



Immingham Green Energy Terminal

TR030008

Volume 6

6.2 Environmental Statement

Chapter 18: Water Use, Water Quality, Coastal
Protection, Flood Risk and Drainage

Planning Act 2008

Regulation 5(2)(a)

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

Immingham Green Energy Terminal

Development Consent Order 2023

6.2 Environmental Statement

Chapter 18: Water Use, Water Quality, Coastal Protection, Flood Risk and Drainage

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18 Water Use, Water Quality, Coastal Protection, Flood Risk and Drainage

18.1 Introduction

18.1.1 This chapter of the Environmental Statement (“ES”) has been produced to assess the likely significant effects of the Project on water use, water quality, coastal protection, flood risk and drainage.

18.1.2 The impact assessment has been undertaken in accordance with the following broad stages:

- a. Reviewing the planning and legislative context.
- b. Establishing the baseline.
- c. Appraisal of potential impacts and determining the classification and significance of effects.
- d. Identification of potential mitigation and enhancement measures.
- e. Identification of any residual likely significant effects.

18.1.3 Environmental effects have been assessed for the construction, operational and decommissioning phases of the Project. The residual effects reported at the end of this chapter take account of embedded mitigation and the implementation of additional mitigation measures as described in this chapter.

18.1.4 There are interrelationships related to the Project’s potential effects on water quality, coastal protection, flood risk and drainage and other disciplines. Therefore, reference should also be made to the following chapters of the **ES [TR030008/APP/6.2]**:

- a. **Chapter 9: Nature Conservation (Marine Ecology).**
- b. **Chapter 16: Physical Processes.**
- c. **Chapter 17: Marine Water and Sediment Quality.**
- d. **Chapter 19: Climate Change.**
- e. **Chapter 21: Ground Conditions and Land Quality.**

18.1.5 This chapter is also supported by the following figures **[TR030008/APP/6.3]** and appendices **[TR030008/APP/6.4]**:

- a. **Figure 18.1:** Study Area.
- b. **Figure 18.2:** Environment Agency Flood Map for Planning.
- c. **Figure 18.3:** Risk of Flooding from Surface Water.
- d. **Figure 18.4:** WFD Water bodies within ZOI
- e. **Figure 18.5:** WFD Baseline Screening Sampling Locations
- f. **Appendix 18.A:** Flood Risk Assessment.
- g. **Appendix 18.B:** Drainage Strategy.

- h. **Appendix 18.C:** Water Quality Sampling 2023
- i. **Appendix 17.A:** WFD Screening Assessment (incorporates all WFD aspects).

18.2 Consultation and Engagement

- 18.2.1 A scoping exercise was undertaken in August 2022 to establish the form and nature of the water quality, coastal protection, flood risk and drainage assessment, and the approach and methods to be followed. The Scoping Report (**Appendix 1.A [TR030008/APP/6.4]**) records the findings of the scoping exercise and details the technical guidance, standards, best practice and criteria being applied in the assessment to identify and evaluate the likely significant effects of the Project on water quality, coastal protection, flood risk and drainage. A Scoping Opinion was adopted by the Secretary of State on 10 October 2022 **[TR030008/APP/6.4]**.
- 18.2.2 The first Statutory Consultation took place between 9 January and 20 February 2023 in accordance with the Planning Act 2008 (“2008 Act”). The Applicant prepared a Preliminary Environmental Information Report (“PEI Report”), which formed part of the consultation.
- 18.2.3 Through consideration of the responses to the first Statutory Consultation, the developing environmental assessments and through ongoing design-development and assessment, a series of changes within the Project were identified. A second Statutory Consultation took place between 24 May and 20 July 2023 in accordance with the 2008 Act and a PEI Report Addendum formed part of the consultation.
- 18.2.4 A range of stakeholders were engaged as part of the scoping process to obtain their views on the Project and the scope of the water quality, coastal protection, flood risk and drainage assessment, the results of which are presented within the Scoping Opinion (**Appendix 1.A [TR030008/APP/6.4]**).
- 18.2.5 Consultation has been undertaken with the following stakeholders to discuss any potential issues relating to water quality, coastal protection, flood risk and drainage:
 - a. Environment Agency
 - b. North-East Lindsey Drainage Board (“NELIDB”)
 - c. Coal Authority
 - d. Natural England
 - e. Immingham Town Council
 - f. Lincolnshire Council
 - g. North East Lincolnshire Council (“NELC”)
 - h. Crown Estate
 - i. The Port Authority
 - j. Marine Management Organisation (“MMO”)
 - k. Anglian Water.

- 18.2.6 The consultation undertaken with statutory consultees to inform this chapter, including a summary of comments raised via the formal scoping opinion (**Appendix 1.A [TR030008/APP/6.4]**) and in response to the formal consultations and other pre-application engagement is summarised in **Table 18-1**. The full responses to consultation comments are included within the **Consultation Report [TR030008/APP/5.1]**.

Table 18-1: Consultation summary table

Reference/ Date	Consultee	Summary of Response	How comments have been addressed in this chapter
Scoping Report August 2022	Environment Agency	<p>Paragraph 17.2.14 considers that the residual risk from overtopping or failure of defences is low and as a result, the potential impacts of this are given little weight in the remainder of the Report. The flood risk assessment will need to recognise that the probability of defence failure is not suitable for planning purposes; we would refer the Applicant to paragraph 024 of the recently updated Planning Practice Guidance (Flood risk and coastal change section) for further information on what is required in this respect. To help with considering the residual risk the Environment Agency has produced Coastal Hazard Mapping which covers the site (this is not referenced as a data source in paragraph 17.2.1). To obtain this information the Applicant is advised to make a formal enquiry to our Customers and Engagement team at LEnquiries@environment-agency.gov.uk. Please request a Product 3/8. There is no charge for this information. COMAH regulated sites are expected to consider the level of flood risk and appropriate resilience. This is set out in the Inspection of COMAH Operator Flood Preparedness delivery guide. The delivery of this is not specifically required within the EIA for planning purposes, but it will need to be considered as part of the pre-operation Safety Report. As such, it would be prudent to consider this alongside planning guidance on flood risk so that any additional mitigation standards, which may be required</p>	<p>Existing flood risk issues are considered in Section 18.6 and the assessment of impacts and effects is detailed in Section 18.8.</p> <p>The Flood Risk Assessment (“FRA”) which forms ES Appendix 18.A [TR030008/APP/6.4] assesses in detail the residual risk of flooding from overtopping and flood defence failure using the Coastal Hazard Mapping provided by the Environment Agency. The maximum breach flood water level for the 2115 0.5% AEP and 0.1% AEP events have been provided by the Environment Agency and have been used to inform mitigation measures for the Project.</p> <p>The Project is designed to meet the requirements defined under the COMAH regulations, including flood preparedness therefore a Pre-operation Safety Report is currently being undertaken.</p> <p>The assessment of physical processes is provided in Chapter 16: Physical Processes [TR030008/APP/6.2] and explains how geomorphology has been considered.</p>

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Reference/ Date	Consultee	Summary of Response	How comments have been addressed in this chapter
		during site operation (e.g. for the storage of hazardous substances), can be included from the outset. Although physical processes are considered in Chapter 17, we would also like to see a discussion (or cross-reference to any discussion in Chapter 15) regarding geomorphology resulting from said processes.	
	Anglian Water	There are significant existing Anglian Water assets including water mains along the south side of the site and within the roads to the north and east. Water recycling assets including rising mains also run to the south, east and north of the site. Maps of Anglian Water's assets are available to view at: www.digdat.co.uk	Noted.
		Anglian Water notes that the promoter identifies at Page 211 that surface water on site is managed by the Port of Immingham (17.2.21). We conclude from this that no surface water will be managed via the Anglian Water public sewer network. At 17.2.3 the promoter comments on the proximity of an Anglian Water 600mm foul sewer in proximity to the site boundary. The rising main on the southern edge of the site is 450mm, the sewers to the north and east of 300mm with connections of 150mm. These assets are part of and serve the wider Immingham Water Recycling catchment including the town of Immingham to the west.	Noted.
		We note that other than a reference to a 'main water pipe' (2.2.7) the promoter does not refer to	The presence of Anglian Water assets is noted and this information has been used to inform Project planning and design. Discussions with Anglian

Reference/ Date	Consultee	Summary of Response	How comments have been addressed in this chapter
		<p>the water supply network assets which run along Kings Road, Queens Road and the southern boundary of the site. Through consultation proposed in 17.7.1 Anglian Water would want to ensure the location and nature of these assets is identified and protected. To reduce the need for diversions and the attendant carbon impacts of those works, ground investigation would enable the promoter to design out these potential impacts and so also reduce the potential impact on services if construction works cause a pipe burst or damage to supporting infrastructure. This approach would accord with Project Objective C. at 2.4.2.</p> <p>The Scoping Report refers to Anglian Water assets and that:</p> <ul style="list-style-type: none"> • the project relies upon a connection to the 'local sewer network' (21.4.7), • a potable water supply connection is required to a 'local main water network' (2.4.20) • a 'site wide cooling water system' is required (2.4.22) <p>In view of the guidance in the National Policy Statements we would have anticipated that the scoping would have included and then considered the approach to water supply, water resources and water recycling assets. Anglian Water requests that these points are assessed early in the EIA to set out how the project will be supplied with water, its wastewater managed, how water assets serving residents and business will be protected and how design has been altered to reduce the need for</p>	<p>Water in relation to asset protection measures are ongoing. The development of protective provisions in respect of Anglian Water's interests is ongoing.</p> <p>Further detail on the Project's water supply requirements are provided in Chapter 2: The Project [TR030008/APP/6.2] and also at Section 18.7 in this Chapter. 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.</p> <p>The Outline Construction Environment Management Plan ("CEMP") for the Project accompanies the DCO Application [TR030008/APP/6.5]. The final CEMP would be prepared by the contractor, in accordance with the Outline CEMP, prior to commencement of construction and is secured by Development Consent Order ("DCO") requirement. The Outline CEMP confirms that a Water Management Plan would be prepared as part of the final CEMP.</p>

Reference/ Date	Consultee	Summary of Response	How comments have been addressed in this chapter
		<p>new water infrastructure or the diversion of existing assets.</p> <p>We support the inclusion of water (17.5.3) including water infrastructure in the Construction Environment Management Plan and Water Management Plan. The CEMP and a WMP should include steps to remove the risk of damage to Anglian Water assets from plant and machinery including haul roads. Further advice on minimising and then relocating Anglian Water existing assets can be obtained from: connections@anglianwater.co.uk</p> <p>The site is in the East Lincolnshire Water Resource Zone (WRZ), which supplies water to Grimsby the eastern parts of Lincolnshire WRZ and serves communities as far south as Boston. We note that whilst the scoping considers water environment impacts it does not look at water resources. As the site is within an area of 'serious water stress' designated by the Environment Agency and water is used in the project construction and operation this indicates that water resources should be assessed in the EIA, learning lessons from previous projects such as Sizewell C. This may include consideration of the Socio-Economic effects of the use of water for the project in the context of growth and climate change as well the potential impacts on communities and business if these services are distributed. There is no reference to assessment of the carbon costs of</p>	

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		<p>relocating water infrastructure if assets are impacted during construction or operation.</p> <p>Anglian Water notes that the applicant has not sought to scope these matters out by providing sufficient information to reach a conclusion that the projects impact regarding water supply as well as water recycling and water quality, are not significant.</p>	
		<p>Anglian Water would welcome the instigation of discussions with Associated British Ports as the prospective applicant, in line with the requirements of the 2008 Planning Act and guidance. Experience has shown that early engagement and agreement is required between NSIP applicants and statutory undertakers during design and assessment and well before submission of the draft DCO for examination. Consultation at the statutory PEIR stage would in our view be too late to inform design and may result in delays to the project. We would recommend discussion on the following issues:</p> <ol style="list-style-type: none"> 1. Requirement for potable and raw water supplies 2. Impact of development on Anglian Water's assets including groundwater and water abstraction and the need for mitigation 3. Requirement for water recycling connections 4. The design of the project to minimise interaction with Anglian Water assets and specifically to avoid the need for diversions which have carbon costs 	<p>An assessment of the cumulative effects of the Project with other nearby development is presented in Chapter 25: Cumulative and In-combination Effects [TR030008/APP/6.2]. No proposed Anglian Water projects are identified on the Long List of developments for further consideration and no cumulative impacts are expected in relation to Anglian Water projects.</p>

