameters (in the marine environment, see **Table 2-1** below) and (iii) the geometry of the dredge pocket.

2.4.14 **Table 2-1** below provides the parameters for the Terminal (Work No. 1a). These parameters are secured by their inclusion within the Outline **Construction Environmental Management Plan ("CEMP") [TR030008/APP/6.5 (5)],** which is itself secured by a Requirement in Schedule 2 of the **draft DCO [TR030008/APP/2.1 (6)]**:

Table 2-1: Parameters for Work No. 1a

Work element	Parameter
Jetty head and related topside infrastructure	Jetty head– up to +13.5m above chart datum Topside infrastructure – up to +35m above chart datum
Mooring dolphins	Up to eight mooring dolphins, to the east of the jetty head and four to the west of the jetty head. Each dolphin up to 13m long and up to 15m wide with a height of up to +[13.5]m above chart datum
Approach jetty length	Up to 1,200m
Approach jetty height	Up to +13.5m above chart datum
Approach jetty width	Up to 16m wide save for in the location of vehicle passing places where it will be up to 19m wide and in the vicinity of the jetty operations building where it will be up to 29m wide
Pile number and spacing	Approach jetty between point "A" in Sheets 3 & 4 of the **Works Plans [TR030008/APP/4.2 (4)]** and point "B" on Sheet 2 & 3 of the **Works Plans [TR030008/APP/4.2 (4)]** – up to 59 piles. Two piles in each row will have a maximum diameter of 1.575m; the remaining piles in the row will have a maximum diameter of 1.2m. The pile rows will be spaced at a minimum of 25m (save for the final row at point B as the jetty changes angle where the separation will be less than 25m) and no more than four

Work element	Parameter
	piles per row (save for the location of the jetty operations building where there will be no more than seven per row and vehicle passing places where there will be no more than five per row). Approach jetty between point "B" on Sheets 2 & 3 of the **Works Plans [TR030008/APP/4.2 (4)]** and point "C" on Sheets 1 & 2 of the **Works Plans [TR030008/APP/4.2 (4)]** – up to 156 piles. Two piles in each row will have a maximum diameter of 1.575m; the remaining piles in the row will have a maximum diameter of 1.2m. There will be no more than four piles per row (save for the location of vehicle passing places where there will be no more than five per row) Jetty head and breasting dolphins – up to 104 piles (each up to 1.5m diameter) Mooring dolphins – up to 72 piles (each up to 1.5m in diameter) across up to eight mooring dolphins Four monopile fenders each up to 2.3m in diameter

Terrestrial parameters

2.4.15 **Table 2-2** defines the vertical parameters for the above ground landside elements (Work No. 2, 3, 5 and 7):

Table 2-2: Vertical Parameters for landside elements

Work No.	(2) Maximum built element height	(3) Maximum finished ground level	(4) Built element	(5) Minimum built element height
Work No.2	15m above finished ground level	5.0m above ordinance datum		
Work No.3 (except Work No.3A)	20m above finished ground level	3.5m above ordinance datum		
Work No.3A	65m above finished ground level	3.5m above ordinance datum		
Work No.5 (except Work No.5A)	20m above finished ground level	3.8m above ordinance datum		

Work No.	(2) Maximum built element height	(3) Maximum finished ground level	(4) Built element	(5) Minimum built element height
Work No.5A	45m above finished ground level	3.8m above ordinance datum	Hydrogen production unit flare stack	37m above finished ground level
Work No.7 (except Work Nos. 7A, 7B, 7C and 7D)	20m above finished ground level	2.5m above ordinance datum		
Work No.7A, 7B and 7C	45m above finished ground level	2.5m above ordinance datum	Hydrogen production unit flare stack	37m above finished ground level
Work No. 7D	15m above finished ground level	2.5m above ordinance datum		

2.4.16 Where applicable, the technical assessment chapters of the **ES [APP-047 to APP-067** and TR030008/APP/6.2 (2)**]** detail how the parameters detailed above have been considered within the individual topic assessments undertaken.

Project Components

Introduction

2.4.17 This section provides further indicative details regarding the Project components which were introduced in **Paragraph 2.4.3** above and are presented sequentially from the NSIP (Work No.1) to Work No. 10. It is important to note that **approval is not sought for illustrative layouts or indicative details.** Any such information presented in tables, drawings and plates is clearly marked accordingly. **The illustrative layouts and indicative details are included here solely to assist in the understanding of the Project and how the Work Plans have been developed, but the EIA has not been undertaken by reference to them.**

2.4.18 The indicative details are presented in a number of forms. **Table 2-3** to **Table 2-9** which follow below provide indicative details of the main buildings listed in Schedule 1 for Work Nos. 1, 2, 3, 5 and 7 (Work Nos. 4 and 6 are for underground works only and have no buildings). As set out in Schedule 1, each of these works will also include a wide range of other structures and equipment and all of the buildings, structures and equipment will be constructed within the maximum height limits defined in **Table 2-1** and **Table 2-2** above. Illustrative layouts, sections and elevations are provided as **Illustrative Layouts [TR030008/APP/4.3 (3)]** and **Illustrative Sections and Elevations**

[TR030008/APP/4.4 (3)] and an illustrative Project layout is also presented in this chapter as **Figure 2.5 [TR030008/APP/6.3 (3)]**.

Marine Infrastructure (the NSIP or principal development)

Terminal (Work No. 1)

2.4.19 The Terminal would comprise the construction during Phase 1 of a new jetty located in the Humber to the east of the existing Immingham Oil Terminal jetty. A new in-river jetty with one berth, including topside infrastructure, is proposed that would have the capacity to facilitate the import and export of liquid bulk products. The berth would be capable of handling a variety of vessels, of between 100 - 250m in length over all ("LOA") with draughts of up to 12.8m. The associated hydrogen production facility, to be operated by Air Products and described below, would be the first user of the jetty facility for the import of green ammonia to be converted to green hydrogen. The other liquid bulk products are expected to include products such as liquefied CO_2 for the purpose of carbon capture and storage via connection to proposed CO_2 transport infrastructure being developed close to the Port.

2.4.20 The preliminary design of the jetty has been subject to extensive optioneering and modelling to develop a design which minimises, so far as is possible, habitat loss on the intertidal habitats of the Humber. The alternative designs and the reasons they were not taken forward are summarised in **Chapter 3: Need and Alternatives** of the **ES [APP-045]** and also, specifically in relation to Habitat Regulation Assessment, in the **Without Prejudice Shadow Habitats Regulations Assessment ("HRA") Derogation Report [REP3-030]**.

2.4.21 The preliminary design of the Terminal is shown in **Figure 2.5 [TR030008/APP/6.3 (3)]** and **Illustrative Layouts [TR030008/APP/4.3 (3)]** and **Illustrative Sections and Elevations [TR030008/APP/4.4 (3)]**. The location and orientation of the jetty in the marine environment is defined within Work No. 1a shown on the **Works Plans [TR030008/APP/4.2 (4)]** which reflects the extent to which the preliminary design has had to be developed to ensure adverse effects on the protected ecological sites on the Humber have been minimised. The much wider extent of Work No. 1 (i.e. beyond Work No. 1a) defined on the **Works Plans [TR030008/APP/4.2 (4)]** is primarily to provide for construction working width and near-shore construction vessel movements rather than to provide flexibility for the future jetty design.

2.4.22 The marine infrastructure for the Terminal which comprises Work No. 1 would consist of the following operational components:

a. An open piled jetty approach trestle, up to 1.2km in length, which would extend from the river frontage in a north-easterly direction leading to the jetty head structure and which would provide access for vehicles and pipework to and from the shore to the berth. The approach trestle would be 16m wide for the main length with increased widths of 19m and 29m for passing places and an operations building respectively. The jetty approach connects to a jetty head to provide the berth. The jetty approach would be supported by up

to 219 steel tubular piles (215 marine piles and four landside piles), with a diameter of up to 1.575m.

b. The jetty head would comprise (un)loading platforms and two breasting dolphins with fenders. The jetty head would be supported by up to 106 piles comprising up to 104 piles with a diameter of up to 1.5m and four monopiles (located in front of the jetty head/loading platform to provide fendering suitable for small vessels) with a diameter of up to 2.3m. The berth would support large (with a draught up to 12.8m) and small vessels.

c. Eight mooring dolphins linked to each other and to the jetty head by high level walkways to facilitate operational and maintenance access. The mooring dolphins would each be supported by 9 steel tubular piles with a diameter of up to 1.5m (72 piles in total).

d. A jetty head building and a separate refuge shelter with attached office, WC and external safety shower located on the jetty head, the latter to provide a safe and secure area for personnel in the event of an emergency.

e. A jetty operations building near the landside end of the jetty approach to house control/operations function and various electrical equipment (switch room, operations room and welfare facilities).

f. Appropriate topside infrastructure installed on the jetty head and approach jetty to load and unload vessels including marine loading arms, gangway towers, piping, maintenance access roadways and access ramps, wastewater collection and drainage and supporting utilities for handling liquid bulk shipments. The pipework would run along the jetty, over the existing seawall, to a connection point with the landside pipework.

g. The construction of lighting infrastructure, utilities (electrical systems, firewater systems including pumps and pipework, communications systems, security systems) and drainage.

h. A capital dredge of approximately 4,000m^3 (based on the latest available site-specific geotechnical and geophysical information) would be required to ensure accessibility and safe mooring for vessels on the berth at all states of the tide. The required dredge depth would be approximately 14.5m below Chart Datum. As noted at **Paragraph 2.4.3**, the dredge will be located in accordance with the co-ordinates for it provided in a Condition of the Deemed Marine Licence which forms Schedule 3 of the **draft DCO [TR030008/APP/2.1 (6)]**.

i. The dredged berth pocket would be optimised to include side slopes to ensure its stability, and the dredged arisings would be disposed of at licensed sites within the estuary.

j. Periodic maintenance dredging may be required and would be undertaken alongside existing maintenance dredge operations undertaken at the Port by the Applicant.

k. A landside jetty access ramp, up to 105m in length and 6.5 wide, would connect the jetty approach trestle to the jetty access road. The jetty access ramp would be supported by up to 14 piles with a maximum diameter of 1.2m. The jetty access ramp would include a turnout ramp which would provide vehicle access to the northern side of the jetty; this is required for maintenance and emergency works.

l. Replacement of up to 25m of the existing flood defence (sea wall) to facilitate the new jetty access ramp including raising the flood defence level directly under the jetty access ramp to +7m Ordnance Datum.

m. Infrastructure to enable the Environment Agency ongoing access to the sea wall for flood defence monitoring and maintenance activities. This will include a dedicated flood defence access ramp providing access onto the existing flood defence road. This ramp will connect to the jetty access road and will involve a bridge across the watercourse. The ramp will be a concrete slab supported by up to 10 piles with a maximum diameter of 1.2m.

2.4.23 **Table 2-3** below provides further details of the structures and buildings that would be constructed as part of Work No. 1, expanding where relevant on the bullet point list provided above. The details in **Table 2-3**, including dimensions, locations, construction type and colour shown in the table, are all indicative:

Table 2-3: Terminal – Proposed Structures and Buildings (Indicative details)

Structures/ Buildings	No. of Units	Indicative Dimensions			Indicative Location	Indicative Construction Type, Materials and Finishes
		Length (m)	Width (m)	Height (m)		
Jetty Head Loading Platform	1	40	31	From seabed level to between +11.5 and +13.5 Chart Datum	-	Exposed reinforced concrete jetty deck supported by piles, grey. Piles will be black painted or brown (natural rust coloured) steel piles.
Breasting Dolphin 1	1	31	16	From seabed level to +10.5 Chart Datum	-	Exposed reinforced concrete deck supported by piles, grey. Piles will be black painted or brown (natural rust coloured) steel piles.
Breasting Dolphin 2	1	21	31	From seabed level to between +11.5 and +13.5 Chart Datum	-	Exposed reinforced concrete deck supported by piles, grey. Piles will be black painted or brown (natural rust coloured) steel piles.

Structures/ Buildings	No. of Units	Indicative Dimensions			Indicative Location	Indicative Construction Type, Materials and Finishes
		Length (m)	Width (m)	Height (m)		
Mooring Dolphins	8	13	15	From seabed level to +10.5 Chart Datum	-	Exposed reinforced concrete deck supported by piles, grey. Unpainted aluminum or galvanized steel (grey) walkways. Piles will be black painted or brown (natural rust coloured) steel piles.
Approach Jetty	1	1200	16 typically (up to 19 at roadway passing places and 29 at Jetty Operations Building)	From seabed level to between +11.5 and +13.5 Chart Datum	-	Exposed reinforced concrete deck supported by piles, grey. Open galvanized steel or Glass-Reinforced-Plastic ("GRP") mesh flooring under pipe racks. Piles will be black painted or brown (natural rust coloured) steel piles.
Gangway Towers	2	-	-	14.5 above deck level	One on each of the Breasting Dolphins	Galvanised steel/ unpainted aluminium.
Marine Loading Arms	7	-	-	20 above deck level	Jetty head loading platform	Galvanised/painted steel, grey/silver.
Fire-fighting Towers	2	-	-	20 above deck level	One on each of the Breasting Dolphins	Galvanised/painted steel, red.
Jetty Head Building	1	16.5	4.5	4 above deck level	Breasting dolphin 2	Prefabricated fiberglass, pale grey.
Toxic Refuge Shelter with attached office, WC and external shower	1	2	8	4 above deck level	Jetty head loading platform	Prefabricated fiberglass, pale grey.

Structures/ Buildings	No. of Units	Indicative Dimensions			Indicative Location	Indicative Construction Type, Materials and Finishes
		Length (m)	Width (m)	Height (m)		
Jetty Operations Building	1	22	10	4 above deck level	Approach jetty	Prefabricated portacabin, pale grey.
Jetty Access Ramp	1	105	6.5	From seabed level to +13.5 Chart Datum	-	Concrete slabs supported by up to 14 piles (1.2m diameter). Piles will be black painted or brown (natural rust coloured) steel piles.
Flood Defence Access Ramp	1	52	6.5	Up to +8 Ordnance Datum	-	Concrete slabs supported by up to ten piles (1.2m diameter). Piles will be black painted or brown (natural rust coloured) steel piles. Ground bearing slab turning area with retaining wall.
Flood Defence Raising	1	25	4	Up to +7 Ordnance Datum	-	L-section reinforced concrete structure built on top of the existing embankment.

2.4.24 Utility/service connections for the Terminal are detailed in the **Utilities Statement [APP-239]** and summarised in **Table 2-4.**

Table 2-4: Terminal Utility/Service Connections

Utility/Service	Connection
Power	The Terminal will be supplied with electricity from a separate connection located in Laporte Road which will connect to an electrical substation on the East Site for onward transmission to the Terminal.
Potable water	A new potable water connection from Laporte Road to the Terminal serving the control buildings and welfare facilities at the jetty head.
Telecommunications	A data and telecommunications connection for the Terminal to be provided from the West Site via the Pipeline Corridor to the East Site and then onto the Terminal.

Landside Infrastructure (Associated Development – Permanent Works)

2.4.25 The main elements of landside infrastructure[1] associated with the Project for which consent is sought under this application for development consent would consist of a jetty access road and the infrastructure, including the buildings, plant and pipelines, necessary to import the ammonia from the jetty, to store the ammonia on the East Site and then to convert that ammonia into green hydrogen at the East and West Sites. The green hydrogen production facility would be the first user of the NSIP.