Reference/ Date	Consultee	Summary of Response	How comments have been addressed in this chapter
		<p>5. Confirmation of the project’s cumulative impacts (if any) with Anglian Water projects</p> <p>6. Draft Protective Provisions</p>	
	Planning Inspectorate	<p>Paragraph 17.2.14 considers that the residual risk from overtopping or failure of defences is low. The Applicant’s attention is drawn to the Environment Agency’s consultation response and paragraph 024 of the Planning Practice Guidance (Flood risk and coastal change) which states that information on the probability of flood defence failure is unsuitable for planning purposes given the substantial uncertainties involved in such long-term predictions. The Applicant is advised to use the Environment Agency Coastal Hazard Mapping when considering residual flood risk and agree the detailed flood risk methodology and mitigation with the Environment Agency where possible.</p>	<p>The FRA which forms Appendix 18.A [TR030008/APP/6.4] assesses in detail the residual risk of flooding from overtopping and flood defence failure using the Coastal Hazard Mapping provided by the Environment Agency. The maximum breach flood water level for the 2115 0.5% AEP and 0.1% AEP events have been provided by the Environment Agency and have been used to inform mitigation measures for the Project.</p>
		<p>Paragraph 17.2.5 notes that tide-locking is an existing problem for Habrough Marsh Drain and North Beck Drain. The Inspectorate draws attention to concerns within the consultation response from North East Lindsey Drainage Board that offshore infrastructure in proximity to the gravity outfall of Habrough Marsh Drain could impede drainage. The ES should consider any likely impacts arising from the construction and operation of the offshore infrastructure on the function of drains outfalls and implications for flood risk onshore.</p>	<p>The Habrough Marsh Drain gravity outfall and the associated intertidal area is considered in Chapter 16: Physical Processes [TR030008/APP/6.2]. The Chapter assesses the impacts of the marine development for both the construction and operation phases of the Project. Chapter 16: Physical Processes [TR030008/APP/6.2] states “Across the wider study area (including the existing berths at Immingham Oil Terminal (IOT), the rest of the intertidal area along the Immingham frontage, the Habrough Marsh Drain and Immingham Sea outfalls, the offshore banks and channels and the wider estuary up- and down-stream), the Project marine facilities have no impact on the existing (baseline) accretion and erosion rates.” Based on this assessment no impacts are predicted from the construction and</p>

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			operation of the offshore infrastructure on the function of drains, outfalls etc, therefore any impacts on flood risk onshore are considered unlikely.
	North East Lindsey Drainage Board	The onshore part of the site is within the North East Lindsey Drainage Board area. Generally, the report contains appropriate references to North East Lindsey Drainage Board and the Board has already provided information to the consultants. An area of concern is the impact offshore. The proposals show new infrastructure in the Humber near to the gravity outfall of Habrough Marsh Drain, there is concern that this will result in siltation which will impede the discharge. The FRA should address this and put in place measures to mitigate it.	The Habrough Marsh Drain gravity outfall and the associated intertidal area is considered in Chapter 16: Physical Processes [TR030008/APP/6.2] . The Chapter assesses the impacts of the marine development for both the construction and operation phases of the Project. Chapter 16: Physical Processes [TR030008/APP/6.2] states “Across the wider study area (including the existing berths at Immingham Oil Terminal (IOT), the rest of the intertidal area along the Immingham frontage, the Habrough Marsh Drain and Immingham Sea outfalls, the offshore banks and channels and the wider estuary up- and down-stream), the Project marine facilities have no impact on the existing (baseline) accretion and erosion rates.” Based on this assessment no likely impacts are predicted from the construction and operation of the offshore infrastructure on the function of drains, outfalls etc, therefore any impacts on flood risk onshore are considered unlikely. No additional mitigation measures are required.
Statutory Consultation January 2023	Anglian Water	Can you advise when Anglian Water will be provided with information on the water demand requirements for the project?	Further detail on the Project’s water supply requirements are provided in Chapter 2: The Project [TR030008/APP/6.2] and also at Section 18.7 in this Chapter.
		Anglian Water had decided to bring the planning liaison for the IGET project back in house given the potential demand for and possible impact on water resources.	Noted.
		There are significant existing Anglian Water assets including water mains along the south side of the site and within the roads to the north and east. Water recycling (sewerage) assets, including rising mains, also run to the south, east and north of the	The presence of Anglian Water assets is noted and this information has been used to inform Project planning and design. The Applicant can confirm that protective provisions for relevant AWS assets are included in the draft Development Consent Order (“DCO”)

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		<p>site. Anglian Water understands as of 31 January 2023, no diversions are required by the project. The protection of existing infrastructure through stand-off distances (e.g.) and the process for agreeing diversions will be required to be set out with Protection Provisions (PPs) and Requirements in the draft DCO order. The draft DCO should be agreed with Anglian Water's team in advance of submission of the application to the Planning Inspectorate.</p>	<p>[TR030008/APP/2.1] and summarised in the Utilities Statement [TR030008/APP/7.7].</p> <p>Air Products is actively working with AWS to agree a statement of common ground.</p>
		<p>Anglian Water welcomes the approach by the project in 2022 seeking advice on a new water connection. Anglian Water identified that through the development of statutory Water Resources Management Plan (WRMP) that there was insufficient water supplies available to meet the new and expanded water demands from planned non-household projects in the South Humber cluster. The regulatory position is that non-household demands are not permitted to jeopardise domestic supplies to households. Air Products have sought confirmation on the availability of 3.5 Ml/d of non-potable water for the project. The water is currently available although we understand that Air Products aren't currently in a position to enter into a contract to secure this maximum daily demand. Air Products have been made aware that the headroom may not be available at a later date.</p> <p>Total housing growth across the WRZ is forecast to be 16% over the 25 years to 2050, resulting an</p>	<p>Noted.</p> <p>Further detail on the Project's water supply requirements are provided in Chapter 2: The Project [TR030008/APP/6.2] and also at Section 18.7 in this Chapter.</p> <p>The needs for potable supplies are small and will not have an impact on potable supplies for the region.</p> <p>Air Products is actively working with Anglian Water to agree a statement of common ground on these matters including for foul water connection.</p>

Reference/ Date	Consultee	Summary of Response	How comments have been addressed in this chapter
		<p>increased population of 432,800 people by 2050. Anglian Water’s WRMP indicates that household demand reduces from 56.1 MI/d to 55.8 MI/d in 2050 (Dry Year Annual Average) even accounting for the increase in population. However, by this measure and without interventions, the WRZ is forecast to go into deficit by 2040. Demand management including smart metering is forecast to reduce average per capita consumption from 134.9 l/d to 112.0 l/d in 2050. With demand management, total demand is forecast to be 95.4 MI/d.</p> <p>In our draft WRMP, NHH demand (Dry Year Annual Average - DYAA) was forecast to change from 32.7 MI/d to 32.2 MI/d in 2050. This 2022 forecast did not include the project’s water demands or that of other hydrogen, carbon capture or low carbon economy projects. Cuts in household demand and a flat NHH demand meant that abstraction reductions to protect the environment could be delivered with an overall supply demand balance in the WRZ (DYAA).</p> <p>In our Scoping response Anglian Water noted that whilst scoping considered water environment impacts, it did not look at water resources. As the site is within an area of ‘serious water stress’ designated by the Environment Agency (EA) and water is used in the project construction and operation, Anglian Water directed that water resources should be assessed in the EIA. The reductions in available water supply coupled with the likely environmental impacts of continuing to</p>	

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		<p>abstract from current sources or to construct and utilize new sources such as desalination as 'upstream' effects mean that the project EIA is required to assess these likely significant effects. Anglian Water would want to work with the project to ensure this assessment is appropriate and dovetails with our WRMP and if required, DWMP process. For example, one solution may be to utilize final effluent (FE) from water recycling (sewage) works as a feedstock for the project or other new uses and so provide either raw water or potable water to projects whose technical requirements limit its supply to non-FE sources.</p> <p>The project timeline proposing submission in summer 2023 means that the NSIP is ahead of Anglian Water's WRMP (and DWMP) timelines which would only provide certainty of water supply and options such as non-potable or final effluent supply in 2024 following Regulator sign off. It may be possible through collaborative working with the project to put in place agreements including MDD which provide sufficient certainty for the Examining Authority as advised by the EA and others in Spring 2024 such that, subject to regulatory approval the Secretary of State in making their decision in or about Winter 2024, would be cognisant of approval of Anglian Water's WRMP (and DWMP). If that were not possible, then water supply options may need to be considered outside of the economic regulatory framework which introduces additional commercial and environmental uncertainties. Those solutions may</p>	

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		<p>also involve a significantly higher carbon footprint if new infrastructure is required which would be contrary to the project's and UK decarbonization policy.</p>	
		<p>Anglian Water supports the project's objectives and to make 'effective use of available land, water, transport and utility connections', and to enhance the 'local and regional economy' as these align with our company articles to support environmental and social prosperity in the region and our focus on being net zero by 2030. We note that the Terminal description includes disposal of wastewater and so Anglian Water will need to undertake an assessment of the quantum of wastewater requiring treatment via the public sewer network to assess network and treatment capacity, as so inform the project design and the relevant sections in the EIA. Whilst Anglian Water pipeline diversions in roads and adjacent land may not be necessary, the project is able to meet the required standoff distances in project design, construction and operation including retaining suitable easements to access water infrastructure.</p>	<p>The Project's sewerage requirements in respect of the number of users were provided to Anglian Water at an early stage.</p> <p>Similarly the requirements of the Project in respect of cooling water blowdown wastewater treatment, which would drain to the foul sewer, have been shared with Anglian Water.</p> <p>Air Products is actively working with Anglian Water to agree a statement of common ground.</p>
		<p>Anglian Water welcomes the inclusion of water in the list of environmental impacts to be assessed, minimized, and mitigated. This will also assist the local Councils, MPs, community and businesses to be assured that water supply for domestic and existing customers won't be jeopardized and the</p>	<p>Noted</p>

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		abstraction of water and management of wastewater does not degrade the environment.	
		Anglian Water supports the reference to other projects as the cumulative impact of the projects including their need for water supplies and wastewater treatment can be assessed to seek to future proof the environmental gains from the transition to a low carbon economy.	Noted
		Anglian Water would want to ensure that water and wastewater are considered within the final EIA and this assessment includes consideration of Anglian Water and related parties such as the EA advice and solutions.	Further detail on the Project's water supply and wastewater requirements are provided in Chapter 2: The Project [TR030008/APP/6.2] and also at Section 18.7 in this Chapter. The requirements and proposed connection points are covered in the Utilities Statement [TR030008/APP/7.7] .
		Anglian Water recognises the potential locational advantages of Immingham including CCS. We are not in a position now to advise whether alternative locations or technologies would be more sustainably located to supply the required quantum of water or whether required regulatory approvals would be forthcoming to serve the site or would be more sustainable and viable for the environment and customers in alternative locations. For example, larger scale hydrogen facilities proposed elsewhere in the UK may have more sustainable access to water supplies. The spatial options for water resources may be an appropriate matter for forthcoming National Policy Statements which themselves may be guided by the recently	<p>Further detail on the Project's water supply requirements are provided in Chapter 2: The Project [TR030008/APP/6.2] and also at Section 18.7 in this Chapter.</p> <p>A commercial offer has been made by Anglian Water to provide a sub-potable supply of water from a non-potable water main within Laporte Road. This water will originate from an existing Anglian water source with capacity and will be water will be transferred to the site for use within via a non-potable water main.</p> <p>Applicant and Air Products has water efficiency as one of its five top objectives for the project. The use of all economically viable methods to support regional water resources is acknowledged.</p> <p>The Applicant can confirm that protective provisions for relevant Anglian Water assets are included in the draft DCO and summarised in the utilities statement.</p>