2.4.26 The permanent landside infrastructure would consist of a number of components, comprising **Work No. 2** to **Work No. 7**, as detailed below. Unlike **Work No. 1**, the landside infrastructure is expected to be subject to extensive further design development within the ambit of the spatial parameters described for these works at **Paragraphs 2.4.12** and **2.4.15**. The descriptions below also include brief descriptions of temporary uses of these work areas during the construction phase.

Pipe-Rack and Jetty Access Road (Work No. 2)

2.4.27 These works include the construction of a 'jetty access road', a pipe-rack and associated buildings and plant, including:

a. The construction of a private road (the 'jetty access road') for operational access to the Terminal (Work No. 1) and maintenance access to the pipelines, including the formation of a new access on Laporte Road.

b. The construction of above-ground pipe-racks supporting pipelines and utilities, linking pipelines and utilities which form part of the Terminal (Work No. 1) to pipelines and utilities in the East Site (Work No. 3).

c. The construction of a gated access control point with security access gates at the entrance to Laporte Road, a security building and parking provision.

d. The construction of a power distribution building to house high-voltage switchgear which would have a separate connection from Northern Powergrid network located in Laporte Road. The building will contain electrical equipment to supply power to facilities on the jetty and parking provision would be provided. This building is sized to enable a shore power equipment (frequency converter) to be added in the future.

e. The construction of lighting infrastructure, utilities (electrical systems, communications systems, security systems, potable water supply), drainage, culverts, traffic control systems, gates and fencing.

[1] Noting that Work No 1. (the NSIP) includes an element of landside works, primarily the ramps associated with the jetty

2.4.28 The pipe-rack would support the ammonia (NH_3) pipelines from the Terminal (Work No. 1) to the East Site – Ammonia Storage area (Work No. 3) to deliver refrigerated liquid ammonia to the ammonia storage tank (Work No. 3-A). The pipelines would be insulated and have emergency shutdown valves, thermal relief, expansion loops, and leak detection as required. The pipe-rack would also include power, communications and utilities. The pipe-rack structure would run along the western side of the jetty access road, which would allow maintenance access to the pipelines from the access road as required.

2.4.29 A corridor adjacent to the ammonia pipelines to the west has been reserved for future pipelines for transfer of other liquid bulk products from the Terminal to the public highway. Separate applications for these works would be submitted as required. The width of this corridor is also required to provide a working site for the construction of the jetty access road and to enable the perimeter fencing to the east of the jetty access road to be installed.

2.4.30 The construction of the jetty access road and pipe rack corridor would lead to tree loss from the Long Strip woodland TPO area - this is considered in **Chapter 8: Nature Conservation (Terrestrial Ecology) [APP-050]** and **Chapter 13: Landscape and Visual [APP-055]**. The tree loss has been minimised by routing the jetty access road and the pipe rack corridor through the western side of the Long Strip and by routing the southern end of the jetty access road through the East Site.

2.4.31 The routing of the jetty access road is considered further in **Chapter 3: Need and Alternatives [APP-045]**. For these works and the approach ramp to the jetty (included as part of Work No. 1), it is predicted that approximately 0.64ha of the heavily wooded area would need to be cleared. The removal of trees from the Long Strip TPO woodland (and the removal of hedgerows across the site as a whole) is controlled by an Article of the **draft DCO [TR030008/APP/2.1 (6)]** and the **Plan of Potentially Affected Hedgerows and Trees Subject to Preservation Orders [TR030008/APP/4.9 (4)]**. An **Arboricultural Impact Assessment** and **Tree Constraints Plan** are provided in **Appendix 8.F [APP-185]**.

2.4.32 The drainage of the jetty access road would be developed through detailed design; however, it is likely that three new culverts would be constructed as part of Work No. 2. These three culverts would likely be required as follows:

a. Where the new jetty access road crosses an existing road side ditch near the landside access road junction with Laporte Road; in this location the conveyance within the ditch would be maintained through the provision of a precast concrete piped culvert.

b. Where the new jetty access road crosses an existing field ditch mid-way along its length; in this location the conveyance within the ditch would be maintained through the provision of a precast concrete piped culvert.

c. Where the new jetty access road runs parallel with the existing field ditch; it is expected that the section of ditch to the south of the access road crossing would be retained as a natural channel although its profile would be modified to improve its hydraulic characteristics. The section of ditch to the north of the access road crossing would be hydraulically enhanced through the provision of a concrete lined channel given its close proximity to the proposed infrastructure.

2.4.33 The approach to drainage across the proposed operational works on the Site is provided in the **Drainage Strategy Appendix 18.B [APP-210]** of this ES.

2.4.34 The preliminary design of the pipe-rack and jetty access road is shown on **Figure 2.5 [TR030008/APP/6.3 (3)],** in **Illustrative Layouts [TR030008/APP/4.3 (3)]** and **Illustrative Sections and Elevations [TR030008/APP/4.4 (3)]**.

2.4.35 **Table 2-5** provides indicative details of the main buildings and structures that would be constructed during Work No. 2, such as approximate dimensions and likely construction type and colour. No indicative details are provided for smaller elements of infrastructure such as gates, fences or lighting columns.

Table 2-5: Jetty Access Road – Proposed Buildings and Structures (Indicative details)

Building/ Structure	No. of Units	Indicative Dimensions			Indicative Construction Type, Materials and Finishes
		Length (m)	Width (m)	Height (m)	
Jetty access road	1	375	5-7 (excluding passing bays)	Up to +5 Ordnance Datum	Suitable fill and likely asphalt surface or concrete pavement
Security building	1	5	2	3 above Finished Ground Level	Prefabricated portacabin building, pale grey
Power distribution building	1	20	11	4.5 above Finished Ground Level	Prefabricated portacabin building, pale grey/ dark green

East Site (Work Nos. 3 and 5)

2.4.36 The East Site would comprise an ammonia storage facility (Work No. 3, including Work No. 3a) and a hydrogen production facility supporting up to three hydrogen production units for the production of hydrogen from ammonia (Work No. 5 including 5a). The two parts of the East Site would be linked by pipelines through a culvert under Laporte Road (Work No. 4, described below).

2.4.37 The East Site would be linked to the Terminal (Work No. 1) through the jetty access road and ammonia pipelines (which form part of Work No. 2) as well as communications and utilities links as described above.

2.4.38 Offloaded refrigerated liquid ammonia from the Terminal would be transferred via the pipelines to the ammonia storage tank on the East Site (Work No. 3-A). The storage facility would include a refrigeration (boil-off gas) system, storage flare for emergency or infrequent operational use and supply pumps for the hydrogen production units.

2.4.39 In the hydrogen production units, the liquid ammonia would be split into hydrogen and nitrogen (N) (nitrogen makes up 78% of the composition of ambient air). The core of the process is a catalytic bed. This reaction is endothermic i.e. it requires heat to take place, so the catalytic bed sits within a furnace, which would be fired using natural gas. The furnace output capacity would be approximately 30MW during the initial phases of development (operation of the first three hydrogen production units) plus a similar output for the future phases (full operation of six hydrogen production units in total). It is anticipated that this process could be further decarbonised in future by switching to low carbon fuels, potentially including green or low carbon hydrogen or biomethane.

2.4.40 The East Site – Ammonia Storage area (Work No. 3) would include the construction of the following components:

a. An ammonia storage tank in which refrigerated liquid ammonia would be stored at nearly atmospheric pressure and minus 33°C and which would include a boil-off gas processing unit, ammonia tank flare stack, pumps and associated plant and infrastructure (Work No. 3a).

b. Piling and foundations to support the construction of the ammonia storage tank, pipe-racks and other equipment and infrastructure.

c. Ancillary buildings and works, including welfare building, power distribution building and process instrumentation building and process and utility equipment, including a fire water tank and an instrument air receiver vessel.

d. Pipelines, pipes and cables (above and below ground) and pipe-racks and cable racks (above ground) between operational works and extensions of those parts of the pipelines, cables and related structures in Work Nos. 4 and 6 which link to elements within the Work No. 3.

e. Permanent road accesses from the public highway to the Site and to the jetty access road (Work No. 2).

f. Internal site roads, hard standing and parking areas.

g. Drainage system, sumps and pumps and a water retention pond.

h. Utilities, transformers, lighting infrastructure.

i. Fencing and gates.

2.4.41 Initially, no hydrogen production units would be constructed on the East Site – Hydrogen Production Facility (Work No. 5) in Phase 1 of the Project (see **Paragraphs 2.4.78** onwards for definitions of Phases), with hydrogen production units (up to three) at this location being added in future phases of development (Phases 3-6). One flare stack would be required per hydrogen production unit, therefore up to three flare stacks would be required on the East Site in addition to the Ammonia tank flare stack (part of Work No. 3a). Each flare stack would be

fitted with a shroud to minimise visibility of the pilot light. Use of the flares would be exceptional i.e. for emergency use only and during start up and shut down during catalyst replacement (every 2-3 years).

2.4.42 The East Site – Hydrogen Production Facility (Work No. 5) would include the construction, in Phases 3-6, of the following components:

a. Up to three hydrogen production units, that convert ammonia to produce the hydrogen, each including fired heater, fired heater flue gas stack (one per unit), flare stack (one per unit), heat exchangers, compressor buildings and associated structures, process equipment, pipe-racks, pipelines, pipes, cable-racks, cables and other conducting media (Work No. 5a).

b. Piling and foundations to support the construction of the hydrogen production units and other infrastructure.

c. Ancillary buildings and works, including a process control building, power distribution buildings, process instrumentation buildings and analyser shelters and process and utility equipment, including a firewater tank and an instrument air receiver vessel.

d. Pipelines, pipes and cables (above and below ground) and pipe racks and cable racks (above ground) between operational works and extensions of those parts of the pipelines, cables and related structures in Work Nos. 4 which link to elements within Work No. 5.

e. Permanent road accesses from the public highway to the Site and to the jetty access road (Work No. 2).

f. Internal site roads, hard standing and parking areas.

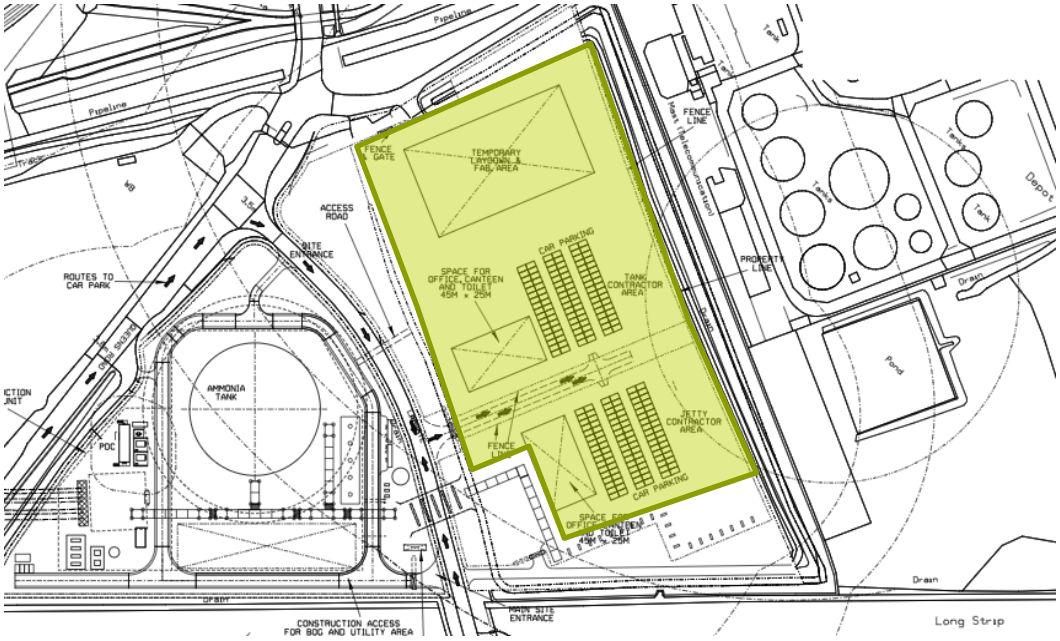
g. Drainage system, sumps and pumps and a water retention pond.

h. Utilities, transformers, lighting infrastructure.

i. Fencing and gates.

2.4.43 During Phase 1 of the Project, the area of Work No. 5 would be used for contractor and subcontractor cabins, laydown, warehouse storage and car parking related to the ammonia tank and jetty contractors. An illustrative layout for this is shown in **Plate 2-1:**

Plate 2-1: Illustrative layout of area of Work No. 5 during temporary use



2.4.44 The preliminary design of the East Site – Ammonia Storage and the East Site – Hydrogen Production Facility is shown in **Figure 2.5 [TR030008/APP/6.3 (3)]**, in **Illustrative Layouts [TR030008/APP/4.3 (3)]** and **Illustrative Sections and Elevations [TR030008/APP/4.4 (3)]**.

2.4.45 **Table 2-6** provides indicative details for the main buildings and other structures that would be constructed under Work Nos. 3, 3a, 5 and 5a, such as approximate dimensions (heights are above FGL), likely construction type and indicative colours.

Table 2-6: East Site – Main Buildings and Structures (Indicative details)

Building/Structure	Indicative Dimensions			Indicative Construction Type	No. of Units	Indicative Colour
	Length (m)	Width (m)	Height above FGL (m)			
East Site – Ammonia Storage area (Work No. 3a)						
Ammonia Tank	70 (dia.)		38-45	Steel or concrete	1	White
Ammonia Tank Flare Stack	4	4	55-65	Steel framed open structure	1	Window grey
East Site – Ammonia Storage area (Work No. 3, other than Work No. 3a)						

Building/Structure	Indicative Dimensions			Indicative Construction Type	No. of Units	Indicative Colour
	Length (m)	Width (m)	Height above FGL (m)			
Main Buildings						
Welfare Building	4	8	4	Pre-fab Module	1	Signal grey
Power Distribution Building	25	6	7	Pre-fab Module	1	Signal grey
Process Instrumentation Building	15	6	4	Pre-fab Module	1	Signal grey
Firewater tank	14 (dia.)		12	Steel	1	White
Instrument Air Receiver vessel	5.5 (dia.)		20	Steel	1	White
East Site – Hydrogen Production Facility (Work No 5a)						
Hydrogen Production Unit compressor building	14	18	15	Steel framed structure	3	Signal grey
Hydrogen production unit fired heater and associated structures	13	8	27.6	Steel framed open structure	3	Window grey RAL7040
Hydrogen production unit fired heater flue gas stack	-	-	30.5	Steel framed open structure	3	Window grey RAL7040
Hydrogen production unit flare stack	-	-	37-45	Steel	3	Window grey RAL7040
East Site – Hydrogen Production Facility (Work Nos 5, other than Work No. 5a)						
Process Control Building	35	20	4.5	Reinforced concrete building or steel clad	1	Signal grey
Power Distribution Building	20	6	4	Pre-fab Module	3	Signal grey
Process Instrumentation Building	15	6	4	Pre-fab Module	3	Signal grey RAL7004

Building/Structure	Indicative Dimensions			Indicative Construction Type	No. of Units	Indicative Colour
	Length (m)	Width (m)	Height above FGL (m)			
Analyzer Shelter	5	5	4	Pre-fab Module	12	Signal grey RAL7004
Firewater Tank	14 (dia.)		12	Steel	1	White
Instrument Air Receiver Vessel	5.5 (dia.)		20	Steel	1	White

2.4.46 Utility and service connections for both parts of the East Site are detailed in the **Utilities Statement [APP-239]** and summarised in **Table 2-7.**

Table 2-7: East Site Utility/Service Connections

Utility/Service	Connection
Nitrogen	The East Site would receive nitrogen that is generated at the West Site via a connection pipeline in the Pipeline Corridor.
Natural gas	Natural gas would be provided by Cadent Gas from a tie-in to a gas main running from an existing gas governor compound on Laporte Road, which is expected to be installed by Cadent Gas.
Power	The Project requires a power feed of approximately 90MW for landside works. The East Site would be supplied with electricity via a connection to the Immingham substation from the West Site via the Pipeline Corridor, which would be provided by Northern Power Grid. The voltage level of the supply is approximately 132kV.
Potable water	A connection to the local water mains network would be made for personnel welfare use only, via a connection into the existing potable water main running the length of Laporte Road. The local provider is Anglian Water.
Non-Potable Water	A connection to an existing non-potable water main running the length of Laporte Road would be required for cooling water for the Hydrogen Production Facility. The local provider is Anglian Water.
Firewater	A firewater system within the Site Boundary is required and would be serviced from an on-site fire water tank, approximately 12m high and 14m in diameter, fed from the non-potable water connection. An allowance would be made for the retention of firewater (contaminated water from firefighting). It is anticipated that this would be a retention basin sized for the maximum fire case with allowance for storm conditions. This basin would also be able to act as a hold up for chemical spills and arrangements would be made to sewerage provided to collect spills.

Utility/Service	Connection
Wastewater	A site-wide drainage system would be required for surface run-off and would include attenuation storage to mitigate the impact of introducing impermeable surfaces. Refer to the Drainage Strategy **[APP-210]** for further details on the management of wastewater and its disposal from Site.

Laporte Road Culvert (Work No. 4)

2.4.47 The Laporte Road culvert involves the construction in Phase 1 of an underground culvert, containing pipelines and cables and other conducting media, under Laporte Road, to link infrastructure in the East Site – Ammonia Storage area (Work No. 3) to the East Site – Hydrogen Production Facility (Work No. 5). The works would include related surface works, excavations, installation of the works, back-filling and making good to the highway.

Pipeline Corridor (Work No. 6)

2.4.48 The Pipeline Corridor would contain a series of underground pipelines, linking the East and West Sites. These are expected to be parallel pipelines and would be installed underground at an expected depth of 5-10m below the existing ground level. They would be constructed using Horizontal Directional Drilling ("HDD") or micro tunnelling techniques, both of which would minimise surface disturbance. The pipelines would include:

a. A hydrogen pipeline to allow the export of hydrogen from hydrogen production units installed on the East Site to the liquefier(s) installed on the West Site.

e. Two Ammonia pipelines, with leak detection technology, to allow the export of ammonia from the storage tank installed on the East Site to the hydrogen production units installed on the West Site.

c. A nitrogen pipeline to supply nitrogen from a generator on the West Site for safety related purposes such as line purging or blanketing.

n. A cathodic protection system, to be installed to protect the pipeline(s) from corrosion.

o. A cooling water make up supply line from the tie in location near the East Site

p. Utility connections in the Pipeline Corridor for the supply of communications links and electricity between the East and West Sites. It is possible that the utility connections could be provided by constructing these from the surface using standard techniques for utilities works (trench excavation and backfill).

2.4.49 The proposed Pipeline Corridor for the main group of pipelines is illustrated on **Figure 2.5 [TR030008/APP/6.3 (3)]**.

West Site (Work No. 7)

2.4.50 The West Site, Work No. 7, includes the following main elements:

a. West Site – Hydrogen Production and Liquefication (Phase 1) (Work No. 7a).

b. West Site – Hydrogen Production and Liquefication (Work No. 7b).

c. West Site – Liquid Hydrogen Storage and Trailer Filling Stations (Work No. 7c).

d. West Site – Gaseous Hydrogen Vehicle Refuelling and Trailer Filling Stations (Work No. 7d).

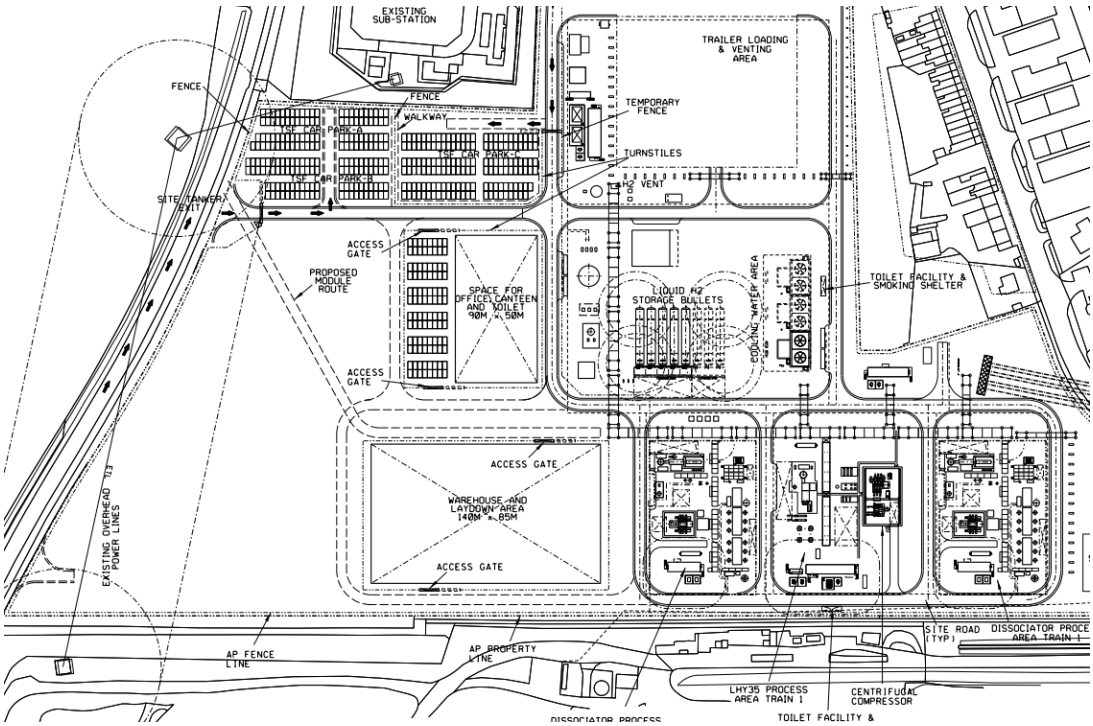
2.4.51 The West Site would comprise up to four hydrogen liquefiers (one in Work No. 7a and three in Work No. 7b) and vessels for the temporary storage of the liquid hydrogen (part of Work No. 7c). A site-wide cooling system is also required for the Project and the cooling towers would be installed on the West Site. In addition, the West Site would accommodate a control room and workshop building, warehouse, security and visitor building and other buildings associated with the operation of the facility, as well as liquid hydrogen storage and trailer filling stations (part of Work No. 7c) associated with the bulk distribution of the green hydrogen.

2.4.52 Initially two hydrogen production units would be constructed on the West Site in Phase 1, whilst one further unit would be added in Phase 2 of the Project as indicated in **Table 2-11**, making a total of six hydrogen production units across the West and East Sites when fully built out.

2.4.53 Access to the West Site is proposed via the construction of three new permanent entrances, two from Kings Road and the other from the A1173 – see **Street Works and Accesses Plan [TR030008/APP/4.6 (3)]** for further details. For details regarding operational traffic estimates see **Chapter 11: Traffic and Transport [APP-053]**.

2.4.54 During the Phases 1-4 of the construction of the Project, an area within the West Site would be used for contractor and subcontractor cabins, laydown, warehouse storage and car parking related to the construction of the buildings and structures within the West Site. An indicative arrangement for Phase 1 is shown in **Plate 2-2.**

Plate 2-2: Illustrative layout of Work No. 7 during temporary use



2.4.55 **Table 2-8** provides indicative details of the buildings and structures that would be constructed under Work No. 7 such as the indicative dimensions, construction type and colour.

2.4.56 The preliminary design of the West Site is shown in **Figure 2.5 [TR030008/APP/6.3 (3)], Illustrative Layouts [TR030008/APP/4.3 (3)]** and **Illustrative Sections and Elevations [TR030008/APP/4.4 (3)]**.

Table 2-8: West Site Key Buildings and Infrastructure (Indicative details)

Building/Infrastructure Name	Indicative Dimensions			Indicative Construction Type	No. of Units (total)	Indicative Colour
	Length (m)	Width (m)	Height above FGL (m)			
West Site – Work No. 7a						
Hydrogen Production Unit Compressor Building	14	18	15	Steel framed structure	Up to 2	Signal grey RAL7004
Hydrogen production unit fired heater and associated structures	13	8	27.6	Steel framed open structure	Up to 2	Window grey RAL7040

Building/Infrastructure Name	Indicative Dimensions			Indicative Construction Type	No. of Units (total)	Indicative Colour
	Length (m)	Width (m)	Height above FGL (m)			
Hydrogen production unit fired heater flue gas stack	-	-	30.5	Steel framed open structure	Up to 2	Window grey RAL7040
Hydrogen production unit flare stack	-	-	37-45	Steel	Up to 2	Window grey RAL7040
Hydrogen Liquefier Unit Compressor Building	24	36	15	Steel framed structure	1	Signal grey RAL7004
Liquefier cold box	4	4	25	Steel	1	Pure white RAL9010
Liquefier H_2 flare stack and structure	3	3	40-45	Steel	1	Window grey RAL7040
West Site – Work No. 7b						
Hydrogen Production Unit Compressor Building	14	18	15	Steel framed structure	1	Signal grey RAL7004
Hydrogen production unit fired heater and associated structures	13	8	27.6	Steel framed open structure	1	Window grey RAL7040
Hydrogen production unit fired heater flue gas stack	-	-	30.5	Steel framed open structure	1	Window grey RAL7040
Hydrogen production unit flare stack	-	-	37-45	Steel	1	Window grey RAL7040
Hydrogen Liquefier Unit Compressor Building	24	36	15	Steel framed structure	Up to 3	Signal grey RAL7004
Liquefier cold box	4	4	25	Steel	Up to 3	Pure white RAL9010
Liquefier H_2 flare stack and structure	3	3	40-45	Steel	Up to 3	Window grey RAL7040

Building/Infrastructure Name	Indicative Dimensions			Indicative Construction Type	No. of Units (total)	Indicative Colour
	Length (m)	Width (m)	Height above FGL (m)			
West Site – Work No. 7c						
Hydrogen vent stack	3	3	40-45	Steel	1	Window grey RAL7040
West Site – Hydrogen Production Facility (Work No 7, other than Work No. 7a-7c)						
Control Room and Workshop Building	69	25	7	Reinforced concrete or steel clad	1	Signal grey RAL7004
Security & Visitor Building	20	15	4.5	Reinforced concrete or steel clad	1	Signal grey RAL7004
Contractor Building	18	12	4.5	Reinforced concrete or steel clad	1	Signal grey RAL7004
Warehouse	15	10	4.5	Prefabricated module	1	Signal grey RAL7004
Driver Administration Building	5	5	3.5	Prefabricated Module	1	Signal grey RAL7004
Safe Haven Building	5	10	4	Reinforced concrete or steel clad	1	Signal grey RAL7004
Electrical Substation and Metering Station	30	8	4.5	Prefabricated module	1	Signal grey RAL7004
Power Distribution Building	20-40	5.8	5	Prefabricated module	8	Signal grey RAL7004
Process instrumentation Building	12-15	2.5-6	4	Prefabricated module	7	Signal grey RAL7004
Analyser Building	3-13	3-7	2-5	Prefabricated module	15	Signal grey RAL7004
Cooling Tower	12	12	20	Steel framed and clad structure	Up to 6	Signal grey RAL7004

Building/Infrastructure Name	Indicative Dimensions			Indicative Construction Type	No. of Units (total)	Indicative Colour
	Length (m)	Width (m)	Height above FGL (m)			
Firewater Tank	14 (dia)		12	Steel	1	White
Instrument Air receiver vessel	4.5 (dia)		16	Steel	1	White
Other Buildings	undefined	undefined	6	undefined	undefined	undefined

2.4.57 Utility/service connections for the West Site are detailed in **Utilities Statement [APP-239]** summarised in **Table 2-9.**

Table 2-9: West Site Utility / Service Connections

Utility/Service	Connection
Nitrogen	Nitrogen would be generated on the West Site and used across all operational areas to purge pipelines, pipes and vessels and create inert atmospheres within the same.
Natural gas	A new intermediate gas connection to the West Site via a tie-in from the existing main intermediate pressure underground gas line beneath Queens Road would be required. Gas will be distributed internally across the West Site and via the Pipeline Corridor to the East Site – Ammonia Storage area.
Power	The Project requires a power feed of approximately 90MW for landside works. The power feed for the landside works would be provided by Northern Powergrid to the West Site and internally distributed across the West Site and via the Pipeline Corridor to the East Site. Modifications to Immingham substation adjacent to the West Site would be required to accommodate a new 132kV connection to 132kV/33kV transformers on the West Site
Potable water	A connection to the local water mains network would be made. The local provider is Anglian Water.
Cooling water	A site-wide cooling loop would be required. Make-up water will be supplied from a tie in point close to the East Site and routed through the Pipeline Corridor.

Utility/Service	Connection
Firewater	A firewater system within the Site Boundary is required and would be serviced from on on-site fire water tank approximately 12m high and 14m in diameter. An allowance would be made for the retention of firewater (contaminated water from firefighting). It is anticipated that this would be a retention basin sized for the maximum fire case with allowance for storm conditions. This basin would also be able to act as a hold up for chemical spills and arrangements would be made to sewerage provided to collect spills.
Wastewater	A site-wide drainage system would be required for surface run-off and would include attenuation storage to mitigate the impact of introducing impermeable surfaces. Refer to the Drainage Strategy **[**APP-210**]** for further details regarding the management of wastewater and its disposal from Site.

Water and Sewerage

2.4.58 The operational Project is estimated to require approximately 3,640m^3/day of non-potable water to support the hydrogen production facility. The non-potable supply is primarily required to provide cooling water make-up.

2.4.59 The hydrogen production facility would also require non-potable water for periodic use including fire water storage and utility stations but these would be small quantities and would not impact the overall water demand.

2.4.60 Agreement has been reached in principle with Anglian Water for the provision of non-potable water to the required standards suitable for use in the site cooling towers for the hydrogen production facility, sufficient for the full project (Phases 1-6). This water is to be transferred to the site from an existing Anglian Water resource. The use of non-potable water for this application will reduce the pressure of the Project on an already water stressed Water Resource zone within the UK. A connection to an existing non-potable water main running the length of Laporte Road would be required (see also the **Utilities Statement, [**APP-239**]).**

2.4.61 The operational Project would also require a limited potable water supply for offices (including fire sprinkler systems), welfare facilities, steam boiler and site safety showers. The potable supply is expected to be drawn from the existing mains water supply through a connection in Kings Road (for West Site **Work No. 7**), Laporte Road (for East Sites and jetty, **Work Nos. 1**, **3** and **5**) (see the **Utilities Statement**, **[**APP-239**]**). The potable supply would be sized by Anglian Water based on number of future users and subject to a separate agreement (from the non-potable supply) with the company.

2.4.62 Water supply and the potential for impacts on existing and future users is considered further in **Chapter 18: Water Use, Water Quality, Coastal Protection, Flood Risk and Drainage [**APP-060**].**

2.4.63 Domestic sewer connections would be required for occupied buildings throughout the Site. The sewerage at the Terminal and at the jetty access road security building would be removed via road tanker and no new sewerage connections are envisaged.

2.4.64 Temporary potable water and sewerage connections would also be required during construction of the Project as detailed in **Section 2.6**.