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		<p>launched National Infrastructure Commission NPS review.</p> <p>We note the timeline (Table 3.2) for the Green Hydrogen Production Facility indicating that construction would be determined by market demand and would take from 3 to 11 years to build out capacity. Build out and operation of one hydrogen production unit by year 3 and a second by year 5 would potentially limit Anglian Water's ability through the WRMP to supply water (and/or wastewater recycling capacity) to meet those new demands in 2025 to 2030 (the AMP8 regulated investment cycle).</p> <p>Anglian Water has sought throughout engagement to flag the potentially critical issue of water supply to the project. We again advocate that the water supply and related wastewater topic is considered against the process set out in 5.1.2.</p> <p>Given the fortuitous timing of the WRMP and DWMP and supporting SEA, the project could consider the new baseline and future position up to 2050 in the project EIA including HRA and other assessments. The impact of curtailed water supply to domestic customers could also be assessed including consideration of the Socio-Economic effects of the use of water for the project in the context of growth and climate change as well as the potential impacts on communities and business</p>	<p>Air Products is actively working with Anglian Water to agree a statement of common ground on these matters including for foul water connection.</p>

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		<p>The impact of water supply provision to the project (and wastewater) on nature is not evident in the summary. For example, should this not include the potential impact from increased abstraction of water from groundwater sources within the port. This then may indicate that water sources from elsewhere have the potential to be less damaging on ecology. Similarly, the impact from wastewater particularly on marine ecology should also be summarized in the PEIR. This then enables the subsequent full EIA to consider those impacts and effects and advise on whether those upstream impacts have a level of significance requiring mitigation.</p>	<p>No abstractions from groundwater are proposed for this development and no related impacts on ecology are anticipated.</p> <p>The impacts of the Project on marine receptors are addressed in Chapter 17: Marine Water and Sediment Quality [TR030008/APP/6.2] and Chapter 9: Nature Conservation (Marine Ecology) [TR030008/APP/6.2].</p>
		<p>Anglian Water welcomes the inclusion of the impact of the project on water bodies, groundwater etc – including those utilized for water supply – in Chapter 18. The Chapter as currently headed Water Quality does enable consideration of the impact of the water demands of the project through the lens of Water Quality. We suggest however that the Chapter is called Water Supply, Water Quality, Coastal Protection, Flood Risk and Drainage to ensure the end to end consideration is captured.</p>	<p>The chapter title has been expanded to include Water Use.</p>
		<p>We recognize that further work is needed by the project with Anglian Water and the Environment Agency when considering our current draft WRMP consultation to bring forward solutions that enable a similar conclusion to be reached on the</p>	<p>Further detail on the Project's water supply requirements are provided in Chapter 2: The Project [TR030008/APP/6.2] and also at Section 18.7 in this Chapter.</p>

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		<p>magnitude of the residual impacts from water supply and wastewater management. That assessment should include the carbon costs of water and wastewater infrastructure. This assessment may equally be considered in Chapter 19: Climate Change. At this point it is important to re-state that Anglian Water is committed to being net zero by 2030.</p> <p>The draft nature of the WRMP and DWMP means that any solutions to water supply or wastewater are not at a stage which could be considered as reasonably foreseeable future projects. The water demands and wastewater requirements of known projects such as the Immingham RoRo or CCS projects can though be assessed in Chapter 25. The domestic water supply and wastewater position and on-household trajectory without factoring these projects can be drawn from the draft WRMP and DWMP.</p> <p>It is probable that the water supply assessment in Chapter 18 will be a Significant Effect. This may require consideration to interim solutions which require further regulatory decisions where the outcome of which cannot be certain. If the project, working with Anglian Water, despite the national importance of hydrogen for decarbonization and net zero, could not secure such decisions, then the project would need alternative options which themselves may constitute an NSIP.</p> <p>As set out above, the key issue for the project is the impact of local water resources, which the</p>	<p>Applicant and Air Products has water efficiency as one of its five top objectives for the Project. The use of all economically viable methods to support regional water resources is acknowledged.</p> <p>A commercial offer has been made by Anglian Water to provide a sub-potable supply of water from a non-potable water main within Laporte Road. This water will originate from an existing Anglian water source with capacity and will be water will be transferred to the site for use within via a non-potable water main.</p> <p>The Applicant can confirm that protective provisions for relevant Anglian Water assets are included in the draft DCO and summarised in the utilities statement.</p> <p>Air Products is actively working with Anglian Water to agree a statement of common ground on these matters including for foul water connection.</p>

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		PEIR at 18-4 advises: "Water requirements will be discussed with Anglian Water in order to determine Project impacts on local water resources. Potential Project impacts will be reported in the ES".	
		On the question of a 'local sewer network' (18-3) connection, the PEIR is silent. Given the potential for water recycling to be part of the solution for water supply to the project including greywater and rainwater harvesting for site operatives to use, Anglian Water looks forward to resolving the question of sewer network connections with the project. With reference to 18.4.18 and 18.4.19, the project may conclude that no connection is required to Anglian Water's sewer network. We would anticipate that a detailed Drainage Strategy would be a matter for a post consent requirement approval by the LPA and that AW would be a consultant if any connections including surface water were proposed to the public sewer network.	A Drainage Strategy has been prepared and forms Appendix 18.B [TR030008/APP/6.4] . There is no plan to discharge surface water to the sewer network. There is a robust ditch network around and through the site which would be used as a discharge location (see rows below).
Statutory Consultation January 2023	North East Lindsey Drainage Board	<p>The site is within the NELIDB area. The Board maintained Habrough Marsh Drain is on the Northwest of the site. The surface water catchment of the site discharges three ways.</p> <p>Northwest into the Board maintained Habrough Marsh Drain (8) gravity system.</p> <p>Southwest into the Board maintained Immingham 2 Pumping Station system.</p>	<p>A Drainage Strategy has been prepared and forms Appendix 18.B [TR030008/APP/6.4]. The Drainage Strategy has been produced in consultation with NELIDB which is secured by DCO requirement.</p> <p>The Applicant is in discussion with the North East Lindsey Drainage Board about disapplication of the land drainage consent within the DCO. See Article 3 of the draft DCO [TR030008/APP/2.1]. Access to Parcel 55 will be maintained as part of the Project design.</p> <p>The Drainage Strategy in Appendix 18.B [TR030008/APP/6.4] is an outline strategy at this time with detailed design being undertaken at the detailed design stage.</p>

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		<p>Northeast into Stallingborough North Beck. The watercourse is an Environment Agency main river, an Environment Permit (from the Environment Agency) will be required for any works within Byelaw distance and discharge outfall(s).</p> <p>Any surface water discharges into the drainage systems to be attenuated to an agreed rate. As a brown field site the surface water discharge into the Boards drainage systems from any re-development will be expected to be reduced to 70% of the existing 'actual' discharge rate via any discharge points or routes. It is essential a full survey is undertaken to establish the existing surface water drainage system, catchments and current discharge rates. Under the terms of the Board's Byelaws, the prior written consent of the Board is required for any proposed temporary or permanent works or structures in, under, over or within the byelaw 9m distance of the top of the bank of a Board maintained watercourse, Habrough Marsh Drain (8).</p> <p>Under the terms of the Land Drainage Act. 1991 the prior written consent of the Board is required for any proposed temporary or permanent works or structures within any ordinary watercourse including infilling or a diversion.</p> <p>An area of concern is the impact off shore. The proposals show new infrastructure in the Humber near to the gravity outfall of Habrough Marsh Drain, there is concern that this will result in siltation which will impede the discharge. The</p>	<p>The gravity outfall of the Habrough Marsh Drain has been considered in the assessment set out in Chapter 16: Physical Processes [TR030008/APP/6.2]. The outputs from this assessment have been used to inform the FRA and this chapter.</p> <p>Chapter 16: Physical Processes [TR030008/APP/6.2] states “Across the wider study area (including the existing berths at Immingham Oil Terminal (IOT), the rest of the intertidal area along the Immingham frontage, the Habrough Marsh Drain and Immingham Sea outfalls, the offshore banks and channels and the wider estuary up- and down-stream), the Project marine facilities have no impact on the existing (baseline) accretion and erosion rates.”</p> <p>Based on this assessment no likely impacts are predicted from the construction and operation of the offshore infrastructure on the function of drains, outfalls etc, therefore any impact on flood risk onshore is considered unlikely. No additional mitigation measures are required.</p>

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		<p>Flood Risk Assessment should address this and put in place measures to mitigate it.</p> <p>With regard to the land owned by the NELIDB a land interest questionnaire was returned on 16th November 2016. The land is adjacent to Parcel 55 which is the A1173. If the access to the Board's land is affected it is essential the Board is contacted to discuss and agree future access arrangements.</p> <p>[Note: These points were restated verbatim by NELIDB in response to the second Statutory Consultation. Additional comments made in that response are covered in rows below]</p>	
Statutory Consultation January 2023	Canal & River Trust	<p>Given the location of the project and the relationship of the proposal with our network, we do not believe that the proposals as shown would impact our interests. Should the scheme be amended to potentially affect our navigations, we could welcome further consultation on the proposals so that we can advise about any potential impact for our network.</p>	<p>Noted: The Project is not located in close proximity to any Canal and River Trust Assets.</p>
		<p>The Louth Canal is not owned or managed by the Trust. However, the Trust supports the preservation, conservation and protection of inland waterways for the public benefit. We recommend that you correspond with the Louth Navigation Trust regarding your proposal, and we advise that consideration is given to any response from the</p>	<p>A consultation response was requested from Louth Navigation Trust, however a response has not been received.</p>

Reference/ Date	Consultee	Summary of Response	How comments have been addressed in this chapter
Statutory Consultation January 2023	Environment Agency	<p>LNT on any impact that the proposal may have on LNT's preservation and regeneration objectives.</p> <p>Paragraph 2.3.41 – we would point out that in addition to the tidal flood risk explained in this section, the site is also at risk of fluvial flooding. The site lies adjacent to the Stallingborough North Beck Main River and flood levels from this system should inform the flood risk assessment (FRA), ensuring that there is no increase in flood risk to third parties as a result of the development proposals.</p> <p>The project site falls within Flood Zone 3, which is land defined as having a high probability of flooding. The National Planning Policy Framework and National Policy Statement EN-1 states that an FRA must be submitted when development is proposed in such locations, and we welcome the further pre-application discussions that you are undertaking with us on the scope and requirements of this. The FRA should identify and assess the risks from all sources of flooding, to and from the development including residual risk. The FRA must demonstrate how these flood risks will be managed to ensure that the development remains safe throughout its lifetime, taking climate change into account, without increasing flood risk elsewhere and where possible reducing flood risk overall. The FRA will also need to address how flood risk will be managed during construction, to ensure the existing continuous flood defence wall height and integrity are maintained throughout,</p>	<p>The FRA (Appendix 18.A [TR030008/APP/6.4]) assesses in detail the risk of fluvial flooding from North Beck Drain and the results are summarised at Section 18.6 in this chapter. The hydraulic modelling outputs from the 2020 Stallingborough & Oldfleet Model, provided by the Environment Agency, were used in the assessment. The FRA confirms that there would be no increase in flood risk from the North Beck Drain Main River to third parties as a result of the Project.</p> <p>The FRA which forms Appendix 18.A [TR030008/APP/6.4] has been undertaken in accordance with the requirements of the National Policy Statement for Ports (“NPSfP”) and the National Planning Policy Framework (“NPPF”). The FRA identifies and assesses flood risk from all sources to and from the development both for the existing baseline and taking into account climate change over the lifetime of the development. Mitigation measures are included at Section 18.7 to manage flood risk associated with the Project.</p> <p>The design of the jetty access road where it passes over the flood defences includes sufficient space for the flood defences to be improved and the defences along the landside frontage, beneath and in close proximity to the jetty access road crossing, will be replaced by a new section of flood defence wall with a crest height of 7.0m AOD during the construction phase of the Project. Construction would be undertaken in such a way that the integrity of the flood defences would not be compromised]</p> <p>The Applicant is in discussion with the Environment Agency about disapplication of the flood risk activity permit. See Article 3 of the draft DCO [TR030008/APP/2.1].</p>