Landscape and Biodiversity

2.4.65 An **Outline Landscaping and Ecology Management Plan** ("LEMP") **[REP4-012]** has been prepared. This plan sets out the measures which will be taken relating to landscape and biodiversity to enhance the operational design. Implementation of the proposed measures would be secured by a Requirement of the **draft DCO [TR030008/APP/2.1 (6)]**.

2.4.66 A Woodland Compensation Strategy **[APP-224]** has been prepared. This strategy sets out the approach which will be used to compensate for the tree loss from the Long Strip woodland. The approach is to provide compensatory tree planting, in accordance with NELC policy, on a defined area within ABP's wider Port of Immingham estate. Approval of the final strategy and its implementation is secured by a Requirement of the **draft DCO [TR030008/APP/2.1 (6)]**.

Fencing and Gates

2.4.67 Secure boundary fencing, such as paladin (or similar) fencing, would be provided on the Terminal (Work No.1), the corridor for pipe-rack and jetty access road (Work No. 2), the East Site (Work No. 3 and Work No. 5) and the West Site (Work No. 7). The Terminal and the corridor for the pipe-rack and jetty access road will be incorporated into the existing Port of Immingham's International Ship and Port Facility Security ("ISPS") boundary fence-line. The boundary fencing will comply with the minimum ISPS requirements and any updated security procedures will be incorporated into an update to the Port Facility Security Plan ("PFSP"). This would include the use of access control systems to manage people and vehicle access to each site. Close circuit television ("CCTV") and other security measures, including intruder alarms, would also be installed.

2.4.68 Offsets for security clearance from fencing and structures (including the hydrogen production facilities and the jetty access road) are required and are allowed for within the areas for the Works which are spatially defined on the **Works Plans [TR030008/APP/4.2 (4)]**. A "clear zone" would be established with a minimum 2.0m either side of the protective perimeter barrier. The clear zone would be kept free of any objects (saplings, weeds, overhanging tree branches, stored materials etc) that could possibly damage the perimeter fencing or facilitate unauthorised entry.

External Lighting

2.4.69 **Appendix 2.B** sets out a **Lighting Assessment** for the DCO Application **[APP-173]**. Before any permanent lighting is installed, a detailed lighting scheme for the relevant landside lighting infrastructure would be submitted to the local planning authority for approval under a Requirement of the **draft DCO [TR030008/APP/2.1 (6)]** and, in respect of the operational marine infrastructure lighting requirements, it is anticipated that a separate lighting scheme would be prepared in consultation with Humber Estuary Services.

2.4.70 The external lighting scheme for the landside infrastructure will be designed in accordance with relevant standards, including the Guidance Notes for the Reduction of Obtrusive Light (2020) published by the Institute of Lighting Engineers and/or Chartered Buildings Services Engineers ("CIBSE") requirements, as appropriate.

2.4.71 The external lighting scheme for the marine infrastructure will be designed to ensure that there is no interference with observation of navigation marks, buoys, and ships' navigation lights, nor affecting the night vision of crew members. The jetty structure would be marked with navigation lights. The current proposal is to use two fixed red lights, mounted vertically 3m apart, with the lower light 3m above the structure. The navigation lights would have a nominal range of five nautical miles. It is also proposed to mark the outer mooring dolphins and the outer breasting dolphins (i.e. four pairs of lights in total).

Flood Risk and Drainage

2.4.72 All sources of flood risk to and from the Project, including the impact of a changing climate on flood risk, have been assessed throughout the design development of the Project.

2.4.73 A surface water drainage system for the terrestrial parts of the Site has been designed which would intercept and attenuate all runoff generated by the Site to be conveyed to attenuation ponds prior to discharging to nearby surface watercourses. The drainage design includes the appropriate allowances for climate change. The discharge rates would be restricted to site greenfield rates ensuring no detriment with regard to flood risk.

2.4.74 The process of assessing the risk of flooding is set out in **Appendix 18.A Flood Risk Assessment [TR030008/APP/6.4 (3)]** and within **Chapter 18: Water Quality, Coastal Protection, Flood Risk & Drainage [APP-060]**, whilst the drainage strategy for the Project is set out in **Appendix 18.B Drainage Strategy [APP-210]**.

Emissions to Air and Odour Risk

2.4.75 Information on emissions to air and odour risk arising from the Project is provided in **Chapter 6: Air Quality [APP-048]**.

Waste

2.4.76 Details regarding the disposal of solid waste are set out in **Chapter 20: Materials and Waste [APP-062]**.

Process Safety and Hazard Management

2.4.77 Process safety and hazard management are addressed in **Chapter 22: Major Accidents and Disasters [APP-064]**.

Construction and Operational Phasing of the Project

2.4.78 There would be a phased approach to the construction of the Project as illustrated in **Figure 2.6 [TR030008/APP/6.3 (2)]**. Under this scenario, the construction of the Terminal and first phase of the green hydrogen production facility (including works on both the East Site and West Site as outlined above and described below) would comprise the first phase of development, which, subject to securing the relevant consents, is likely to start in early 2025 and last for between two and a half and three years.

2.4.79 Following completion of the first phase of the construction, a further five phases of the hydrogen production facility would be constructed incrementally to increase the processing capacity as the market for green hydrogen increases. There would be six phases of development in total (see **Table 2-10)**.

2.4.80 For the purposes of this ES, a development scenario has been defined based on a six-phase construction timeline through to full completion of all phases over an indicative eleven-year period. This programme duration is likely to be a worst case in EIA terms. This is because although market demand could accelerate the programme for Phases 2-6, Phase 1 would always represent the peak of construction, irrespective of the subsequent programme for Phases 2 onwards. Phase 1 includes the construction of the permanent works Work Nos 1, 2, 4, and 6 in their entirety and substantive elements of Work Nos 3, 5 and 7, as well as the use of temporary construction areas at Work No 8 and 9. An indicative construction phasing timeline is illustrated in **Table 2-10** and assumes that each phase of the Associated Development would become operational following its construction.

Table 2-10: Indicative Construction Phasing Timeline for the Project

Phase	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Phase 1											
Phase 2											
Phase 3											
Phase 4											
Phase 5											
Phase 6											

2.4.81 The start of construction of Phase 2 (here shown in Year 4), would depend on a number of factors including market demands for hydrogen at that point in time, whilst the timing of subsequent phases would be subject to the same tests. Construction of Phases 2 – 6 may take up to eight years.

2.4.82 Each phase of the Project's development would involve construction of different buildings and infrastructure within each area of the Site, as presented in **Table 2-11**.

Table 2-11: Principal Buildings and Infrastructure within the Site by Phase

Phase	Terminal (Work No. 1)	Pipeline Corridors (Works Nos 2, 4, 6)	East Site (Work Nos 3, 5)	West Site (Work No. 7)	Temporary Construction Areas (Work no. 8, 9 and temporary use of other sites)
Phase 1 **Construction:** **Y 1 – Y3**	Jetty structure and Jetty topside infrastructure, including pipework for ammonia and other liquid bulks Jetty access ramp Flood defence access ramp and flood defence replacement	Piperack and NH_3 pipeline from the jetty Jetty access road H_2, NH_3 and Natural Gas pipelines and utilities between East and West Site Culvert including pipework, utilities and cabling linking the two parts of the East Site	NH_3 tank Internal access roads, drainage and utilities Temporary construction area	Two hydrogen production units One liquefier Tanker loading bays and hydrogen storage Trailer filling Station Control room and workshop building Other supporting building and facilities as listed in **Table 2-8** Internal access roads, drainage and utilities	Queens Road Temporary Construction Area for Air Products and contractor offices (Work No 8) Laporte Road Temporary Construction Area for material laydown and storage (Work No. 9) East Site – Hydrogen Production Facility for contractor offices, car parking, laydown storage in addition to a possible concrete batching plant and pile welding facility West Site – for contractor and subcontractor cabins, laydown and warehouse storage and car parking

Phase	Terminal (Work No. 1)	Pipeline Corridors (Works Nos 2, 4, 6)	East Site (Work Nos 3, 5)	West Site (Work No. 7)	Temporary Construction Areas (Work no. 8, 9 and temporary use of other sites)
Phase 2 Construction: Y4 – Y5	-	-	-	One hydrogen production unit One liquefier Hydrogen Refuelling Station and compressor	West Site – for contractor and subcontractor cabins, laydown and warehouse storage and car parking
Phase 3 Construction: Y6 – Y7	-	-	One hydrogen production unit	One liquefier	West Site – for contractor and subcontractor cabins, laydown and warehouse storage and car parking East Site – Hydrogen Production Facility for contractor offices, car parking, laydown storage
Phase 4 Construction: Y8 – Y9	-	-	-	One liquefier	West Site – for contractor and subcontractor cabins, laydown and warehouse storage and car parking
Phase 5 Construction: Y9 – Y10	-	-	One hydrogen production unit	-	West Site – for contractor and subcontractor cabins, laydown and warehouse storage and car parking East Site – Hydrogen Production Facility for

Phase	Terminal (Work No. 1)	Pipeline Corridors (Works Nos 2, 4, 6)	East Site (Work Nos 3, 5)	West Site (Work No. 7)	Temporary Construction Areas (Work no. 8, 9 and temporary use of other sites)
					contractor offices, car parking, laydown storage
Phase 6 Construction: Y10 – Y11	-	-	One hydrogen production unit	-	West Site – for contractor and subcontractor cabins, laydown and warehouse storage and car parking

2.5 Construction

Construction Activities

2.5.1 The approach to Project construction described in the following sections is indicative. However, it is considered to be representative of a reasonable worst-case scenario of how the Project would be implemented and the description provided here has been used as the basis of the EIA for the construction phase. The approach to construction would be further refined and finalised during the detailed design phase. The definition of "construct" in the **draft DCO [TR030008/APP/2.1 (6)]** is stated to include execution, placing, altering, replacing, relaying and removal, and those activities have been taken into account in the assessment contained in this Environmental Statement.

2.5.2 The main aspects of constructing the Project's marine and landside infrastructure components are detailed in the following sections. Construction of the Project is anticipated to require the following activities which are detailed further below:

a. Installation and use of temporary site facilities and laydown areas comprising fencing, vehicle parking, material storage areas, fuel storage bunds and worksites.

b. Installation and use of temporary accesses and haul routes, vegetation clearance and soil removal.

c. Transportation of materials and labour throughout the construction phase.

d. Use of a concrete batching plant.

e. Ground works (including remediation as required).

f. Piling.

g. Infrastructure construction activities, routing or services and utilities.

2.5.3 The Site Boundary, shown in **Figure 1.1 [TR030008/APP/6.3 (3)]** is sized to ensure that sufficient space is included for temporary roads, temporary working and storage areas, and provision of site facilities and laydown areas to be used during the construction of the Project.

2.5.4 It is expected that certain works (referred to as early works) would need to be undertaken ahead of the main marine and landside construction works to allow these works to proceed, and to optimise the overall delivery programme of the Project. Early works are expected to comprise works associated with establishment of construction compounds, including construction accesses and haul roads. The works would also include preliminary site clearance (primarily any required vegetation removal) and grading works (including import of fill material required to provide the required Finished Ground Levels), site access works, site fencing, diversion of utilities and temporary diversions works to Bridleway-36. Irrespective of whether these works ultimately form part of an 'early works' strategy, the works have all been assessed as part of the EIA.

Construction Compounds

2.5.5 The **Works Plans Schedule 1: Authorised Project** of the **draft DCO [TR030008/APP/2.1 (6)]** includes three exclusively temporary components, which are spatially defined on the **Works Plans [TR030008/APP/4.2 (4)]**, and comprise **Work No. 8** to **Work No. 10,** as detailed below. The approach described for each of the compounds below is indicative only.

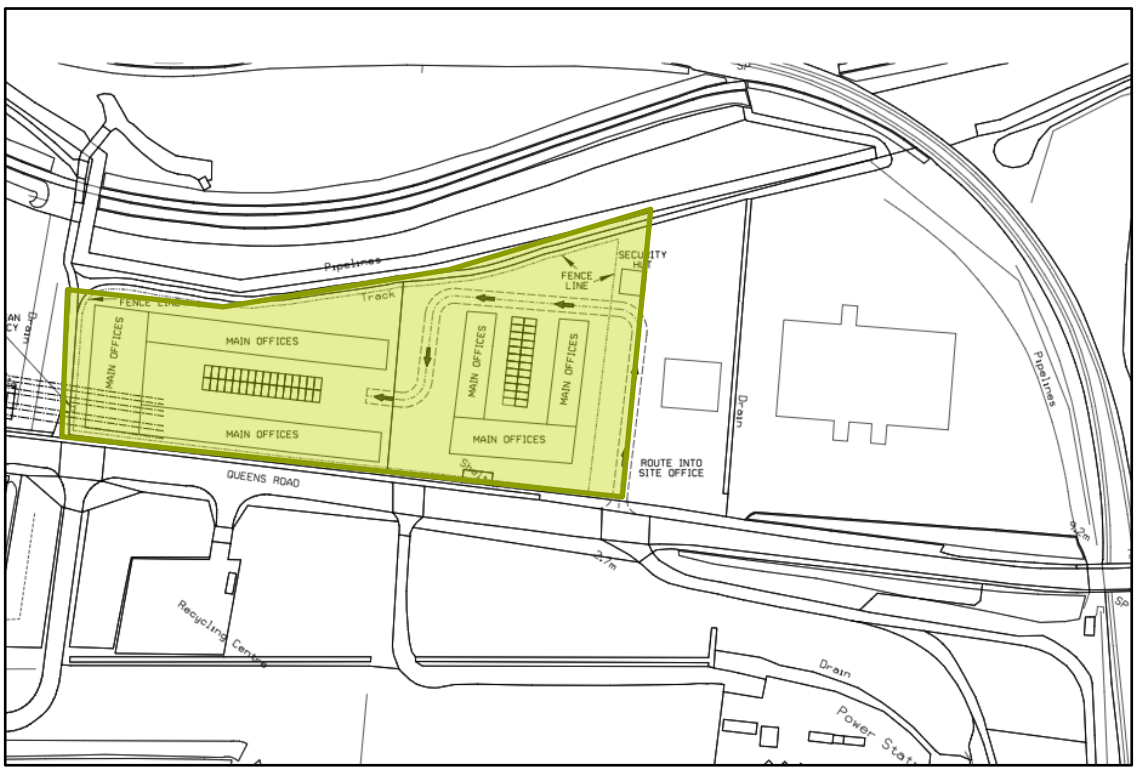
2.5.6 There would be two main temporary construction areas, one located off Queens Road (**Work No. 8**) and one off Laporte Road (**Work No. 9**), as well two additional temporary construction compounds, one located in the East Site (within the footprint of **Work No. 5**) and one in the West site (within the footprint of **Work No. 7**). It is envisaged that temporary welfare units would be required at localised work sites, but these would be self-contained and moved as required. These temporary construction areas are described in more detail below.

Queens Road Temporary Construction Area (Work No. 8)

2.5.7 The Temporary Construction Area which constitutes **Work No. 8** would involve the set up and use during **Phase 1** of a temporary site facilities area to accommodate temporary offices, welfare facilities, car parking, storage buildings and the formation of a temporary road access to Queens Road.

2.5.8 The location of the Temporary Construction Area is illustrated on **Figure 2.5 [TR030008/APP/6.3 (3)]** and an indicative arrangement is shown in **Plate 2-3**. Once **Phase 1** of construction is complete, the temporary construction area would be removed and reinstated to its current condition.

Plate 2-3: Indicative arrangement of Work No. 8



2.5.9 The Queens Road Temporary Construction Area (**Work No. 8**) would accommodate temporary offices, welfare facilities, car parking and storage buildings during the construction phase. The approximate area of the compound would be approximately 1.25ha. Access to the compound would require the formation of a temporary road access from Queens Road in addition to the existing road access.

2.5.10 The extent of the compound would be levelled and graded to allow hardstanding to be installed. As a minimum, the car park and all trafficable areas would have subbase in place. Concrete foundation pads would be cast for the office facilities which would be installed using a mobile crane. Cables for lighting of the compound will be installed. Fencing would be installed around the perimeter (either Heras or hoarding) and fenced pedestrian routes clearly marked, gated or fenced. Lighting would be required for security and safety. Local security detection equipment would be installed to prevent theft and damage.

2.5.11 A connection to the local power network will be made, however short-term use of silent generators may be required until such a connection is in place.

2.5.12 The compound's surface water and drainage approach would allow for a filter drain system to be installed to collect surface water run-off along the perimeter. The run-off would then be taken to an oil interceptor, silt buster or similar to treat run-off to an acceptable quality level. For foul drainage, it is anticipated that a septic tank or similar would be used and which would require regular emptying by a sewage tanker.

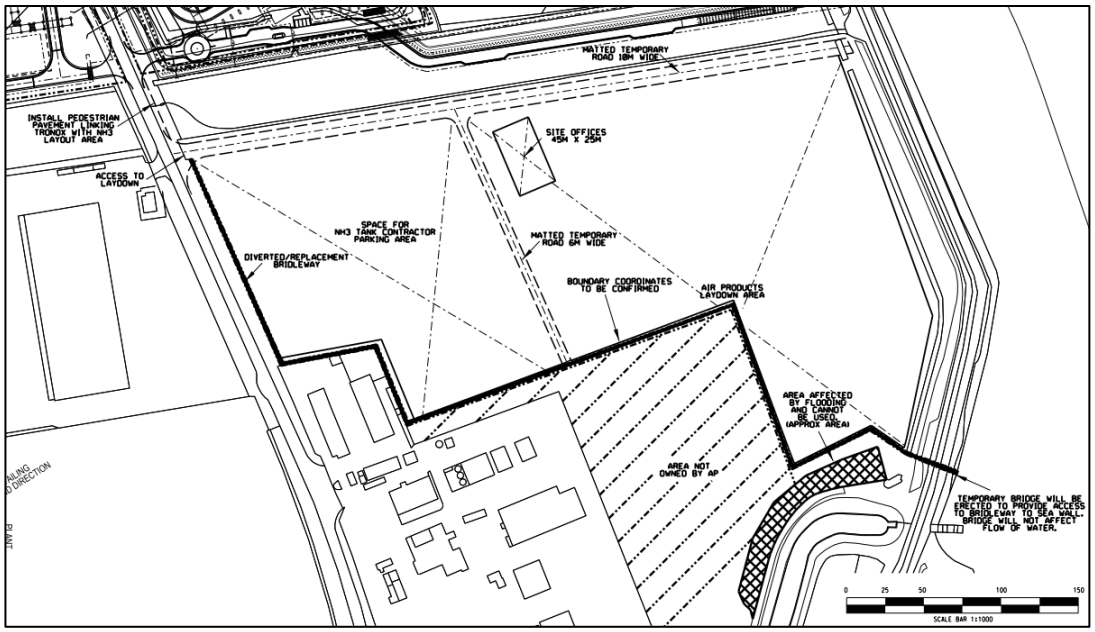
2.5.13 Once the compound is no longer required, the area would be returned to its original state, with the subbase and any concrete foundations being removed.

Laporte Road Temporary Construction Area (Work No. 9)

2.5.14 The Temporary Construction Area which constitutes **Work No. 9** involves the set up and use during **Phase 1** of a temporary laydown area for the storage of equipment and materials and the formation of a temporary road access to Laporte Road. The location of the Temporary Construction Area is illustrated on **Figure 2.5 [TR030008/APP/6.3 (3)]**. It is anticipated that **Work No. 9** would support both marine and terrestrial construction activities.

2.5.15 This construction area would be located in the large arable field to the east of the Long Strip woodland. This compound would be the main laydown area for the storage of materials and would accommodate storage containers for such purposes. The approximate area of the compound would be approximately 8.66ha, however the area anticipated to be initially required for access and laydown is expected to be approximately 4000m^2, with further sections of the field being required for laydown progressively to meet Project requirements. Access to the compound would require the formation of a temporary road access to Laporte Road. An Indicative arrangement of Work No. 9 is provided in **Plate 2-4** below. The layout would be adapted for any relevant flood risk constraints:

Plate 2-4: Indicative arrangement of Work No. 9



2.5.16 Access for deliveries and other construction plant would primarily be from the A1173 via Kings Road and Queens Road.

2.5.17 The land required for the compound would not require any foundation or excavation work, nor would any topsoil removal be undertaken. It is proposed that any area improvements would be minimal and would consist of the provision of a geotextile layer and a layer (150mm) of compacted fill material to prevent any undue environmental impact. In the early stages of site establishment, Bridleway-36 would be diverted around the eastern side of the construction area to re-join the coastal path on the sea wall. A small temporary scaffold bridge may be required to support the bridleway diversion over the channel behind the sea wall.

2.5.18 Fencing would be installed around the perimeter (either Heras or hoarding) and fenced pedestrian routes clearly marked, gated or fenced. Lighting would be required for security and safety. Local security detection equipment would be installed to prevent theft and damage.

2.5.19 Once the construction compound is no longer required, which is currently assumed to be after the first phase of construction is completed, a duration of approximately 2.5 to 3 years, the area would be reinstated to its original state through lifting of the geotextile layer and compacted fill material.

Temporary Removal of Kings Road Street Furniture and Overhead Cables (Work No. 10)

2.5.20 The Project is expected to use modularisation to reduce on-site works and maximise the works completed in specialised fabrication facilities off-site where practicable. This would require the delivery by sea to the Port of Immingham of large, prefabricated elements of operational plant and then the use of large HGVs to transport abnormal loads from the Port to the relevant parts of the Site. Modularisation and delivery by sea is specified in the **Outline CEMP [TR030008/APP/6.5 (5)]**.

2.5.21 In order to facilitate this, the works involve the temporary removal of street furniture and modification of overhead cables in four locations (as identified in **Figure 2.5** of the ES **[TR030008/APP/6.3 (3)]** to allow the passage of these loads along Kings Road to the Site. This would take place to allow up to 30 abnormal load movements over approximately a six-month period during Phase 1 of construction and a similar approach is likely to be required for subsequent phases, albeit with fewer movements.

2.5.22 The overhead lines would be either raised or lowered to allow passage of the abnormal loads and then reinstated. Street furniture would be taken down to accommodate the abnormal loads and reinstalled as soon as possible.

Other Works

2.5.23 In addition to the main temporary construction areas described above (8 & 9), parts of both the West Site (Work No 7) and eastern part of East Site (Work No. 5) would also be used as temporary construction areas during the construction of the works.

2.5.24 In addition to the localised street works described in Works No. 10, there will be a number of works in the highway within the Site Boundary to accommodate temporary and permanent access and utilities connections. These works are described more fully in Schedule 4 Streets subject to Street Works, Schedule 5 Alteration of Streets and Schedule 9 Access to Works of the **draft DCO [TR030008/APP/2.1 (6)]** and the **Utilities Statement [APP-239]**.

2.5.25 In addition, Schedule 1: Authorised Project of the **draft DCO [TR030008/APP/2.1 (6)]** includes ‘Further associated development’ and ‘Ancillary Works’ which extend across the full extent of the Site. In summary, ‘further associated development’ enables the undertaking as required of works such as site clearance, creation of additional construction compounds, utility works, landscaping works and street works on a site wide basis. ‘Ancillary works’ constitute works that would not necessarily constitute development, such as vegetation removal, the installation of fencing and the demobilisation of construction works.

Plant and Equipment

2.5.26 Construction activities undertaken across the Project would involve the use of a range of plant, equipment and machinery depending on the location and nature of the works.

2.5.27 The final plant numbers and type would be determined by the construction methodology, although for the purpose of this assessment, reasonable worst-case estimates have been made of the types and numbers of plant and machinery and their locations likely to be used during the construction of the Project, for example in order to assess potential construction phase noise and vibration effects as presented in **Chapter 7: Noise and Vibration [APP-049]**.

Construction Workforce

2.5.28 During construction, it is predicted that the workforce supporting the marine works would peak at approximately 220 personnel and the landside workforce would peak at 792. Both workforce peaks would be during Phase 1 of construction and for a 'realistic worst case assessment', it is assumed that the marine and landside terrestrial peaks would occur at the same time and during Year 2 of construction. A total construction workforce figure of 1012 workers has therefore been used to inform the assessments in **Chapter 11: Traffic and Transport [APP-053]** and **Chapter 23: Socio-Economics [APP-065]**.

2.5.29 Further details are presented in the **Outline Construction Workers' Travel Plan** ("Outline CWTP") **[TR030008/APP/6.7 (5)]**, which accompanies the DCO Application and which is appended to the Outline Construction Traffic Management Plan ("CTMP") (approval of the final CTMP and compliance with it are secured through a Requirement in the **draft DCO [TR030008/APP/2.1 (6)]**). A proposed Requirement also requires a phasing plan to be submitted and approved before construction of the third hydrogen production unit or second hydrogen liquefier.

Street Works and Utilities

2.5.30 Construction of the Project would require the diversion, relocation or protection of a number of utility assets. It is likely that most of the required diversions would be undertaken as early works prior to the main phases of Project construction. The proposed diversion, relocation or protection of utility assets are set out in the **Utilities Statement [APP-239].**

2.5.31 The area of the public highway and private roads which could be required for the placing and connecting of apparatus and associated works is outlined as follows on **Street Works and Accesses Plan [TR030008/APP/4.6 (3)]**:

a. Between the points marked B and C on sheet 4 for the unnamed access road north of Laporte Road.

b. Between points marked E on sheet 4 and the point marked D on sheets 4 and 5 for Laporte Road.

c. Between the point marked F on sheets 4 and 5 and the point marked G on sheet 4 for the private road to water treatment works south of Laporte Road.

d. Between the point marked C on sheets 4 and 5 and point marked I on sheets 5 and 6 for Queens Road.

e. Between the points marked V and W, the area between the points marked AI, AH and AJ, the area between the points marked AK and AL, the area

between the points marked AM and AN and the area between the points marked AO, AP and AQ (in each case) on sheet 7 for Kings Road.

2.5.32 Temporary closure will be required for the construction of all of the temporary and permanent accesses required for the Project to construct the accesses, further details of the accesses are provided in **Paragraph 2.5.24** of this ES Chapter. Temporary closure and diversion of Public Rights of Way ("PRoWs") as well as temporary and permanent removal of informal access is required to facilitate the Project, further details relating to Prows are provided in **Paragraph 2.5.41** of this ES chapter.

2.5.33 As described under Work No. 10 above, temporary works are required to enable the passage of abnormal indivisible loads on Kings Road during the construction phase, this would involve the removal of signage and street furniture within the areas shaded red and marked respectively AD and AE on sheet 7 of **Street Works and Accesses Plan [TR030008/APP/4.6 (3)].** Temporary works are required to enable the temporary modification of existing overhead lines within the areas shaded purple and marked respectively AG and AF on sheet 7 of **Street Works and Accesses Plan [TR030008/APP/4.6 (3)].**

2.5.34 Construction works are required to provide an altered layout and revised signage and markings to enable the provision of the permanent speed limit of 30 mph for an approximate distance of 365m along Laporte Road within the area shaded blue between the points marked D on sheets 4 and 5 and BC on sheet 4 of **Street Works and Accesses Plan [TR030008/APP/4.6 (3)]** and **Traffic Regulation Measures Plan [TR030008/APP/4.8 (4)]**. Construction works are also required to provide revised signage and markings to enable the provision of the permanent speed limit of 40mph for an approximate distance of 545m along Laporte Road within the area shaded yellow between the points marked BC on sheets 4 and 5 and E on sheet 4 and Inset 1 of the **Street Works and Accesses Plan [TR030008/APP/4.6 (3)]** and the **Traffic Regulation Measures Plan [TR030008/APP/4.8 (4)]**.

2.5.35 Temporary overnight road closure including temporary parking restriction would be required on an occasional basis between the hours of 23:00 and 06:00 to all traffic on Laporte Road, Queens Road and Kings Road to allow large construction plant to access the Site. This would be required on approximately 30 occasions over a six month period during Phase 1. The temporary overnight closure will be of a length of approximately 2,890m and is shown as hatched dark blue and marked between point BC and BD on sheets 4, 5, 6, 7, and 8 on **Traffic Regulation Measures Plan [TR030008/APP/4.8 (4)]**.

2.5.36 In addition to the temporary overnight closure described above, temporary road closure to all traffic of the area shaded green between the points marked S and T on Laporte Road on sheets 4 and 5 of the **Stopping Up and Restriction of Use of Streets and Public Rights of Way Plan [TR030008/APP/4.7 (3)],** is also required to enable the construction of Work No. 4.

2.5.37 Temporary traffic lights would be required on Laporte Road at the direction of the undertaker at the location edged green between the points marked BE and BF on sheets 4 and 5 of **Traffic Regulation Measures Plan [TR030008/APP/4.8 (4)]** to allow large construction plant to cross Laporte Road at this location.

2.5.38 During construction, traffic management measures would be put in place to ensure that traffic flows on the road network are maintained, whilst allowing safe working at the interface between the existing road network and the Project.

2.5.39 Traffic management measures, in addition to those listed above, would include the following measures:

a. The use of signage and clear road marking systems.

b. Formation of safe access and egress points.

c. Communication of measures to stakeholders.

Public Rights of Way Works

2.5.40 Public Bridleway-36 crosses land within the Order Limits, between Laporte Road and the sea wall, along the eastern edge of the Long Strip woodland, whilst two other areas of informal access would be impacted by the Project. Details of how these interact with the Project can be seen on the **Stopping Up and Restriction of Use of Streets and Public Rights of Way Plan [TR030008/APP/4.7 (3)]**.

2.5.41 During the early works phase, the following measures would be implemented:

a. Diversion of Public Bridleway 36 onto a new temporary route – a temporary diversion route is proposed between the two points BB and BA shown on the **Stopping Up and Restriction of Use of Streets and Public Rights of Way Plan [TR030008/APP/4.7 (3)]**, with users being diverted around the eastern perimeter of the temporary construction area which would be established on the area defined for Work No. 9, to reconnect with the retained bridleway further to the east on the sea wall. Once the first phase of construction is completed, the bridleway would be re-instated on its current alignment and the temporary diversion would be closed.

b. Permanent removal of informal access between the APT Jetty and the point at which Public Bridleway 36 meets the sea wall – access would need to be removed permanently to enable construction and operation of the new Terminal and continued informal access west of the new jetty would be incompatible with this.

c. Temporary closure of informal access through the southern part of the Long Strip woodland, south of Laporte Road – access would need to be removed temporarily during the construction of the Project so limiting the number of walkers crossing Laporte Road in close proximity to the construction works in this area.

2.5.42 The impacts on PRoW are considered in **Chapter 23: Socio-Economics [APP-065]**.

Construction Materials

2.5.43 Estimates of the types and quantities of materials required to construct the Project, and those generated by construction, have been developed in order to inform the ES. The estimates are precautionary and allow the environmental assessments to consider a reasonable worst-case scenario.

2.5.44 Details of the main types and estimated quantities of construction materials required for the delivery of the Project are provided in **Chapter 20: Materials and Waste [APP-062]**.