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		<p>and the risks associated with the crossing of the tidal/sea defence are included.</p> <p>The PEI Report refers to the National Policy Statement for Ports which states “Port development is water-compatible development and therefore acceptable in high flood risk areas”. However, we understand the site will also require a Hazardous Substance Consent (ref PEI Report, Chapter 4, Paragraph 4.6.5) and Annex 3 of the NPPF: Flood risk vulnerability classifications, advises that such installations should be classified as ‘Essential Infrastructure’. The vulnerability of the development should be confirmed and include any additional mitigation measures that may be necessary, resulting from this. In Flood Zone 3a, ‘Essential Infrastructure’ should be designed and constructed to remain operational and safe in times of flood.</p> <p>The PPG has recently been updated with a suggested lifespan for non-residential development and recommends working on an assumed 75-year lifetime. In addition, it mentions that some major infrastructure projects may be expected to have development lifetimes beyond 100 years and should be assessed for a longer period of time. We request that the FRA clearly states the expected lifetime for the development elements (the landside development, the marine infrastructure, plant or equipment on the jetty topside etc.) and includes the appropriate</p>	<p>Although the National Policy Statement for Ports states "Port development is water compatible development and therefore acceptable in high flood risk areas" the FRA appended at Appendix 18.A [TR030008/APP/6.4] confirms that the development vulnerability classification of “Essential Infrastructure” is applicable to the landside Hydrogen Production Facility, based on the requirement for Hazardous Substance Consent.</p> <p>The required mitigation measures are outlined in the FRA appended at Appendix 18.A [TR030008/APP/6.4] and are summarised in Section 18.7 of this chapter. It should be noted however, given the nature of the Project, there is no requirement for the Site to remain <i>operational</i> should a flood event occur. However, the Project is designed in such a way that it would remain <i>safe</i> over the lifetime of the development.</p> <p>The design life of the landside development (the hydrogen production facility) is 25 years but the terminal (the jetty and related topside infrastructure) would become part of the permanent port infrastructure and refurbished accordingly as required. This and the approach to decommissioning is explained in greater detail in Chapter 2: The Project [TR030008/APP/6.2].</p> <p>The FRA, at Appendix 18.A [TR030008/APP/6.4] uses the suggested 75 year lifespan for non-residential development, as outlined in the updated PPG, when assessing flood risk from fluvial, tidal, surface water/drainage system sources. The residual risk of flooding to the site should a breach in the flood defences occur is assessed against the 2115 0.1% AEP depth/velocity/hazard mapping for a breach event scenario and further</p>

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		assessment to reflect this, along with decommissioning expectations/plans and information on how this will be secured in the DCO.	water level information for this event has been used to inform mitigation measures, where required. This provides a conservative approach to the assessment of flood risk.
		Although Chapter 4 (paragraph 4.4.3) states that the “relevant NPS that applies to this Project is the National Policy Statement for Ports”, Chapter 18 (paragraph 18.3.6) acknowledges that the FRA will be prepared in accordance with the Overarching NPS for Energy (EN-1). Accordingly, it is our view that the assessment of climate change should include consideration of a maximum credible scenario (EN-1 paragraph 4.8.8).	The Maximum Credible Scenario, as outlined in the Environment Agency updated Flood Risk Assessments: Climate Change Allowances guidance (Ref 18-13) has been included in the assessment of climate change for fluvial and tidal sources within the FRA as a sensitivity test for the worst case climate change scenario.
		<p>An area of concern for us is maintaining continued access to the flood defence northwards of the jetty. We will look to maintain continued access to this area with you, secured through an appropriate mechanism.</p> <p>Whilst sufficient headroom could be made available for most maintenance operations, the need to use a larger plant would be restricted if an alternative access from Associated British Port’s land is not secured as part of this DCO (e.g. as and when the defences have to be adapted in the future to counter the growing risk of tidal overtopping and flooding). Access to Stallingborough North Beck and the outfall must also be maintained.</p>	The design of the jetty access road where it passes over the flood defences includes sufficient space for the flood defences to be improved and the defences along the landside frontage, beneath and in close proximity to the jetty access road crossing, will be replaced with a new section of flood defence with a crest height of 7.0m AOD during the construction phase of the Project. Construction would be undertaken in such a way that the integrity of the flood defences would not be compromised.

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		<p>There should be no unadaptable development within 15.0 m of the landward toe (plus width for any existing soak dye) of the sea defences to allow for future improvements. Sufficient details should be provided on the works close to and over the existing defences and main rivers to give us the confidence that the required flood defence function will not be compromised at any time during the construction process. We welcome the continued pre-application engagement with ABP in respect of the works close to and over the existing defences and main rivers.</p>	
		<p>Paragraphs 18.4.6 and 18.4.10 – we would point out that the standard of protection of coastal assets takes account of wave height and an allowable overtopping rate. Tables 18.8-10: The effect of Minor/Moderate adverse for Humber Estuary (Tidal flooding- medium) and tidal flooding could be greater as hazard mapping shows a significant number of residential properties within the breach flood cell. Further review and consideration should be given to this effect.</p>	<p>These factors have been reviewed and taken into consideration in the FRA, at Appendix 18.A [TR030008/APP/6.4] and as relevant in this chapter at Section 18.4.</p>
		<p>Paragraph 18.1.14 – we note that the “water resource needs for the Project have not yet fully been quantified, but a source of water for cooling purposes, fire water for emergencies and a source of potable water would be required”. The EA recently carried out work to explore the needs of industry and the impacts on the water environment of proposed technologies for carbon capture,</p>	<p>Further detail on the Project’s water supply requirements is provided in Chapter 2: The Project [TR030008/APP/6.2] and also at Section 18.7 in this Chapter. 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</p>

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		<p>storage, and hydrogen production in the net zero industrial clusters. The Humber Industrial Cluster was chosen for a pathfinder project and the results of this showed that water resources need to be recognised as a limiting factor. We would urge you to undertake sufficient assessment work to provide you with the confidence that water resources will be able to satisfy your project's requirements. We also note that in response to the Scoping Report (Table 18.1) Anglian Water Services raised this issue and recommended the need for discussions on:</p> <ul style="list-style-type: none"> · Requirement for potable and raw water supplies; · Impact of the development on Anglian Water's assets including groundwater and water abstraction; and · Requirement for water recycling connections <p>If a new source of water or additional water from an existing source is being considered, the EA must be contacted at the earliest opportunity to discuss water availability and abstraction licensing agreements.</p>	<p>this application will reduce the pressure of the Project on an already water stressed Water Resource zone within the UK.</p>
		<p>Section 18.4 – In addition to the baseline conditions currently identified, Magic Map Application identifies North Beck Drain as a High Certainty chalk river and identifies a number of drains near the proposed site as Low Certainty chalk rivers. MagicMap details that chalk rivers are recognised as a priority habitat for protection under the UK Biodiversity Action Plan. The North Beck</p>	<p>The status of the North Beck Drain has been reviewed and taken into consideration in this chapter and also in the WFD Compliance Assessment appended at Appendix 17.A [TR030008/APP/6.4].</p> <p>The designations on Magic Map do not appear to take account of the presence of Boulder Clay (glacial deposits) and Alluvium (estuarine deposits) both of which will sit upon the Chalk aquifer. The local geology limits the surface connectivity with the underlying groundwater.</p>

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		<p>Drain was raised during a meeting between consultants, AECOM and the EA on 17 November 2022 and it was highlighted that the Project could potentially cause deterioration, which in turn would reduce the scope for any further improvements of the North Beck Drain – the meeting organiser recorded this as an action for further consideration.</p>	
		<p>We note that a Water Framework Directive assessment will be undertaken (mentioned in paragraph 18.3.5) to determine whether the project complies with the objectives of the WFD. We look forward to reviewing this in due course.</p>	<p>The WFD Compliance Assessment is appended at Appendix 17.A [TR030008/APP/6.4].</p>
		<p>NELIDB need to be part of this consultation as the surface water drainage for the site is reliant on their infrastructure. However, I believe that they will have been consulted directly by ABP along with the MMO and EA...</p> <p>The newer higher 40% climate change allowance should be used within the drainage design on the site. An assessment on the exceedance routes should be undertaken on storms over and above the design 1:100 year plus climate change scenario.</p> <p>We will need to see a drainage strategy for the development at this current stage to agree the principals of the design before the detailed design starts.</p>	<p>A Drainage Strategy has been prepared and forms Appendix 18.B [TR030008/APP/6.4]. The Drainage Strategy has been produced in consultation with NELIDB which is secured by DCO Requirement.</p>

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Statutory Consultation January 2023	North East Lincolnshire Council	The site will have to discharge at greenfield rates to manage flood risk, the final discharge rate will be agreed with NELIDB. SuDS will have to be utilised across the development to manage surface water and help improve water quality. Water quality is key in this area due to all the habitat designations in the Estuary. SuDS can help to deliver the Biodiversity Net Gain requirements in addition to the flood risk management function. We will need to see a drainage strategy for the development at this current stage to agree the principals of the design before detailed design starts.	A Drainage Strategy forms Appendix 18.B [TR030008/APP/6.4] and identifies the SUDS measures used to meet the discharge rates agreed with NELIDB. Locations of high contamination potential would be bunded and would not impact the surface water drainage system. The areas draining into the system are not expected to generate significant contamination and the combination of gravel storage areas and swales/ditches is expected to provide sufficient treatment.
		The Applicant should investigate ways to re-use surface water on the site to make use of surface water if feasible.	Further detail on the Project's water supply requirements are provided in Chapter 2: The Project [TR030008/APP/6.2] and also at Section 18.7 in this Chapter. Arising from discussions with Anglian Water, a commercial offer has been made to provide a non-potable supply of water from a non-potable water main within Laporte Road. This water will originate from an existing Anglian water source with capacity and will be water will be transferred to the site for use within via a non-potable water main. The re-use of surface water for operational use is not considered viable because it in the absence of large storage volumes, which are not possible within a limited site area, this possible source would not provide a sufficiently reliable supply.
		With the site being on the floodplain, any rising of ground levels will displace water elsewhere, if the project requires raised levels, compensatory	The Environment Agency Flood Map for Planning shows the Site is located in Flood Zone 3a (tidal) when the tidal flood defences are not accounted for. The Site benefits from the presence of flood defences up to and including the 0.5% AEP flood event, therefore the actual risk of flooding to the Site

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		<p>storage will be required elsewhere, so that flood risk is not increased in the surrounding area.</p>	<p>from tidal sources is low. However, there remains a residual risk of flooding should there be overtopping or a breach in the flood defences. This is considered further in the FRA and in Section 18.8 of this chapter. Compensatory storage is not required to mitigate for residual <i>tidal</i> flood risks, (but might have been required if the Project had been located within the <i>fluvial</i> Flood Zone 3 extent).</p>
		<p>The newer higher 40% climate change allowance should be used within the drainage design on the site. An assessment on the exceedance routes should be undertaken on storms over and above the design 1:100 year plus climate change scenario.</p>	<p>The Drainage Strategy that is provided at Appendix 18.B [TR030008/APP/6.4] includes the higher 40% climate change allowance within the conceptual drainage design. The Strategy also assesses exceedance flow routes for storms over and above the 1:100 year plus climate change scenario.</p>
		<p>The flood risk implications of the IGET Project are also not assessed adequately in the consultations documentation, with the preliminary information stating that a full Flood Risk Assessment is to be submitted at a later date. Given the Plant and Order Land's location adjacent to the Humber, and noting the ongoing effects of climate change, the risk of flooding affecting our operation is significant. We will require comfort that the risk of flooding at both the Order Land and the Plant will not be heightened by the IGET Project.</p>	<p>The FRA, at Appendix 18.A [TR030008/APP/6.4] considers the risk of flooding from all sources to and from the Project over the lifetime of the terrestrial elements of the development in accordance with both the National Policy Statement for Ports and the National Planning Policy Guidance. Mitigation measures are described in Section 18.7 of this chapter which would minimise the risk of flooding and to ensure the development remains safe.</p> <p>The FRA also assesses the impact of the Project on flood risk, particularly from tidal, fluvial and surface water sources. The FRA and the summary provided below at Section 18.8 of this chapter concludes that given the presence of the tidal flood defences, which would be raised by the Environment Agency in line with flood management plan proposals in order to maintain the standard of protection along the Humber Estuary in this area, the Project is considered to be at low risk of tidal flooding. It is unlikely, given the extent and depth of flooding along the South Humber Bank should a breach occur, that the Project would increase the risk of flooding off-site to surrounding land over its lifetime as these areas would</p>

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			<p>be flooded to the same depth as the Site. Any increase in flood water level is likely to be insignificant.</p> <p>The Drainage Strategy Appendix 18.B [TR030008/APP/6.4] outlines how surface water generated on site would be managed so that the risk of surface water flooding does not increase over the existing scenario.</p>
Statutory Consultation January 2023	Polynt Composites	Concern about the impact to the water table and compensation due to increased risk of flooding	The response provided in the row above addresses the concern raised.
Statutory Consultation January 2023	Local Resident (living within approx. 10km of the project)	<p>Change No. 3: Routing of pipe-rack & Jetty Access Road in the 'Long Strip' woodland</p> <p>It is essential provision is made to allow for maintenance access adjacent to all watercourses within or adjacent to the site. An unobstructed strip of suitable width should be left adjacent to the watercourse to allow for maintenance by suitable plant. The submitted plans are not clear enough to determine if suitable access has been left.</p>	The existing small drainage channel that runs along the western edge of the Long Strip woodland within proposed Work No. 2 would be cleared of vegetation and re-lined to ensure its effective drainage function. The available flow area of the channel will be maintained and even improved by the removal of vegetation. The Applicant would undertake ongoing maintenance of the drainage channel.
Statutory Consultation May - June 2023	North East Lindsey Drainage Board	<p>Change No. 4: West Site layout, elevations and drainage</p> <p>It is noted land is proposed to be raised from 0.5m to 2.5m, the Board is concerned that any potential land raising within the flood plain (zone 3 on the Environment Agency Flood maps). The residential area of Immingham is within the catchment and loss of flood plain volume is likely to increase flood risk. Also there can be a negative impact of third</p>	<p>For the West Site, existing ground elevations range from the highest point of 3.0m AOD at the north-east corner, to 2.0m AOD at the lowest point in the south-west corner. The finished ground level of the West Site, in which Work No. 7 would be constructed, would be approximately 2.5m AOD. The levels are required to ensure the site can drain adequately (see also the Appendix 18.B [TR030008/APP/6.4]. The finished ground levels for the Project are covered in Chapter 2: The Project [TR030008/APP/6.2].</p> <p>As explained in Section 18.8 of this chapter the risk of flooding to the Site is predominantly from tidal sources. The designation of the West Site in Flood Zone 3 on the Environment Agency FMfP does not take in to account the</p>

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		<p>parties by acting as a dam, diverting surface water flows and locally lifting ground water levels.</p>	<p>presence of the tidal flood defences. With the defences in place the risk of flooding to the Site is low. The Site is at residual risk of flooding should overtopping or a breach of the flood defences occur. Should a breach or overtopping of the defences occur the South Humber Bank, including the Project, would be inundated. Given the extent of flooding, any increase in flood water level in surrounding areas due to the level increase, is likely to be insignificant.</p> <p>Mapping of fluvial flood extents (as provided in the NELC PFRA (Ref 18-16) shows the Project is located in Flood Zone 1 (low risk) and analysis of the Environment Agency RoFSW mapping (Figure 18.3) shows only small areas of surface water flooding from low to high risk associated with topographical low spots and constrained to watercourse corridors. Given the location of the Project in an area of low fluvial risk (Flood Zone 1) there would be no loss of floodplain storage and no negative impact on third parties.</p> <p>The Drainage Strategy (Appendix 18.B [TR030008/APP/6.4]) includes provision of attenuation storage for surface water over the lifetime of the development and restricts surface water run-off to less than currently drains to the local watercourses so would provide betterment over the current scenario.</p>
		<p>Second Statutory Consultation</p> <p>Update since 16 March 2023 (Air Products meeting with AW) – agreement with EA for supply of up to 60 Ml/d of water for South Humberside decarbonisation projects. These plans have been incorporated into the draft WRMP 2025-50 which will be submitted to OFWAT later this year.</p> <p>Their response notes the efficient use of water and utility connections are part of key objectives for the</p>	<p>The commercial offer received from Anglian Water over the supply of resources, means that no further assessment is required of any impacts associated with water demand or supply, including any environmental impacts which might be associated of the provision of resources including any new abstractions. Anglian Water as part of their Water Resources Management Planning (WRMP24) process would have made their own assessment in order to give this response. The offer now received from Anglian Water (dated 27 July 2023) for a non-potable supply is in excess of that required for the IGET project Phases 1 to 6.</p>

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Reference/ Date	Consultee	Summary of Response	How comments have been addressed in this chapter
		<p>project. Refs Non-Domestic Water Demand Position (tbc); under which applicants will be required to work with them to produce a Water Resources Assessment as part of the EIA for the project – to be updated through the Examination process as the WRMP process progresses.</p> <p>Engagement with AWS as the water and sewerage undertaker is acknowledged and the Wave as the prospective water retailer is acknowledged.</p> <p>From the PIER addendum, AW acknowledges the ground raising in the west of the site and the aim to not increase flood risk at lower elevation.</p> <p>Confirmation that drainage and runoff does not pose a hydrological risk to their underground assets is requested and to be contained in Chapter 18: Water Quality, Coastal Protection, Flood Risk and Drainage.</p>	<p>The Drainage Strategy (Appendix 18.B [TR030008/APP/6.4]) includes provision of attenuation storage for surface water over the lifetime of the development and retains surface water on the West Site up to the 1% AEP plus 40% climate change event. Discharge rates from the West Site are restricted to the greenfield runoff rate and surface water is discharged to the Immingham Pump Drain via a local land drain to the south of the Site, providing betterment over the current scenario. Drainage and runoff should therefore not pose a hydrological risk to AW underground assets.</p>
July 2023	Anglian Water	<p>Thank you for the opportunity to comment on the above application. The site is within the North East Lindsey Drainage Board area. The Board maintained Habrough Marsh Drain (8) is on the Northwest of the site.</p> <p>Below are comments on the revisions.</p> <p>Change No. 3: Routing of pipe-rack & Jetty Access Road in the ‘Long Strip’ woodland</p> <p>It is essential provision is made to allow for maintenance access adjacent to all watercourses within or adjacent to the site. An unobstructed strip of suitable width should be left adjacent to the</p>	<p>Current proposals show the pipe-rack and Jetty Access Road are located to the east of the land drainage ditch in the Long Strip woodland. The channel of the land drainage ditch will be cleared of vegetation and the remains of the old concrete liner will be removed and replaced by a new concrete lined channel. The drainage ditch will be overlaid by grating along its length to allow for an access corridor for inspection/maintenance of the pipe-rack. The grating allows the open nature of the watercourse to remain rather than being fully culverted along the channel.</p> <p>The Applicant would undertake ongoing maintenance along the land drainage ditch, with access possible from the access road/ adjacent pipe rack area.</p>

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Reference/ Date	Consultee	Summary of Response	How comments have been addressed in this chapter
Secondary Statutory Consultation May 2023 – July 2023		watercourse to allow for maintenance be suitable plant. The submitted plan are not clear enough to determine if suitable access has been left.	
	North East Lindsey Internal Drainage Board	<p>Change No. 4: West Site layout, elevations and drainage</p> <p>It is noted land is proposed to be raised from 0.5m to 2.5m, the Board is concerned that any potential land raising within the flood plain (zone 3 on the Environment Agency Flood maps). The residential area of Immingham is within the catchment and loss of flood plain volume is likely to increase flood risk. Also there can be a negative impact of third parties by acting as a dam, diverting surface water flows and locally lifting ground water levels.</p> <p>The Board has previously commented on the project directly and to the DCO, these comments below remain valid.</p> <p>The surface water catchment of the site discharges three ways.</p> <ol style="list-style-type: none"> 1. Northwest into the Board maintained Habrough Marsh Drain (8) gravity system. 2. Southwest into the Board maintained Immingham 2 Pumping Station system. 3. Northeast into Stallingborough North Beck. The watercourse is an Environment Agency main river, an Environment Permit (from the Environment Agency) will be required for any 	<p>The land in the West Site is being raised from a lowest level of 1.5mAOD to a consistent level of 2.5mAOD. The drainage is planned to capture all flow from the site and limit to a greenfield runoff rate, not just the impermeable parts of the site. By doing this the 1% AEP 1 in 100) event is held on site and the flood risk to surrounding areas is mitigated.</p> <p>The Environment Agency Flood Map for Planning shows the Site is located in Flood Zone 3a (tidal) when the tidal flood defences are not accounted for. The Site benefits from the presence of flood defences up to and including the 0.5% AEP flood event, therefore the actual risk of flooding to the Site from tidal sources is low. However, there remains a residual risk of flooding should there be overtopping or a breach in the flood defences. This is considered further in the FRA [TR030008/APP/6.4] and in Section 18.8 of this chapter. Compensatory storage is not required to mitigate for residual <i>tidal</i> flood risks, (but might have been required if the Project had been located within the <i>fluvial</i> Flood Zone 3 extent).</p> <p>The areas of the Site that contain the Project currently drain to the identified systems 2 and 3 and this would be maintained by the proposed works.</p> <p>Discharge rates have been agreed with the IDB and are described in the Drainage Strategy report (Appendix 18.B [TR030008/APP/6.4]).</p> <p>No work would be undertaken within the stated distance of a board maintained watercourse.</p> <p>The works will impact board maintained watercourses by changing flow rates. The IDB have stated that Drainage Consent will be required. The Applicant is in discussion with the North East Lindsey Drainage Board about disapplication of the land drainage consent within the DCO. See Article 3 of the draft DCO [TR030008/APP/2.1].</p>

Reference/ Date	Consultee	Summary of Response	How comments have been addressed in this chapter
		<p>works within Byelaw distance and discharge outfall(s).</p> <p>Any surface water discharges into the drainage systems to be attenuated to an agreed rate. As a brown field site the surface water discharge into the Boards drainage systems from any re-development will be expected to be reduced to 70% of the existing 'actual' discharge rate via any discharge points or routes. It is essential a full survey is undertaken to establish the existing surface water drainage system, catchments and current discharge rates. The Board has been contacted directly by the Consultants undertaking the drainage design for the site.</p> <p>Under the terms of the Board's Byelaws, the prior written consent of the Board is required for any proposed temporary or permanent works or structures in, under, over or within the byelaw 9m distance of the top of the bank of a Board maintained watercourse, Habrough Marsh Drain (8).</p> <p>Under the terms of the Land Drainage Act. 1991 the prior written consent of the Board is required for any proposed temporary or permanent works or structures within any ordinary watercourse including infilling or a diversion.</p> <p>An area of concern is the impact offshore. The proposals show new infrastructure in the Humber near to the gravity outfall of Habrough Marsh Drain, there is concern that this will result in siltation which will impede the discharge. The</p>	<p>The Habrough Marsh Drain gravity outfall and the associated intertidal area is considered in Chapter 16: Physical Processes [TR030008/APP/6.2]. The Chapter assesses the impacts of the marine development for both the construction and operation phases of the Project. Chapter 16: Physical Processes [TR030008/APP/6.2] states "<i>Across the wider study area (including the existing berths at Immingham Oil Terminal (IOT), the rest of the intertidal area along the Immingham frontage, the Habrough Marsh Drain and Immingham Sea outfalls, the offshore banks and channels and the wider estuary up- and down-stream), the Project marine facilities have no impact on the existing (baseline) accretion and erosion rates.</i>" Based on this assessment no likely impacts are predicted from the construction and operation of the offshore infrastructure on the function of drains, outfalls etc, therefore any impacts on flood risk onshore are considered unlikely.*</p> <p>The proposed works do not cause any impact to the access of IDB land.</p>