Construction Environmental Management Plan (CEMP) and Site Waste Management Plan ("SWMP")

2.5.45 An Outline CEMP **[TR030008/APP/6.5 (5)]** has been prepared and accompanies the DCO Application. This sets out the key measures to be employed during construction of the Project to control and minimise impacts on the environment. It describes how monitoring and auditing activities would be undertaken, in order to ensure that mitigation, management and monitoring measures during construction are carried out and are effective.

2.5.46 A Final CEMP would be prepared by the construction contractor in accordance with the Outline CEMP prior to the commencement of project construction, save for some enabling works. The Outline CEMP enables multiple Final CEMPs to be provided for example in relation to individual work numbers or for project phases to enable the efficient preparation and approval of relevant documents. A Requirement is included in Schedule 2 of the **draft DCO [TR030008/APP/2.1 (6)]** which ensures that the contractor's Final CEMP(s) would be prepared in accordance with the principles set out in the Outline CEMP. The Final CEMP would include, as a minimum:

a. A code of construction practice specifying measures designed to minimise the impacts of the construction works.

b. A scheme for the control of any emissions to air.

c. A soil management plan.

d. A sediment control plan.

e. A scheme for environmental monitoring and reporting during the construction of the Project, including measures for undertaking any corrective actions.

f. A notification scheme for any significant construction impacts on local residents and for handling any complaints received from local residents relating to Project construction impacts.

2.5.47 In order to manage and monitor waste, including any spoil generated on-site, a Framework SWMP has been developed and is appended to the Outline CEMP with the DCO Application. This sets out how waste streams would need to be estimated and monitored and goals set with regards to the waste produced. The contractor's Final CEMP would be required to incorporate the principles of the Framework SWMP as appropriate.

2.5.48 The Applicant would require that the contractor segregates the waste streams on-site, prior to them being taken to a waste facility for recycling or disposal. All waste removal from the Site would be undertaken by licensed waste carriers and taken to licensed waste facilities.

2.5.49 An assessment of impacts in relation to construction and operational waste for the marine and landside infrastructure; and for waste generated during

decommissioning of the landside infrastructure is presented in **Chapter 20: Materials and Waste [APP-062]**.

Construction Traffic Management Plan (CTMP) and Construction Worker Travel Plan (CWTP)

2.5.50 An **Outline CTMP [REP4-010(4)]** has been prepared and accompanies the DCO Application. This sets out the key measures to be employed during construction of the Project to manage construction traffic associated with the Project, such as vehicle routing and explain how monitoring and auditing activities would be undertaken, in order to ensure that the measures carried out are effective.

2.5.51 An **Outline CWTP [REP4-010(4)]** has also been prepared and is appended to the Outline CTMP. This sets out the key measures to be employed during construction of the Project to minimise vehicle trips associated with construction workers and also how monitoring and auditing activities would be undertaken, in order to ensure that the measures carried out are effective.

Marine Construction Works

Overview of approach

2.5.52 Some marine construction works would likely be undertaken from the shoreside to form the jetty connection from the land to sea. The extent of work which would be conducted from the shore side would be determined by the proximity in which a jack-up barge can be brought alongside the existing seawall.

2.5.53 In the marine environment, the structures would rest upon an open piled network of steel tubular piles likely to be driven by vibro and percussive piling techniques. The deck for the approach trestle and jetty would be supported by either a pre-cast or in-situ concrete deck. A steel beam/truss structure with pre-cast concrete units may also be used. The topside pipework would be fabricated off-site in modules and moved into position. The high-level walkways between dolphins would be fabricated off-site and lifted into position. Overwater working would be strictly controlled in accordance with Port safety operations.

Capital Dredge (**Work No. 1** in part)

2.5.54 It has been determined that a capital dredge would be required for the berth. The maximum spatial extent of the dredge is estimated to be approximately 10,000m^2, dredged into existing bathymetry which varies across the area between 12.0m below Chart Datum (“CD”) to 14.5mCD. The berthing pocket with appropriate side slopes would be dredged to a maximum of 14.5m below CD, including an allowance for over dredge.

2.5.55 The majority of the berth pocket does not require any deepening as it is already below the required depth (i.e., 14.5m below CD). Furthermore, over most of the area that does not require dredging, only a relatively small amount of deepening is required. Therefore, in real terms the dredge represents a maximum deepening of 2.5m over a small area, with an extrapolated average lowering of 0.4m.

2.5.56 It is estimated that dredging of approximately 4,000m^3 of material would be required. This in situ volume is predominantly flat alluvial deposits such as unconsolidated material (silts, sands and gravel) of up to 3,900m^3, and consolidated material (e.g. glacial till with limited chalk inclusion) of up to 100m^3.

2.5.57 It is assumed that the dredged material would not be of a quality suitable for alternative use, such as for reclamation purposes, although this would be kept under review. A limited amount of chalk is anticipated in the dredge arisings, the chalk is expected to be weathered and fractured with no engineering properties to allow it to be reused on Site. The disposal of dredged material at sea would be fulfilled at licenced disposal sites within the estuary, at Holme Channel disposal site (HU056) to dispose of consolidated material, and Clay Huts disposal site (HU060) to dispose of unconsolidated material, subject to the dredge material being deemed suitable for disposal at sea by the Marine Management Organisation ("MMO").

2.5.58 A Waste Hierarchy Assessment ("WHA") which includes a more detailed consideration of the alternative options for the dredge material, is included as part of this ES (see **Appendix 2.A Waste Hierarchy Assessment [APP-172]**).

2.5.59 The capital dredge methodology is anticipated to be backhoe dredge with split hopper barge. This would ensure that only one type of dredger would need to be mobilised. Dredge operations would be continuous and operate 24 hours a day and seven days a week.

2.5.60 The location of the proposed dredge and the dredge pockets are shown on **Figure 2.7 [APP-076]**. The side pockets of the dredge pocket interface with the piles for the mooring dolphins, jetty head and the jetty itself. It would be favourable from a construction perspective to do the dredge after the piles have been installed. This may be possible for the jetty approach piles or mooring dolphin piles as the backhoe dredger could be situated perpendicular to the pile bents and trim around them as required. However, this may not be possible at the jetty head where piles are congested, and it would be difficult to dredge in and around them. Careful consideration would be given to the planning of the works to ensure that the dredging is executed at the correct time within the programme to mitigate the risk of further dredging being required prior to completion.

Works to the sea wall (**Work No. 1** in part)

2.5.61 The approach ramp which connects the landside to the jetty approach would bridge over the existing sea wall. The design would continue to allow pedestrian access for maintenance purposes only (no public access) and ensures a minimum clearance of 1.99m to the underside of the jetty (clearance may be increased during detailed design and in consultation with the Environment Agency). Once constructed, the design would continue to allow use of Public Bridleway 36 up to the sea wall but as noted earlier in this Chapter, the informal access which currently exists between the APT Jetty and the point at which Public Bridleway 36 meets the sea wall would be removed for operational reasons.

2.5.62 To futureproof the sea wall below the jetty, it would be extended up to a height of +7m Ordnance Datum prior to the jetty spans being installed. This would most likely be undertaken by tying into the existing wall using traditional formwork and in-situ concrete. As the existing sea wall will be retained, it is not anticipated that a secondary containment would be required.

Construction of the Jetty Access Ramp (**Work No. 1** in part)

2.5.63 A jetty access ramp would be constructed to accommodate the level change between the landside and the jetty structure. The jetty access ramp structure would most likely be constructed with driven steel piles and suspended concrete spans. The suspended concrete deck will rise to the jetty level in two areas prior to traversing over the existing sea wall.

2.5.64 The jetty access ramp would include a turnout ramp which would provide vehicle access to the northern side of the jetty; this is required for maintenance and emergency works. The construction of the turnout ramp would match that of the main ramp structure.

2.5.65 The suspended deck section could be driven steel tubular piles supporting primary pre-cast concrete, or steel deck beams, with an in situ concrete capping slab. This structural form would mirror the marine section of the jetty.

Construction of the Approach Jetty (**Work No. 1** in part)

2.5.66 It is currently estimated that the approach jetty to support the berth would be approximately 1.2km in length and would consist of a piled traverse rigid frames and concrete decks.

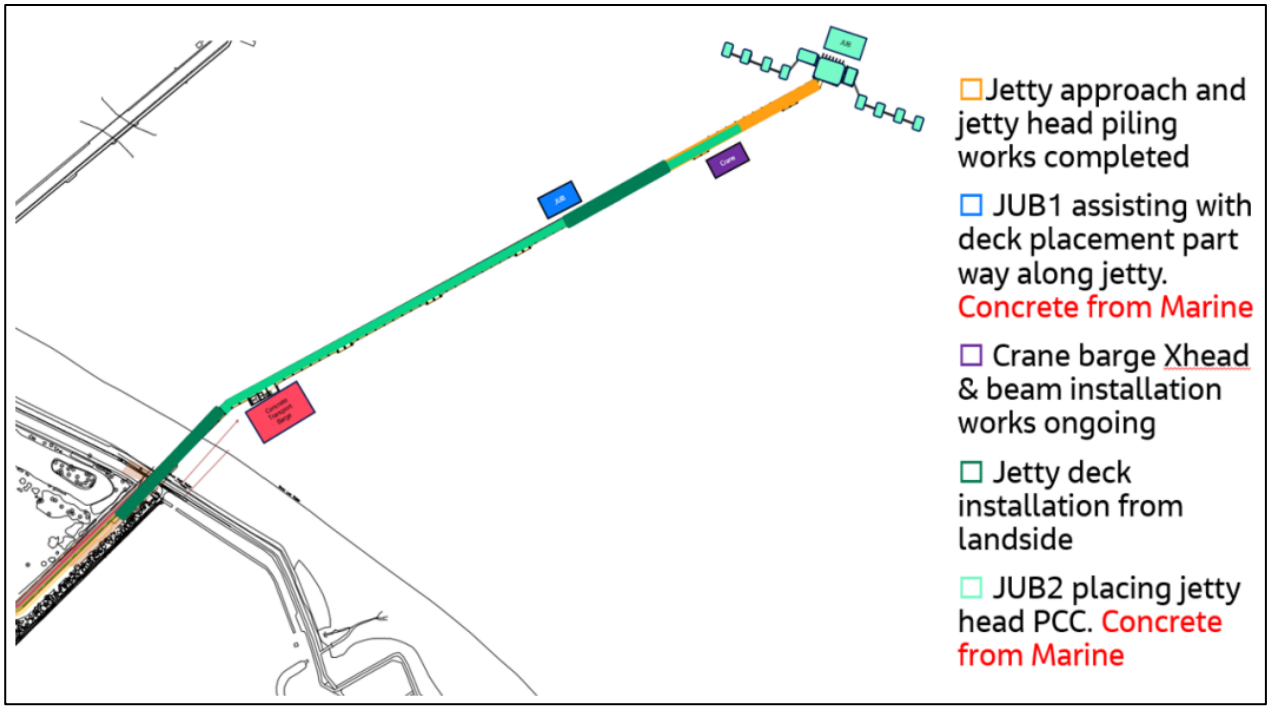
2.5.67 Temporary works using portal gates on jack-up barges would be set up for piling and then piles would be installed initially using vibro-piling to refusal. Percussive piling techniques may then be used to reach the final design level, although appropriate mitigation measures may need to be deployed.

2.5.68 Following the completion of piling, the piles would be cut to the required level prior to the pile-caps/crossheads being lifted into position. The pile-caps/crossheads may be made of steel or pre-cast concrete. Once the pile-caps/crossheads have been installed, steel or pre-cast concrete beams will be lifted onto the piles. An in-situ concrete decking will then be constructed on top of the placed beams. The lifting works would likely be undertaken by a crane barge which would follow behind the piling jack-up barge.

2.5.69 Service barges would be required to bring piles, pile-caps/crossheads, and decking from a marine load-out facility to the point of installation. It is anticipated that the marine load-out facility will be located within existing consented port areas.

2.5.70 The in-situ decking would be installed from landside at first, pumping the concrete from shore along the jetty. In-situ decking works would also be undertaken concurrently starting part way down the jetty (see **Plate 2-5**). This work would be serviced by the jack-up barge once it has completed the jetty piling activity. To supply ready-mix concrete to the jack-up barge, it would be necessary to see barges loaded from the onsite marine loadout facility (see **Plate 2-5**).

Plate 2-5: Example landside and marine construction sequence



Construction of the Jetty Head (**Work No. 1** in part)

2.5.71 It is proposed that a second jack-up barge is mobilised to install these piles concurrently with the jack-up barge installing the jetty approach piles. The piles would be installed using the same methods as the approach jetty using portal piling gates which are positioned on the side of the jack-up barge. The piles would be installed using a combination of vibro and impact pile driving.

2.5.72 Following completion of piling for the jetty head, pre-cast formwork would be installed between piles, reinforcing fixed and then the in situ concrete cast to form the deck. Fenders and bollards would then be installed.

2.5.73 The jetty head would likely incorporate a drainage system with interceptors/containment zones for spillages to protect the marine environment.

Installation of Breasting and Mooring Dolphins (**Work No. 1** in part)

2.5.74 The jetty head would be supplemented by two breasting dolphins and a further eight mooring dolphins. The length of some piles to support the breasting and mooring dolphins may require a lower section to be installed, an extension welded on in situ, before driving the piles to be finished level.

2.5.75 Following completion of the piling for each dolphin, the pre-cast formwork would be installed, reinforcing fixed and then the in-situ concrete would be cast. Bollards and fenders would be installed on the mooring face of the breasting dolphins. The mooring dolphins, breasting dolphins and jetty platform would include bollards.

Cathodic Protection (**Work No. 1** in part)

2.5.76 A cathodic protection would be required to protect the tubular steel jetty piles from corrosion. The system would either by an impressed current system comprising transformer units, cabling, anodes and monitoring equipment, or a galvanised anode system comprising aluminium-zinc anodes permanently attached to the jetty piles below low tide level.

Substructure Finishing works (**Work No. 1** in part)

2.5.77 Catwalks between the mooring dolphins, bollards, fenders, handrails, and mechanical and electrical services equipment would be installed following the above activities.

Topside Ammonia Delivery Systems (**Work No. 1** in part)

2.5.78 Following completion of the substructure the required ammonia delivery systems would be installed. This would consist of pre-assembled pipe racks, pipes, loading arms, and instrumentation and control systems. The marine loading arms and pre-assembled pipe racks would be lifted into position using a jack-up barge. Smaller items would be delivered by road transport and lifted using a mobile crane from the jetty top.

Construction Works in the Intertidal Zone

2.5.79 A section of the jetty approach structure would be constructed within the intertidal zone. The works in this zone would be undertaken by a jack-up barge which would be positioned during high tides, jacked up and prepared for work. The jack-up barge would then be able to proceed with the construction works at any state of the tide. Upon completion of piling in a particular location, the barge would await the next suitable tidal window to undertake the next move.

2.5.80 Some of the work in the intertidal zone may be conducted from the shoreside, due to insufficient water depths or barge access. These works would be undertaken within a temporary construction area situated behind the seawall.

Construction Vessels and Activity Information

2.5.81 During the construction of the jetty, there would be a requirement for multiple marine vessels. Piling operations would be undertaken from the jack-up barges; the number of barges used would be dependent upon the construction programme and work sequencing, however, it is envisaged that up to three barges would be used for the piling works. An example of a jack-up barge is shown in **Plate 2-6**.

2.5.82 Lifting in of oversized and heavy loads such as pre-cast bridge beams and headstocks could be undertaken by a crane barge.