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Reference/ Date	Consultee	Summary of Response	How comments have been addressed in this chapter
		<p>Flood Risk Assessment should address this and put in place measures to mitigate it.</p> <p>With regard to the land owned by the North East Lindsey Drainage Board a land interest questionnaire was returned on 16th November 2016. The land is adjacent to Parcel 55 which is the A1173. If the access to the Board's land is affected it is essential the Board is contacted to discuss and agree future access arrangements.</p>	
		<p>Change 2: Marine Design Changes</p> <p>Table 7.2 of the PEIR Addendum for Water Quality, Coastal Protection Flood Risk and Drainage states that "The changes in jetty alignment, length, the berth arrangements, and dredging requirements have the potential to increase erosion/deposition rates on the foreshore, tidal water levels and wave heights/velocities which in turn can impact existing features, including existing marine infrastructure, outfalls, estuary banks and channels, and the flood defences". We would welcome further detail on the potential changes to physical processes and impacts and how this affects the Stallingborough North Beck outfall, the foreshore and the standard of protection of flood defences on and off site and any mitigation for this that will be proposed.</p>	<p>Chapter 16: Physical Processes [TR030008/APP/6.2] assesses the impacts of the marine development for both the construction and operation phases of the Project. Chapter 16: Physical Processes [TR030008/APP/6.2] states "Across the wider study area (including the existing berths at Immingham Oil Terminal (IOT), the rest of the intertidal area along the Immingham frontage, the Habrough Marsh Drain and Immingham Sea outfalls, the offshore banks and channels and the wider estuary up- and down-stream), the Project marine facilities have no impact on the existing (baseline) accretion and erosion rates." Based on this assessment no likely impacts are predicted from the construction and operation of the offshore infrastructure on the function of drains, outfalls etc, therefore any impacts on flood risk onshore are considered unlikely.</p>
19.06.2023	Environment Agency	Change 7: Public Rights of Way Diversion and removal of other informal access points	Infrastructure to enable the Environment Agency ongoing access to the sea wall for flood defence monitoring and maintenance activities will be provided. This currently comprises a ramp off the Jetty Access Road.

Reference/ Date	Consultee	Summary of Response	How comments have been addressed in this chapter
		<p>Environment Agency access to the defence of the North site of the jetty must be maintained. We are engaged with Associated British Ports (ABP) and welcome continued pre-application discussions in respect of the works close to and over the existing defences and main rivers.</p> <p>The diversion takes the bridleway close to the flood defence assets on Stallingborough North Beck. Appropriate mitigation measures should be put in place to ensure that no access can be gained to the flood defences. We would require a 1m buffer from the landward toe to enable maintenance to be carried out on the flood defences. Sufficient details should be provided to detail these mitigation measures.</p> <p>Table 7.2 of the PEIR Addendum for Water Quality, Coastal Protection Flood Risk and Drainage explains that the temporary ProW diversion may mean that a temporary bridge could be needed over the channel behind the sea wall. We would welcome discussions about this structure as part of our continuing engagement with ABP.</p>	<p>Correspondence from the Environment Agency has confirmed that the requirement of a 1 m buffer for maintenance purposes is no longer required.</p>
		<p>Given the location of the project and the relationship of the proposal with our network, we do not believe that the proposals as shown would impact our interests. Our closest waterways are the River Trent, River Ouse and the Aire & Calder Canal, all of which are located over 40km inland from the proposal. The Trust is Navigation</p>	<p>Noted: The Project is not located in close proximity to any Canal and River Trust Assets.</p> <p>A consultation response was requested from Louth Navigation Trust, however a response has not been received.</p>

Reference/ Date	Consultee	Summary of Response	How comments have been addressed in this chapter
		<p>Authority for these waterways. Should the scheme be amended to potentially affect our navigations, we would welcome further consultation on the proposals, so that we can advise about any potential impact for our network.</p> <p>The Louth Canal is not owned or managed by the Trust. However, pursuant to the charitable objectives of the Trust, the Trust supports the preservation, conservation and protection of inland waterways for the public benefit. We are aware that the Louth Navigation Trust (LNT) is dedicated to preserving the canal and encouraging future regeneration of the Louth Canal and support such initiatives. We recommend that you correspond with the LNT regarding your proposal, and we advise that consideration is given to any response from LNT on any impact that the proposal might have on preservation and regeneration objectives.</p>	
	Canal and River Trust	<p>We note that the efficient use of water and utility connections are part of one of the five objectives for the project. Please find attached Anglian Water's new Non-Domestic Water Demand Position. Without the agreement by regulators to the inclusion of the 60MLD in the draft WRMP, the provision of water for the project would have had to be outside the AWS regulated business. This may still be the case if regulators decline to support the AWS proposal for a desalination plant or final effluent reuse.</p>	<p>As stated above, the commercial offer received from Anglian Water over the supply of resources, means that no further assessment is required of any impacts associated with water demand or supply, including any environmental impacts which might be associated of the provision of resources including any new abstractions. Anglian Water as part of their Water Resources Management Planning (WRMP24) process would have made their own assessment in order to give this response. The offer now received from Anglian Water (dated 27 July 2023) for a non-potable supply is sufficient for the Project Phases 1 to 6 (see Paragraph 18.7.618.7.6).</p>

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		Please note that the position requires that applicants, including NSIP projects will be required to work with us to produce a Water Resources Assessment as part of the EIA for the project and this will be submitted with the DCO, updated through the Examination – partly in response to the WRMP progression – and will then require finalisation and agreement by the local planning authority as DCO Requirement Approval Body in consultation with the EA and other bodies including AWS.	
	Anglian Water	The changes to the project (summarised as A to F on the map) do not materially change the project for AWS or raise new issues for AWS. We support the changes to the project red line area which enable the retention of woodland. We also support the changes in landform which assist in the natural drainage of the site.	Noted
		5.16 We concur that one of the most important questions raised by the first Statutory Consultation is the water demand requirements	Noted
		6.5.2 We note the ground raising proposed for the west site and support in principle the change to a project to ensure surface drainage can be achieved without adding to water going to public sewers or causing increased flood risk at lower elevations. We would welcome confirmation that the planned drainage and run off rates or other changes proposed have been assessed and do	The Drainage Strategy (Appendix 18.B [TR030008/APP/6.4]) includes provision of attenuation storage for surface water over the lifetime of the development and retains surface water on the West Site up to the 1% AEP plus 40% climate change event. Discharge rates from the West Site are restricted to the greenfield runoff rate and surface water is discharged to the Immingham Pump Drain via a local land drain to the south of the Site, providing betterment over the current scenario. Drainage and runoff should

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		not pose a hydrological risk to AWS underground assets. This assessment should be included in the Water Quality, Coastal Protection, Flood Risk and Drainage EIA Chapter.	therefore not pose a hydrological risk to AW underground assets. Paragraph 18.7.35 states no impact to existing underground assets.
		Table 7.2, page 32 and 33. We note the conclusion that the changed landform will assist in managing stormwater and that there are no new or different significant effects. Please include the assessment of the impact on AWS assets in the Water Quality, Coastal Protection, Flood Risk and Drainage EIA Chapter.	The assessment on AWS assets has been included in Section 18.7 , where applicable.
		General comment. Whilst the consultation is to seek views on the eight changes, we would have expected the PEIR Addendum to set out how the EIA will look to address the 'water demand requirements' identified in the first statutory consultation. We would welcome detailed further engagement on the Water Resources Assessment (WRA) at the earliest opportunity and potentially in liaison with the EA to ensure that the WRA methodology is agreed and takes into account and assesses impacts and receptors in the event of a reasonable worst-case scenario as required by EIA regulations. We have advised the Planning Inspectorate on the water resources issue across the Anglian Water region and the requirement now for non- domestic water demand and its supply to be considered by applicants, including NSIPs, when that new demand exceeds 50,000 litres per day	Arising from discussions with Anglian Water a commercial offer has been made to provide a sub-potable supply of water from a non-potable water main within Laporte Road. This water will originate from an existing Anglian water source with capacity and will be transferred to the site for use via a non-potable water main.

Reference/ Date	Consultee	Summary of Response	How comments have been addressed in this chapter
		<p>We note that water is referred to once in the summary of project objectives. We welcome the reference to the role of the EA (para 1.30) and would have anticipated that the projects work with AWS would have been referenced in this section. In developing our non-domestic demand position statement, it is evident that one of the primary concerns of local councils and communities is whether a new major water demand project could jeopardise supplies to homes and existing businesses. Whilst it is our regulatory duty to ensure there is a supply demand balance for current and future planned domestic needs, we would ask the IGET project to ensure that it emphasises in its communications to the community that water supplies to homes and businesses will not be interrupted or reduced as a result of the project. We recommend given the IGET projects promoters that this message of no impact on domestic supplies is included in the cumulative impact assessment for the IGET project and provided to communities and local business stakeholders.</p>	<p>Public water supply in the homes and businesses located within the local community will not be affected by the development being undertaken. The water supply agreement with Anglian Water will not impact on the availability of water within the local area and network infrastructure will not be impacted by construction at the Project Site.</p>
		<p>Section 1.3: Data Sources</p> <p>Throughout the document reference is made to 2011 North East Lincolnshire Strategy Flood Risk Assessment (SFRA); these references should be revised to reflect</p>	<p>Noted. This has been updated throughout the FRA, at Appendix 18.A [TR030008/APP/6.4]</p>

Reference/ Date	Consultee	Summary of Response	How comments have been addressed in this chapter
August 2023	Environment Agency (Review of Draft FRA)	<p>Section 2.7: Hydrology and Flood Risk Management Infrastructure</p> <p><i>Surface Watercourses:</i> paragraph 2.7.1, 2nd bullet point – the Main River that lies to the east and south of the site boundary flowing from east to west is the Stallingborough North Beck</p> <p>We require an 8m clear strip from the landward toe of the fluvial defence to allow for maintenance and access. Any compound or storage would need to be further than 8m from the landward toe.</p> <p>There is a small area of Work N. 9 which is covered by the 0.1% defended and undefended fluvial extents from the Stallingborough North Beck. We request that nothing is located within this area of the fluvial floodplain to allow storage in case of high flows on Stallingborough North Beck. Maps may have been provided to show this area but if these are required, please let us know and we will provide them.</p>	<p>Section 2.7 of the FRA, at Appendix 18.A [TR030008/APP/6.4], has been updated to state “Environment Agency Main River: Stallingborough North Beck Drain (referred to as ‘North Beck Drain’ throughout the FRA) lies to the east and south of the Site Boundary flowing from east to west”.</p> <p>Section 10.1 of the FRA, at Appendix 18.A [TR030008/APP/6.4], has been added to reflect this requirement.</p> <p>Section 4.4 of the FRA, at Appendix 18.A [TR030008/APP/6.4], has been updated to reflect this information. The additional mapping has been requested for reference from the Environment Agency.</p>
		<p>Section 3.2: Development and Flood Vulnerability</p> <p>Paragraph 3.2.21 – we support the intention to shut down the facility during periods when there is a flood warning in place. We also welcome the confirmation that the site can shut down in situ or remotely.</p>	Noted.
		<p>Section 3.4: North East Lincolnshire Strategic Flood Risk Assessment</p>	Paragraph 3.4.11 5 th Bullet Point in the FRA, at Appendix 18.A [TR030008/APP/6.4] , has been amended to reflect the need for an