Plate 2-6: Example Jack-Up Barge Undertaking Jetty Construction

2.5.83 The jack-up and crane barges would be supported by a fleet of support vessels which would include:

a. Tugs (likely three) used for repositioning the barge(s) into new pilling locations and for moving flat top supply barges from marine load-out to the work location.

b. Multi-cats (likely two) used to resupply the barge(s) with piles, plant, consumables and associated jetty fabrications.

c. Flat top barges (likely four) used to transport equipment to the work area, house plant etc.

d. Safety boat (likely one) used to support operations and assist with crew transfers.

e. Dredging vessels formed of backhoe dredger and split hopper barges.

2.5.84 During the jetty construction, it is anticipated that the tug, multi-cat vessels and a safety boat would be operating in the construction area daily. It is anticipated that multiple barge moves would be undertaken each week.

Sources of Noise and Vibration during Marine-Side Works

2.5.85 Some noise and vibration can be expected during the construction of the approach jetty, jetty head, breasting and mooring dolphins. Depending on the piling technique used, it is anticipated that some isolated, short-duration noise and vibration would be generated particularly during percussive piling. It is not proposed to use pre-cast driven piles. Further details as relevant are included in **Chapter 7: Noise and Vibration [APP-049].** Noise trigger levels are be defined

in the **Outline CEMP [TR030008/APP/6.5 (5)]**. Marine working hours including the approach to marine piling are covered in **Paragraph 2.5.119**.

2.5.86 In order to reduce the level of potential impact associated with noise (underwater and airborne) and vibration during marine construction works, several mitigation measures would be implemented. This includes, but is not limited to, the use of soft start procedures, vibro-piling where possible and seasonal working restrictions. An acoustic barrier/ visual screen would also be installed on the approach jetty for a period of time, and only on those sections of the approach jetty within 200 m of exposed intertidal foreshore, to screen the construction of the topside infrastructure. These measures are detailed further **in Chapter 9: Nature Conservation: Marine Ecology [APP-051]** and **Chapter 10: Ornithology [APP-052].**

Marine Construction Lighting

2.5.87 During marine construction works, various forms of lighting would be required to safely undertake the works. All support vessels and barges would use any navigational lighting which is required to comply with the procedures of the Port of Immingham and to ensure they can be seen by other vessels. This lighting would be required at all times. Additionally, the support vessels and barges would require general lighting during operational hours.

2.5.88 Task lighting would be used by the vessels and barges during operational hours to suitably illuminate the working area(s), for example, the pile gates during piling works and areas of the piles where lifting operations are being conducted.

2.5.89 Lighting would also be required on the shoreside, within the temporary construction area. The temporary storage area and the access road leading to the jetty embankment would require general lighting. Task lighting would be required at the flood defence wall where the bank seat construction would be undertaken. The task and general lighting would only be required during operational hours. Jetty Access Road (Work No. 2 in part)

2.5.90 Although part of the landside infrastructure, the construction of the jetty access road from the East Site to the jetty landfall would need to be sequenced with the construction of the Terminal (described under Work No 1. above). The Jetty Access road, from the East Site to the jetty landfall, would be constructed using heavy construction plant and would commence as early as possible in the construction schedule to ensure that there is land-based access to the jetty alignment to facilitate the construction of Work No. 1.

2.5.91 The works to construct the jetty access road would involve vegetation and topsoil strip as detailed in **Section 2.4**, followed by excavation down to formation. Drainage and utilities trenches would be installed prior to building up the road levels using suitable fill material. The road surface is likely to be asphalt, and the required road build-up would be installed by a specialist contractor.

Culverts (Work No. 1 and No. 2 in part)

2.5.92 There are three Ordinary Watercourses in the development site which will be impacted by the construction of the jetty access ramp Work No. 1 and associated jetty access road Work No. 2. The access road and associated jetty access ramp will need to pass over, or be constructed adjacent, to these watercourses.

2.5.93 Two culverts are likely to be required landside in Work No. 1, one where the new APT emergency egress footway crosses an existing field ditch which runs behind (i.e. landward of) the flood defence wall; the conveyance within the ditch will be maintained through the provision of a precast concrete pipe and the second where the new jetty access ramp and Environment Agency access ramp will be constructed over an existing field ditch which runs behind (i.e. landward of) the flood defence wall; the conveyance within the ditch will be maintained through the provision of a concrete lined channel.

2.5.94 Three culverts are likely to be required landside in Work No. 2 one where the new jetty access road crosses an existing roadside ditch near the landside access road junction with Laporte Road; the conveyance within the ditch will be maintained through the provision of a precast concrete piped culvert. The second where the new jetty access road crosses an existing field ditch mid-way along its length; the conveyance within the ditch will be maintained through the provision of a precast concrete piped culvert, and the third where the new jetty access road runs parallel with the existing field ditch; the section of ditch to the south of the access road crossing will be retained as a natural channel; however, it's profile will be modified to improve its hydraulic characteristics. The section of ditch to the north of the access road crossing will be hydraulically enhanced through the provision of a concrete lined channel due to its close proximity to the proposed infrastructure.

2.5.95 Construction of the culverts and lined channels would require the watercourses to be temporarily blocked and a pumping system installed to 'over pump' the flows downstream of the construction area. The section of the lined channel in the Long Strip would have a grated cover to facilitate pipe rack maintenance.

Overall approach to Construction of the Hydrogen Production Facility

2.5.96 During the detailed design stage, the approach to construction would be defined. For the purposes of this ES, it is assumed that certain equipment would be modularised and pre-fabricated/assembled. Modularised units, along with large specialist equipment are likely to require special transport considerations as explained below. Off-site pre-fabrication would be supplemented by on-site construction of certain larger components which due to their size or weight, may involve fabrication and erection on-site.

2.5.97 Small components and modules would be transported using the existing road network with more significant modules being transported by ship along the Humber Estuary to the Port of Immingham where they would be offloaded onto suitable haulage vehicles and transported into the Site using Kings Road with some temporary local raising/lowering of overhead lines and removal of street furniture required (**Work No. 10**).

2.5.98 Construction traffic and road haulage would be achieved along designated routes as outlined within the **Outline CTMP [REP4-010(4)]**. The Final CTMP would be prepared by the construction contractor in accordance with the Outline CTMP and is secured through a Requirement of the **draft DCO [TR030008/APP/2.1 (6)]**.

Pipeline construction (Work No. 4 and Work No. 6)

2.5.99 The pipelines would be installed as a combination of above ground sections and below ground sections. Installation below ground would be used for the pipeline corridor (Work No. 6) linking the East and West Sites other than where these pipelines would be within the sites themselves and connect into other above ground structures).

2.5.100 The pipeline installation would involve clearing of areas, preparation for pipeline installation and either Horizontal Directional Drilling ("HDD") or micro tunnelling techniques.

2.5.101 Pipeline crossing of Queens Road and the railway line would be required. It is envisaged that HDD would be used for these pipeline crossings. Pipe crossing of Laporte Road would also be required and it is envisaged that a culvert would be constructed in this location (Work No. 4).

2.5.102 The pipeline route would be marked with marker posts which would be set to ensure visibility.

East and West Site (Work No 3, No. 5 and No. 7.) construction works

2.5.103 The East and West Sites would require civil, mechanical and piping ("M&P"), and electrical and control ("E&C") construction works.

2.5.104 Civil works would include the use of piled foundations in those areas where the ground is unsuitable for supporting shallow foundations. This is expected to include the West Site, the East Site and the pipe-rack that runs from the jetty landfall to the East Site. Pile design is not yet complete, but at this stage it is anticipated that bored cast in-situ piles are likely to be adopted to minimise noise and vibration during piling activities. The exact piling technique to be employed would be finalised during detailed design. There is also a possibility that ground improvement works may be carried out in the East Site or West Site, such as installation of vibro-concrete columns or controlled modulus columns. The need for such works, and the precise techniques to be adopted, would be defined during detailed design. Some land-raising is expected to be required on these sites to bring the FGL up to a maximum of 2.5-3.8m AOD, where required. The HGV numbers associated with the importation of the required material are included within the HGV numbers for Phase 1 of the project covered in **Paragraph 2.5.121** onwards below.

2.5.105 Where practicable, the Project would use modularisation to reduce the on-site works and maximise the works completed in specialised off site fabrication facilities, to improve the safety and efficiency of the work. Sections of the plant delivered in modules will include pre-assembled pipe-racks, fired heater sections, flue stacks, compressors and pumps. M&P works would involve installation of large equipment and modules and would require heavy equipment such as cranes and transport vehicles. Coatings would be applied off-site with only coating touch up applied at the Site. An on-site fabrication facility would support the erection of steel and piping systems.

2.5.106 The E&C works would include the installation of modular electrical and control buildings which would be constructed off-site and assembled on site. The Project would be connected to the electricity transmission network via overhead or underground electricity transmission cables. Power distribution to the power distribution centres ("PDC") across the facility and onwards to the power users would be via cables installed in tray on pipe-racks or via underground ducts. Control system cabling will be installed to connect local instrumentation to the control room via the various process instrumentation buildings ("PIB") across the facility. Cabling within modules will be pre-installed during offsite fabrication.

2.5.107 The various buildings across all sites will be either pre-fabricated and transported to site, constructed using steel frame and steel cladding or brick built. The methodology for each building will be confirmed during detailed design phase.

Ammonia Storage Tank (**Work No. 3A**)

2.5.108 The ammonia storage tank (**Work No 3A**) would be situated on the East Site – Storage Area (**Work No. 3**) and would be constructed by a specialist tank contractor. The tank will have an inner and outer wall to provide dual containment. The tank would be constructed from large sections brought to Site via the Port which are lifted into position and welded. If the tank outer wall is constructed from concrete, this would be done using a slipform technique.

Construction Lighting

2.5.109 Construction lighting would be required in areas where natural lighting is unable to reach (sheltered/confined areas) and prior to permanent lighting being installed. Lighting may also be required around the landside areas of the Site for night-time construction and during core working hours within winter months.

2.5.110 Artificial lighting would be provided to maintain sufficient security and health and safety for the Site during construction. The **Outline CEMP [TR030008/APP/6.5 (5)]** outlines measures during construction to avoid excessive glare and minimise spill of light to nearby receptors (including local residents and some ecological receptors) outside of the Site as far as reasonably practicable.

Hazard Prevention

2.5.111 The potential risk events during Project construction have been identified and assessed in **Tables 22.4** and **22.5** of **Chapter 22: Major Accidents and Disasters [APP-064]**. Where risks cannot be eliminated, they would be reduced to as low as reasonably practicable ("ALARP") via controls and mitigation that primarily involve compliance with Construction Design and Management ("CDM") Regulations and compliance with the measures set out in the Final CEMP(s) (see **Paragraphs 2.5.45** - **2.5.49**).

2.5.112 A COMAH Safety Report would be submitted for review by the competent authority prior to Project construction under the COMAH Regulations 2015. The purpose of this report is to demonstrate to the competent authority that all measures necessary to reduce risk have been taken.

2.5.113 For design and construction, a competent and adequately resources CDM Coordinator and contractor would be appointed. The Applicant would ensure that its own staff, its designers and contractors follow the Approved Code of Practice ("ACoP") laid down by the CDM Regulations 2015.

Commissioning

2.5.114 Commissioning of the hydrogen production facility would include testing and commissioning of the process equipment in order to ensure that all systems and components installed are in accordance with the requirements of Air Products and meet the requirements of the Environmental Permit. Commissioning of the process equipment on the jetty topside would be handled in a similar way.

Site Access

2.5.115 There are eight proposed temporary means of access to facilitate the construction of the Project and eight permanent means of access to facilitate the operation of the Project. In some instances, the temporary accesses will become permanent following completion of the construction phase as the access would be required for both the construction and operation of the Project. This is clarified below where applicable.

2.5.116 The locations of the temporary means of access are shown as areas shaded orange and the permanent means of access shown as areas edged purple on **Street Works and Accesses Plan [TR030008/APP/4.6 (3)]**. Illustrative designs of each access are available within **Figure 4.3: Illustrative Layouts [TR030008/APP/4.3 (3)]**.

2.5.117 The temporary means of access are defined below:

a. Temporary access AA (as labelled on **Figure 4.6: Street Works and Accesses plan [TR030008/APP/4.6 (3)]**) provides access to the West Site, specifically to Work No. 7 from Kings Road. This access will be required for the construction phase and will then remain in use during the operation of the Project.

b. Temporary Access AB (as labelled on **Figure 4.6: Street Works and Accesses plan [TR030008/APP/4.6 (3)]**) provides access to the West Site, specifically to Works No. 7 from the A1173. This access will be required for the construction phase and will then remain in use during the operation of the Project.

c. Temporary Access AC (as labelled on **Figure 4.6: Street Works and Accesses plan [TR030008/APP/4.6 (3)]**) provides access to the West Site, specifically to Works No. 7 from the A1173.

d. Temporary Access M (as labelled on **Figure 4.6: Street Works and Accesses plan [TR030008/APP/4.6 (3)]**) provides access to the east site, specifically to Work No. 3 from the unnamed private road to water treatment works, this road then connects to Queens Road. This access will be required for the construction phase and will then remain in use during the operation of the Project.

e. Temporary Access O (as labelled on **Figure 4.6: Street Works and Accesses plan [TR030008/APP/4.6 (3)]**) provides access to the East Site, specifically to Work No. 3 from Laporte Road.

f. Temporary Access N (as labelled on **Figure 4.6: Street Works and Accesses plan [TR030008/APP/4.6 (3)]**) provides access to the East Site, specifically to Work No. 5 from Laporte Road.

g. Temporary Access P (as labelled on **Figure 4.6: Street Works and Accesses plan [TR030008/APP/4.6 (3)]**) provides access to the East Site, specifically to Work No. 9 from Laporte Road.

h. Temporary Access U (as labelled on **Street Works and Accesses plan [TR030008/APP/4.6 (3)]**) provides access to Work No. 8 from Queens Road.

2.5.118 The permanent means of access are defined below:

a. Permanent access AA (as labelled on **Figure 4.6: Street Works and Accesses plan [TR030008/APP/4.6 (3)]**) provides access to the West Site, specifically to Work No. 7 from Kings Road. This access is required for the construction phase and will then remain in use during the operation of the Project.

b. Permanent Access Z (as labelled on **Figure 4.6: Street Works and Accesses plan [TR030008/APP/4.6 (3)]**) provides access to the West Site, specifically to Work No. 7 from Kings Road.

c. Permanent Access AB (as labelled on **Figure 4.6: Street Works and Accesses plan [TR030008/APP/4.6 (3)]**) provides access to the West Site, specifically to Work No. 7 from the A1173. This access will be required for the construction phase and will then remain in use during the operation of the Project.

d. Permanent Access M (as labelled on **Figure 4.6: Street Works and Accesses plan [TR030008/APP/4.6 (3)]**) provides access to the east site, specifically to Work No 3 from the unnamed private road to water treatment works, this road then connects to Queens Road. This access will be required for the construction phase and will then remain in use during the operation of the Project.

e. Permanent Access K (as labelled on **Figure 4.6: Street Works and Accesses plan [TR030008/APP/4.6 (3)]**) provides access to the East Site, specifically to Work No. 2 from Laporte Road.

f. Permanent Access J (as labelled on **Figure 4.6: Street Works and Accesses plan [TR030008/APP/4.6 (3)]**) provides access to the East Site, specifically to Work No. 5 from Laporte Road.

g. Permanent Access L (as labelled on **Figure 4.6: Street Works and Accesses plan [TR030008/APP/4.6 (3)]**) provides access to the East Site, specifically to Work No. 3 from Laporte Road.

h. Permanent Access A (as labelled on **Figure 4.6: Street Works and Accesses plan [TR030008/APP/4.6 (3)]**) provides access to the East Site, specifically to Work No. 5 from unnamed private access road.