Reference/ Date	Consultee	Summary of Response	How comments have been addressed in this chapter
		<p>Paragraph 3.4.11, 5th bullet point – we do not normally comment on or approve the adequacy of flood emergency response procedures accompanying document proposals, as we do not carry out these roles during a flood. Our involvement with this development during an emergency will be limited to delivering flood warnings to occupants/users covered by our flood warning network. This paragraph should be updated to reflect that an appropriate flood warning and evacuation plan will need to be submitted to approved by North East Lincolnshire Council.</p>	<p>appropriate flood warning and evacuation plan will need to be submitted to approved by NELC.</p>
		<p>Section 4.4: Fluvial Sources</p> <p>Paragraph 4.4.8 - an assessment of the residual risk of a breach in the fluvial defences should be made in this FRA, particularly in relation to the temporary construction area (Work No. 9). It has been noted that the modelled flood levels for the Stallingborough North Beck in Table 4-5 show the wrong levels for the 1 in 1000 (0.1%) AEP. This appears to be an error in the model outputs that has since been rectified. A new table with updated levels can be found below, which will allow a more accurate assessment of the residual risk from a breach of the fluvial defences to be made.</p>	<p>Table 4.5 in the FRA at Appendix 18.A [TR030008/APP/6.4], has been updated to present the correct 0.1% AEP flood water levels provided by the Environment Agency.</p> <p>The assessment of residual risk from a breach in the fluvial flood defences is provided in Section 4.4 of the FRA at Appendix 18.A [TR030008/APP/6.4],</p>
		<p>Section 5: Impacts of the Development on Flood Risk</p>	<p>Paragraph 5.2.5 in the FRA [TR030008/APP/6.4] has been amended to reflect the assessment undertaken in Chapter 16: Physical Processes [TR030008/APP/6.2] states “Across the wider study area (including the existing berths at Immingham Oil Terminal (IOT), the rest of the intertidal</p>

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		<p>Paragraph 5.2.5 states that there will be a ‘small impact on “the adjacent foreshore areas fronting the Project site, which include a number of outfalls, including the Habrough Marsh Drain”. However, previous paragraphs indicate that Chapter 16: Physical Processes [TR030008/APP/6.2] concludes that there will be no likely impact on existing accretion rates. Could this be clarified, please? Any increase in sedimentation to the Stallingborough North Beck Outfall and the Habrough Marsh Drain Outfall would require mitigation to ensure flow is not affected.</p>	<p><i>area along the Immingham frontage, the Habrough Marsh Drain and Immingham Sea outfalls, the offshore banks and channels and the wider estuary up- and down-stream), the Project marine facilities have no impact on the existing (baseline) accretion and erosion rates.”</i></p>
		<p>Section 5: Impacts of the Development on Flood Risk</p> <p>Paragraphs 5.3.2 and 5.3.3 appear to contradict each other – could you please correct them as appropriate?</p>	<p>Paragraphs 5.3.2 and 5.3.3 in the FRA, Appendix 18.A [TR030008/APP/6.4], have been amended for clarity.</p>
		<p>Section 5: Impacts of the Development on Flood Risk</p> <p>Paragraph 5.3.4 – we note that reference was made in the Preliminary Environmental Information Report (PEIR) addendum for land raising to the West Site but not the East Site. We require a full assessment of land raising and the potential impacts to third parties from tidal sources. This could entail rerunning the individual hazard mapping breach to show where the displaced flood water would go and the impacts of this.</p>	<p>The FRA and the summary provided below at Section 18.11 of this chapter concludes that given the presence of the tidal flood defences, which would be raised by the Environment Agency in line with flood management plan proposals in order to maintain the standard of protection along the Humber Estuary in this area, the Project is considered to be at low risk of tidal flooding. It is unlikely, given the extent and depth of flooding along the South Humber Bank should a breach occur, that the Project would increase the risk of flooding off-site to surrounding land over its lifetime as these areas would be flooded to the same depth as the Site. Any increase in flood water level is likely to be insignificant.</p>

Reference/ Date	Consultee	Summary of Response	How comments have been addressed in this chapter
		<p>In the current overall site layout, the West Site is not within an area at risk from fluvial flooding from the Main Rivers. However, the site may be at risk from local ordinary watercourses for which other risk management authorities, such as the Lead Local Flood Authority or Internal Drainage Board have responsibility. The FRA should assess the impacts of land raising on the displacement of flood water from non-Main River sources and whether any floodplain compensatory storage is required. The FRA has currently only assessed the floodplain compensation from Main River flooding.</p>	<p>Mapping of fluvial flood extents (as provided in the NELC PFRA (Ref 18-16) shows the Project is located in Flood Zone 1 (low risk) and analysis of the Environment Agency RoFSW mapping (Figure 18.3) shows only small areas of surface water flooding from low to high risk associated with topographical low spots and constrained to watercourse corridors. Given the location of the Project in an area of low fluvial risk (Flood Zone 1) there would be no loss of floodplain storage and no negative impact on third parties.</p>
		<p>Section 6: Mitigation of Future and Residual Flood Risks and Off-Site Impacts</p> <p>Paragraph 6.3.1 - we support the inclusion of the flood resilience and resistance mitigation measures included in this paragraph.</p>	<p>Noted</p>
		<p>Section 6: Mitigation of Future and Residual Flood Risks and Off-Site Impacts</p> <p>Paragraph 6.6.2 - we also support the use of an area of safe refuge. However, it is worth noting that the flood refuge platform would only serve as an area of safe refuge for the control room building itself and its immediate vicinity. The occupants of the rest of the site could have to walk through deep flood water to reach the control room building, which could pose a risk to life. Adding additional areas of safe refuge across the site would provide more options for staff if safe evacuation couldn't be achieved.</p>	<p>Noted. Areas of safe refuge are included at the control room building and Toxic Safe Haven building on the West Site and at the control room building on the East Site.</p>

Reference/ Date	Consultee	Summary of Response	How comments have been addressed in this chapter
		<p>Section 6: Mitigation of Future and Residual Flood Risks and Off-Site Impacts</p> <p>Paragraph 6.9.3 - this suggests that the existing flood wall will be extended so the existing wall will remain in place. We are of the understanding that the wall will be replaced as it could be difficult to raise the existing wall. Therefore, a secondary containment may be required for the duration of the wall replacement.</p>	<p>The relevant sections of the FRA, at Appendix 18.A [TR030008/APP/6.4], have been updated to reflect the replacement of the section of flood defence wall underneath and in proximity to the jetty access road/pipe-rack as it crosses the flood defence. It is noted that these works may require a secondary containment for the duration of the wall replacement (Section 6.9 of the FRA, at Appendix 18.A [TR030008/APP/6.4]).</p> <p>The contractor will be required to provide a deployable or temporary flood defence works method, approved by the Environment Agency, prior to the commencement of the works, or through structuring the works in such a way that the existing defence wall can remain in-situ until the new structure is completed (Section 6.9 of the FRA, at Appendix 18.A [TR030008/APP/6.4]).</p>
		<p>Section 6: Mitigation of Future and Residual Flood Risks and Off-Site Impacts</p> <p>Paragraph 6.9.5 - the most recent drawings seen by the Environment Agency show a pile through the slope of the embankment. This should be updated in the FRA with the mitigation that the embankment will be monitored and if there is any structural movement or damage to the embankment the damage will be rectified, and we must be notified.</p>	<p>Paragraph 6.9.4 & 6.9.5 of the FRA, at Appendix 18.A [TR030008/APP/6.4], have been amended to reflect the current location of the piling in relation to the embankment and the monitoring/survey required by the Environment Agency has been outlined.</p>

Reference/ Date	Consultee	Summary of Response	How comments have been addressed in this chapter
		<p>Section 6: Mitigation of Future and Residual Flood Risks and Off-Site Impacts</p> <p>Paragraph 6.9.6 - we would like to see a contingency plan for the construction of the new flood wall as part of the Development Consent Order submission. There should be a form of continuity of defence at all times to ensure that flood risk is managed throughout.</p>	<p>Text in Section 6.9 of the FRA, Appendix 18.A [TR030008/APP/6.4], has been amended to state “On the landward side, temporary works and contingency measures will be put in place, as necessary, for the construction of the proposed the ramps and new section of flood defence to ensure the continuity of the flood defence throughout the works. The contractor will be required to provide a contingency plan for deployable or temporary flood defence works methods, approved by the Environment Agency, prior to the commencement of the works, or through structuring the works in such a way that the existing defence wall can remain in-situ until the new structure is completed”</p>

18.3 Legislation, Policy and Guidance

18.3.1 **Table 18-2** presents the legislation, policy and guidance relevant to the water quality, coastal protection, flood risk and drainage assessment and details how their requirements would be met by the Project.

Table 18-2: Relevant legislation, policy and guidance regarding Water Quality, Coastal Protection, Flood Risk and Drainage

Legislation/Policy/Guidance	Consideration within the ES
The Water Act 2014 (Ref 18-1)	
The aim of the Act was to reform the water industry to make it more innovative and responsive to customers and to increase the resilience of water supplies to natural hazards such as droughts and floods. The Act describes provisions for the following: abstraction water license modifications, waterworks records, flood insurance for households, internal drainage boards, regulations for the water environment and Regional Flood and Coastal Committees.	Abstractions located within 1km radius of the Site Boundary are described in Chapter 21: Ground Conditions and Land Contamination [TR030008/APP/6.2] .
The Floods and Water Management Act 2010 (Ref 18-2)	
The aim of the Act was to make provision about water, including provision about the management of risks in connection with flooding and coastal erosion.	Flood risks associated with Project are assessed in the FRA (Appendix 18.A [TR030008/APP/6.4]) and summarised in Section 18.8 of this chapter.
The Land Drainage Act 1991 (as amended) (Ref 18-3)	
The aim of the Act was to reform the water industry to make it more innovative and responsive to customers and to increase the resilience of water supplies to natural hazards such as droughts and floods. The Act describes provisions for the following: abstraction water license modifications, waterworks records, flood insurance for households, internal drainage boards, regulations for the water environment and Regional Flood and Coastal Committees.	Abstractions located within a 1km radius of Site Boundary are described in Chapter 21: Ground Conditions and Land Contamination [TR030008/APP/6.2] . Flood risks associated with Project are assessed in the FRA (Appendix 18.A [TR030008/APP/6.4]) submitted with the DCO application.
The Water Resources Act 1991 (Ref 18-4)	
Previously under the Water Resources Act 1991 and now under the <i>Environmental Permitting (England and Wales) Regulations 2016 (as amended)</i> it is an offence for a person to cause or knowingly permit pollution of controlled waters. The Act provides a framework for the application of environmental permits as well as receiving, varying, transferring and surrendering permits and compliance/enforcement of permits.	Controlled waters are discussed in Section 18.4 . Potential impacts upon controlled waters are discussed in Sections 18.8 .