Construction Working Hours

Marine Construction Working Hours

2.5.119 In months where percussive piling is permitted within the water body, spatial, diurnal and duration restrictions apply for certain periods as set out in the Deemed Marine Licence which forms Schedule 3 of the **draft DCO [TR030008/APP/2.1 (6)]**. For example, it is anticipated that night time restrictions will apply to percussive piling works within the water body for Work No. 1, seaward of the mean highwater mark, outside the hours of sunrise and sunset in certain summer months (June and August) and between 19:00 and 07:00 in certain winter months (March, September and October), seven days a week. Other marine construction activities for Work No. 1 including dredging, are assumed to be undertaken on a 24-hour basis and continue until completion for safety or quality reasons. The marine construction working hours would be secured through the Deemed Marine Licence.

2.5.120 Some landside construction activities to support marine working may be required during the marine construction working hours. This landside working would be restricted to the work areas defined for Work No 1, 2 and 9. The landside activities are expected to include material supply, plant maintenance and vehicle movements to support the construction of Work No. 1.

Landside Construction Working Hours

2.5.121 Core construction working hours for the landside works is between 07:00 and 19:00 Monday to Saturday. A Requirement in Schedule 2 of the **draft DCO [TR030008/APP/2.1 (6)]** secure the landside construction working hours and the approach to exceptions to the core working hours. Exceptions may be required because certain construction activities cannot be stopped, such as concrete pouring or tank welding, to support the marine works (and also to manage the construction programme). Where on-site works are to be conducted outside these core hours, they would comply with any restrictions secured in the Requirements or would be agreed with the local planning authority. The need for any such works would be minimised where possible and would be carefully managed to reduce effects on local people.

Construction Traffic

2.5.122 The largest daily development traffic trips (workforce and HGVs) are predicted to be generated in the first phase of construction (Year 2) and have been calculated to total approximately 1,717 two-way trips, with the majority of trips associated with workers commuting to and from the Site.

2.5.123 The construction workforce is anticipated to travel to the Site via the existing trunk road and local road networks. Construction staff arriving by car would use on-site parking, primarily within the Temporary Construction Areas [Works No. 8 and No. 9 through use of Work Nos. 5a and 7 during the early phases of construction].

2.5.124 HGVs delivering construction materials would also access the Site from the A180 and A1173. The volume of HGVs associated with construction of the Project on the network is predicted to be at its maximum of 199 daily two-way vehicle movements (99.5 in and 99.5 out) during Year 2 of construction. The other 6 phases of the construction period, would generate at least 50% less traffic than the peak as described above and as assessed in **Chapter 11: Traffic and Transport [APP-053]**.

2.5.125 Combining construction workforce vehicle movements with construction HGV movements over the entire construction programme shows the overall peak in vehicle movements which would occur would be 1,717 movements in total (1,518 two-way car/van movements and 199 two-way HGV movements per day). Further information on traffic volumes and routing is provided in **Chapter 11: Traffic and Transport [APP-053]**.

2.5.126 It is anticipated that, prior to the start of each construction phase, the contractor would prepare a Final Construction Traffic Management Plan to manage HGV movements, as well as a Final CWTP (to be appended to the CTMP) to manage the trips made by the construction workers (including encouraging car sharing) and thus reduce the impact of the workforce upon the highway network. The Final CTMP(s) and CWTP(s) would be based on the measures set out in the **Outline CTMP [REP4-010(4)]** and **Outline CWTP [REP4-010(4)]** which are submitted with the DCO Application. The production of the final (or phased) CTMP(s) (and associated CWTP(s)) is secured through a Requirement in Schedule 2 of the **draft DCO [TR030008/APP/2.1 (6)]**.

2.5.127 These plans would set out measures and controls to limit the number of trips on the local road network in the peak hours, and as such aim to limit the traffic impact of the construction phase as far as possible. Such plans would be implemented for the duration of the Project construction phase.

2.5.128 It is proposed that the largest abnormal loads would be received at the Port where they would be offloaded onto suitable haulage vehicles and transported into the Site using the A1173, Kings Road. In order to facilitate this, the temporary removal of some specific items of street furniture and overhead cables in four locations (as identified in the **Works Plans [TR030008/APP/4.2 (4)]** would be required to allow the passage of these loads along Kings Road to the Site. This would take place up to 30 times over a six month period during Phase 1. Similar movements are also likely to be required in Phases 2-6 to support the build out of the remaining phases of the hydrogen production facility but the frequency of movements is expected to be lower. The overhead lines would be modified overnight to accommodate the abnormal loads and would be reinstated after the transport. The street furniture would be taken down and reinstated as soon as practicable.

2.6 Operational Phase

2.6.1 The **draft DCO [TR030008/APP/2.1 (6)]** permits the operation, use and maintenance of the Project. The definition of “maintain” in the **draft DCO [TR030008/APP/2.1 (6)]**is stated to include “inspect, repair, adjust, alter, remove or reconstruct” and those activities have been taken into account in the assessment contained in this Environmental Statement.

Terminal Operation

2.6.2 The Terminal would operate 24 hours a day, seven days a week and 365 days a year. The Terminal would have capacity of approximately 11 million tonnes per annum and so be able to accommodate up to 292 vessel calls per year and it is anticipated that up to 12 of these calls would be associated with the hydrogen production facility. The vessels which make up the remaining 280 calls to the Terminal are expected to serve the future carbon capture and storage market and other liquid bulk energy product markets.

2.6.3 The total vessel numbers have been assessed as the worst-case scenario in terms of potential environmental effects in the relevant topic chapters of this ES. A series of assumptions for shipping sizes, imported material and origin have been made as follows:

a. 660,000 tonnes of Terminal capacity would be used for the import of green ammonia for the hydrogen production facility (comprising 12 ships each transporting 55,000 tonnes) from the Middle East and Netherlands.

b. For the carbon capture market, it is assumed that there would also be approximately 9,800,000 tonnes of CO2 which are imported from a maximum distance of 500 nautical miles.

c. It is also assumed that domestic (UK) re-export of liquid bulk products is likely to occur to three port destinations (Teesport, Port Talbot, Cardiff) with an assumed 5,000,000 tonnes re-exported to the furthest distance port (Port Talbot). Of this only 100,000 tonnes of the domestic exports are expected to relate to Air Products shipping of ammonia.

d. The future origins and destinations are however likely to vary substantially based on individual future jetty users and their patterns of operation. The current shipping assumptions are considered to be a realistic worst case, based on current knowledge available.

2.6.4 Operational staff numbers for the Terminal are likely to be up to 14 with at least some staff working to shift systems.

Operation of the Hydrogen Production Facility

2.6.5 The hydrogen production facility is intended to be a continuous operation, although this would be dependent upon shipping frequency. The intention is therefore that the facility will operate 24 hours a day, seven days a week and 365 day a year.

2.6.6 Operational staff numbers and shift patterns would vary across the facility depending upon the duties being undertaken as illustrated in **Table 2-12.**

Table 2-12: Indicative Operational Staff Numbers and Shift Patterns

Role	Staff Numbers	Days	Base Location
Facility Manager	1	Mon – Fri	Site
Production Manager	1	Mon – Fri	Site
Integration Manager	1	Mon – Fri	Site
Environment, Health & Safety Coordinator	1	Mon – Fri	AP Central Offices
Production Superintendent	1	Mon – Fri	Site
Shift Supervisors	4	7 days a week	Site (shift rotation)
Plant Operators	16	7 days a week	Site (shift rotation)
Jetty Operators (Topside infrastructure)	8	7 days a week	Site (shift rotation)
Clerks	1	Mon – Fri	Site
Plant Maintenance	4	7 days a week	Site
Drivers	50	7 days a week	Transient Work Force
Contractor	8	7 days a week	3rd party contractor

Role	Staff Numbers	Days	Base Location
Janitor	2	Mon – Fri	3rd party contractor
Security	9	7 days a week	3rd party contractor
Other workers	14	5 days a week-	AP- Transient Work Force Based at the site but will travel outside the site
Total	120		

2.6.7 It is anticipated that once fully operational, a fleet of up to 50 tanker trailers and tractor units would operate in distributing the green hydrogen throughout the UK. This fleet is predicted to generate an average of around 96 daily movements (48 inbound, 48 outbound) and these movements would take place across the full day (24 hours).

Hazard Prevention

2.6.8 The Applicant aims to protect human health by safely and responsibly managing activities on Site. Based on the volumes of hazardous materials to be stored on the Site, a Hazardous Substance Consent will be required and an application was duly submitted to NELC in March 2023 (application reference number DM/0077/23/HS). The hydrogen production facility would also be regulated in accordance with the HSE's requirements through the COMAH Regulations 2015 and other applicable legislation, industry standards and best practice for the design of process equipment identified in **Chapter 22: Major Accidents and Disasters [APP-064]**.

2.6.9 Continuous monitoring would observe operational conditions such as temperature and pressure, with routine inspection and planned preventative maintenance carried out on all assets to ensure the plant operates safely and efficiently.

2.6.10 All personnel associated with the operation of the Project facilities would be subject to the highest standards of training and competency assurance, including process operators, vessel and jetty personnel and road tanker drivers.

2.6.11 The proposed operation of the Site and the on and off-site emergency plans would be subject to rigorous appraisal by the COMAH competent authority and other stakeholders. As the operator of the facility, Air Products notified the HSE in April 2023 and will submit two COMAH Safety Reports for review (one submitted prior to construction and a second prior to operation), as required by Regulation 7 of the COMAH Regulations to demonstrate that taken all measures necessary to prevent major accidents and to limit the consequences to people and the environment of any that do occur have been taken. The competent authority would authorise Site operations through review / assessment of the COMAH Safety Report.

2.6.12 When operational, the Site would form part of the existing Humberside COMAH cluster. The purpose of these groups is to share information and provide a cooperative, collaborative forum for operators of COMAH sites. The information shared includes the hazards which are present on each site and emergency response plans. Humberside is one of the main clusters in the UK, with sites working together to share information with local residents and people working near the sites as well as with the competent authority and local authorities.

2.6.13 The implications for land uses around the hydrogen production facility have been carefully considered (see **Table 22.2 Relevant Legislation, Policy and Best Practice Regarding MA&D**). As mentioned in **Section 2.3**, the residential use of certain properties on the west side of Queens Road would need to cease as residential use is not considered to be compatible with the operation of the hydrogen production facility on the West Site (based on an assessment undertaken on behalf of Air Products) such that the continued residential uses would be an impediment to the grant of Hazardous Substances Consent. Discussions are ongoing with the owners and occupiers and, where it is not possible to acquire those properties through negotiation, acquisition powers for these properties are sought through the DCO.

2.6.14 Further, as mentioned in **Section 2.3**, a number of businesses and commercial properties are also present in the same area on the west side of Queens Road. It is not expected that the operation of the hydrogen production facility will have any materially adverse impacts on the continued operations of other business in the area based on assessments undertaken.

2.6.15 It is the strong preference of both ABP and Air Products to acquire all necessary interests in land for the construction and operation of the Project through negotiation. Both parties aim to continue discussions with all affected parties through the development of the Project. See the **Statement of Reasons [AS-008]** for further details.

Environmental Management

2.6.16 The hydrogen production facility would comply with the Environmental Permitting (England and Wales) Regulations 2016 (0) (“EPR”) by obtaining an Environmental Permit from the Environment Agency as detailed in **Chapter 4: Legislative and Consenting Framework [APP-046]**.

2.6.17 The Site would operate in line with appropriate standards and the operator would implement and maintain an EMS which would be certified to International Standards Organisation (“ISO”) 14001. The EMS would outline the procedures required to ensure that the Site operates to an appropriate standard.

2.6.18 Sampling and analysis of pollutants would be carried out where required, including monitoring of exhaust emissions levels using continuous emissions monitoring systems (“CEMS”) prior to discharge from the stacks, in accordance with the Environmental Permit.

Operational Heavy Goods Vehicle Movements

2.6.19 HGVs would use the A1173 to access the Site. Operational traffic movements are detailed in **Chapter 11: Traffic and Transport [APP-053]**. In summary, it is anticipated that during the operational phase of the Project, total HGV movements at the Site would be approximately 96 movements (48 in and 48 out) per day. These figures include movements associated with the delivery of consumables and removal of waste products.

2.6.20 The air quality, noise and transport assessments (**Chapters 6: Air Quality [APP-048]; 7: Noise and Vibration [APP-049]** and **11: Traffic and Transport [APP-053]**) consider the worst case traffic profile associated with that topic, which are associated with construction – a detailed assessment of the operational phase of the Project is not considered necessary as the vehicle numbers generated would be considerably lower that the screening threshold for a more detailed assessment (e.g. >200 vehicles per day).

Maintenance Dredging and Disposal

2.6.21 During operation of the Project, maintenance dredging will potentially be required in the same way as currently occurs at the Port. The modelling of the scheme (as reported in **Chapter 16: Physical Processes [APP-058])** indicates that the berth pocket, once dredged, will remain swept clear of deposited material by the flood and ebb tidal flows (in much the same way the existing Immingham Oil Terminal berths are). Consequently, the need for future maintenance dredging within the new berth pocket is expected to be very limited (if required at all).

2.6.22 Should maintenance dredging be required, it is proposed to be incorporated within the maintenance dredge licence for Immingham (L/2014/00429/1) as part of the renewal of the licence at the end of 2025.

Hydrogen Production Facility Maintenance

2.6.23 The hydrogen production facility would be designed and operated as a continuous operation high reliability plant being on stream over 95% of the time. The facility would have a planned preventive maintenance programme. This would include each Hydrogen Production Unit being shut down for several weeks every two years for catalyst change, whilst other equipment would be taken offline for maintenance regularly without impacting operation of the facility. In order to achieve such a high level of continued operation, certain equipment and controls would be duplicated to allow operations to continue whilst maintenance is underway.

2.7 Decommissioning

2.7.1 The main elements of the Terminal would not be decommissioned. The jetty, jetty head, loading platforms, access ramps and the jetty access road would, once constructed, become part of the fabric of the Port estate and would, in simple terms, continue to be maintained so that they could be used for port-related activities to meet a long-term need.

2.7.2 The hydrogen production facility would have a design life of up to approximately 25 years, although the operational life could be longer, depending on its integrity and market conditions at that time. When appropriate, this infrastructure would be decommissioned. It is anticipated that plant and equipment on the jetty topside associated with hydrogen production would be decommissioned in parallel with the decommissioning of the related landside elements.

2.7.3 Decommissioning would be undertaken safely, in line with specific procedures and subject to risk assessment and permit to work schemes, and with regard to the environmental legislation at the time of decommissioning. The required licences and permits would also be acquired.

2.7.4 Decommissioning of the hydrogen production facility would likely involve leaving underground infrastructure such as pipelines, piles, foundations, culverts and drainage in situ and making them safe. All above ground infrastructure associated with the Project would likely be dismantled and all materials removed would be reused or recycled where possible or disposed of in accordance with relevant waste disposal regulations at the time of decommissioning. Land would be restored to a satisfactory state.

2.7.5 An Outline Decommissioning Environmental Management Plan ("DEMP") is submitted as part of the application for development consent. A Final DEMP would be produced prior to decommissioning or demolition works being undertaken, which would detail measures to be implemented to avoid or reduce environmental impacts during the decommissioning of the hydrogen production facility and the related infrastructure on the topside of the jetty. The provision of a DEMP is secured by Requirement in Schedule 2 of the **draft DCO [TR030008/APP/2.1 (6)]**.

2.8 References

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