Legislation/Policy/Guidance	Consideration within the ES
The Salmon and Freshwater Fisheries Act 1975 as amended (Ref 18-5)	
The aim of the Act is to protect salmon and trout from commercial poaching, to protect migration routes, to prevent willful vandalism and neglect of fisheries, ensure correct licensing and water authority approval.	The mitigation measures are detailed in Section 18.7 and aim to protect salmon and freshwater fisheries within the Humber Estuary.
The Environmental Permitting (England and Wales) Regulations 2016 (Ref 18-6)	
The Regulations set out the measures for those carrying out activities that may cause imminent threats of, or actual 'environmental damage', which require a permit. These Regulations also outline the authorities responsible for enforcing the Regulations. Such Regulations cover environmental permits, discharge into regulated facilities, enforcement and offences, public registers and powers/functions of the regulator and authority.	Section 18.7 provides details of mitigation measures that aim to prevent environmental damage.
The Environmental Damage (Prevention and Remediation) Regulations 2015 (Ref 18-7)	
The Regulations concern the prevention and remediation of environmental damage to: (a) protected species or natural habitats, or a site of special scientific interest, (b) surface water or groundwater, or (c) land, as specified in Regulation 4. They implement Directive 2004/35/EC of the European Parliament and of the Council on environmental liability with regard to the prevention and remedying of environmental damage.	Protected habitats and water bodies are discussed in Section 18.6 . Potential impacts are discussed in Sections 18.8 and 18.10 , whilst mitigation measures are detailed in Section 18.7 .
The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 & 2017; incorporated in The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. (Ref 18-8)	
The principal objective of the framework is for all groundwater, surface water and coastal water bodies to achieve 'good' status by 2015 and maintain this status. It includes broader ecological objectives as well as aims to prevent deterioration of all water bodies. The framework aims to develop sustainable water use and reduce and eliminate the presence of hazardous substances within water bodies. It must be considered in any scheme that has the potential to have an impact on any part of the water environment.	Water Framework Directive (WFD) surface water and groundwater bodies are described in Section 18.6 and Table 18-6 . Potential impacts to WFD surface water bodies are outlined in Section 18.8 . A Water Framework Directive Compliance Assessment is appended at Appendix 17.A[TR030008/APP/6.4]

Legislation/Policy/Guidance	Consideration within the ES
The Groundwater (England and Wales) Regulations 2009 (Ref 18-9)	
<p>The Regulations relate to the pollution of groundwater and provide rules for the granting by the Environment Agency of a permit under these Regulations, consent under section 91(8) of the Water Resources Act 1991 and (with exceptions) an environmental permit under the Environmental Permitting (England and Wales) Regulations. In addition, the Regulations create an offence of discharge of a hazardous substance or non-hazardous pollutant without a permit, provide for powers of enforcement of the Environment Agency and prescribe penalties for offences committed under these Regulations.</p>	<p>Potential impacts associated with the discharge of a hazardous substances or non-hazardous substances are considered in Section 18.8.</p>
The Control of Pollution (Oil Storage) (England) Regulations 2001 (Ref 18-10)	
<p>The Regulations require a person having custody or control of oil to carry out certain works and take certain precautions and other steps for preventing pollution of any waters which are controlled waters for the purposes of Part III of the Water Resources Act 1991. Regulation 2(2) sets out circumstances in which these Regulations do not apply to the storage of oil. Regulation 3 imposes general requirements in relation to the storage of oil. Additional requirements which apply to specific types of container are imposed by regulation 4 and regulation 5. Regulation 6 contains transitional provisions. Where in a transitional case the Environment Agency considers that there is a significant risk of pollution of controlled waters from the oil in question it has the power to serve a notice on the person having custody or control to minimise the risk (see reg.7).</p>	<p>Controlled waters are discussed in Section 18.4, whilst potential risks to controlled waters are discussed in Section 18.8.</p>
National Policy Statement for Ports (NPSfP) (Ref 18-11)	
<p>The NPSfP is a framework to address proposals for port development in the UK and associated development (rail and road). It describes the UK Government's policy on new port infrastructure in the context of future demand, needs and the current economy. The Project is considered to be a Nationally Significant Infrastructure Project (NSIP) within the ports industry.</p> <p>The aims of the NPSfP for development and flood risk are to ensure that flood risk from all sources of flooding is taken into account at all stages in the planning process, to avoid inappropriate development in areas at risk of flooding and to direct development away from areas at highest risk. Where new development is, exceptionally, necessary in such</p>	<p>NPSfP requirements are used in assessing the impact of the Project on the water environment – refer to Section 18.8. The FRA (Appendix 18.A [TR030008/APP/6.4]) assesses flood risk in line with applicable policy requirements.</p> <p>The FRA (Appendix 18.A [TR030008/APP/6.4]) identifies and assesses flood risk from all sources (tidal, fluvial, surface water, groundwater, drainage infrastructure and artificial sources) and outlines mitigation measures to keep the Project safe should a flood event occur. The accompanying Planning</p>

Legislation/Policy/Guidance	Consideration within the ES
<p>areas, including ‘water compatible’ development, the policy aims to make it safe without increasing flood risk elsewhere and where possible, reducing flood risk overall. Port development is defined as being water compatible development and, therefore, acceptable in high flood risk areas (Paragraph 5.2.3).</p> <p>The NPSfP states <i>“all applications for port development of 1 hectare or greater in Flood Zone 1 and all proposals for projects located in Flood Zones 2 and 3 should be accompanied by a flood risk assessment (FRA). This should identify and assess the risks of all forms of flooding to and from the project and demonstrate how these flood risks will be managed, taking climate change into account”</i> (Paragraph 5.2.4).</p> <p>The NPSfP notes that the latest set of UK Climate Projections should be used in assessments to ensure the appropriate adaptation measures have been identified. <i>“Applicants should apply, as a minimum, the emissions scenario that the independent Committee on Climate Change suggests the world is currently most closely following – and the 10%, 50% and 90% estimate ranges. These results should be considered alongside relevant research which is based on the climate change projections such as Environment Agency Flood Maps”</i> (Paragraph 4.13.7).</p> <p>Paragraph 5.2.18 of the NPSfP states <i>“The Government’s view is that there is no ‘public good’ need, on national resilience grounds, to require a higher specification than will secure commercial resilience of the individual facility, notwithstanding that some types of severe weather may effect ports in a region or along a particular stretch of coastline, for example from a storm surge. The NPSfP provides more generally for resilience and diversity of ports provision. Applicants will be in the best position to make a commercial judgement on the required appropriate adaptation measures to reduce the risk from long term climate change as it affects their own facilities”</i>.</p> <p>Section 5.6 of NPSfP states that <i>“Infrastructure development can have adverse effects on the water environment, including groundwater, inland surface water, transitional waters and coastal waters. During the construction, operation and decommissioning phases, it can lead to increased demand for water, involve discharges to water and cause adverse ecological effects resulting from physical modifications to the water environment.”</i> The consideration of these effects in terms of water</p>	<p>Statement [TR030008/APP/7.1] provides information with regards site allocations and Chapter 3: Need and Alternatives [TR030008/APP/6.2] outlines the site selection study to support the sequential test.</p> <p>The FRA (Appendix 18.A [TR030008/APP/6.4]) identifies and assesses flood risk from all sources (tidal, fluvial, surface water, groundwater, drainage infrastructure and artificial sources) and outlines mitigation measures to keep the Project safe should a flood event occur. Climate change for the lifetime of the Project has been assessed in line with the Environment Agency Guidance (Ref 18-34).</p> <p>Section 18.7 and the FRA (Appendix 18.A [TR030008/APP/6.4]) outline the flood risk mitigation measures for the Project including flood resilience and resistance measures, site operation and shut down, flood emergency response plans and elevation of critical plant equipment.</p> <p>A Water Framework Directive Compliance Assessment is appended at Appendix 17.A [TR030008/APP/6.4] and potential impacts to WFD surface water bodies are outlined in Section 18.8.</p>

Legislation/Policy/Guidance	Consideration within the ES
bodies failing to meet environmental objectives established under WFD legislation will be necessary.	
National Planning Policy Framework (“NPPF”) (Ref 18-12)	
The NPPF sets out the government’s planning policies and how these are expected to be applied. The NPPF states that “ <i>when determining planning applications, LPA’s should ensure that flood risk is not increased elsewhere (...) where appropriate, applications should be supported by a site-specific Flood Risk Assessment</i> ”.	The impact assessment of the Project on the water environment has been undertaken in accordance with the guidance provided in the NPPF, i.e. to ensure that flood risk is not increased elsewhere. This is demonstrated in this ES chapter and in the supporting FRA (Appendix 18.A [TR030008/APP/6.4]).
National Planning Practice Guidance (“NPPG”) (Ref 18-13)	
The NPPG provides guidance for local planning authorities on assessing the significance of water environment effects of proposed developments. The guidance highlights that adequate water and wastewater infrastructure is needed to support sustainable development.	This guidance has been considered within Section 18.8 when establishing the potential effects of the Project on the local aquatic environment and ensuring the sustainability of the development.
Flood Risk and Coastal Change NPPG (Ref 18-14)	
<p>The Flood Risk and Coastal Change NPPG recommends that “<i>Local Plans should apply a sequential, risk-based approach to the location of development to avoid where possible flood risk to public and property and manage any residual risk, taking account of the impacts of climate change, by:</i></p> <ul style="list-style-type: none"> • <i>Applying the Sequential Test;</i> • <i>Applying the Exception Test if necessary;</i> • <i>Safeguarding land from development that is required for current and future flood management;</i> • <i>Using opportunities offered by new development to reduce the causes and impacts of flooding; and</i> • <i>Where climate change is expected to increase flood risk, seeking opportunities to facilitate the relocation of the development”.</i> 	<p>The NPPG provides general guidance on flood risks in the context of developing local plans. The FRA for the Project (Appendix 18.A [TR030008/APP/6.4]) is aligned with the direction provided by the NPPG in relation to the location of development.</p> <p>The accompanying Planning Statement [TR030008/APP/7.1] provides information with regards site allocations and ES Chapter 3: Need and Alternatives [TR030008/APP/6.2] outlines the site selection study to support the sequential test.</p>
Government’s Green Future: 25 Year Plan to Improve the Environment (Ref 18-15)	
Sets out the Government’s goals for improving the environment within a generation and leaving it in a better state than we found it. With regards to the water environment, the Plan includes specific goals to reduce the environmental impact of water abstraction, meet the objectives of River Basin Management Plans under the WFD, reduce leakage	The green future plans were used in Section 18.8 for assessing the impact of the development on the Estuary bordering the Site by factoring in climate change in future baseline scenarios.

Legislation/Policy/Guidance	Consideration within the ES
<p>from water mains, improve the quality of bathing waters, restore protected freshwater site to a favourable condition, and do more to protect communities and businesses from the impact of flooding, coastal erosion and drought.</p>	
<p>Government's Water Strategy for England, Future Water (Ref 18-16)</p>	
<p>Sets out the Government's goals for improving the aquatic environment within a generation ensuring that water quality remains high, with resources being maintained and future drought scenarios being mitigated with the environment also being protected from climate change events.</p>	<p>The Strategy has been used during the completion of Section 18.6 where baseline conditions and future impacts from contamination risks are explored.</p>
<p>Non-statutory Technical Standards for Sustainable Drainage Systems ("SuDS") (Ref 18-17)</p>	
<p>Sets out the Government's long-term vision for water and the framework for water management in England. It aims to permit the supply of secured water supplies whilst ensuring an improved and protected water environment. Planning policy encourages developers to include SuDS in their proposals where practicable. Defra have provided guidance on the use, design and construction of SuDS in Non-Statutory Technical Standards.</p> <p>A review of Schedule 3 of the Flood and Water Management Act 2010 was published by the UK Government in January 2023 and recommended implementation of Schedule 3 in England. Schedule 3 requires developers to seek approval from a Sustainable Drainage Approving Board (SAB), who must determine whether the application meets the National Standards. Defra is currently carrying out further work to draft these standards which each SAB will refer to, and these are expected to be published in 2024.</p>	<p>The technical standards are used to assess the SuDS requirements within the Drainage Strategy at Appendix 18.B [TR030008/APP/6.4]</p>
<p>North East Lincolnshire Council (NELC) Local Plan (Ref 18-40)</p>	
<p>The following policies of the NELC Local Plan are relevant to the water quality, coastal protection, flood risk and drainage assessment:</p> <p>Policy 33: Flood Risk. This policy outlines the requirements of the Sequential and Exception Tests and sets out criteria that development proposals should demonstrate in order to minimise flood risk impacts and mitigate against the likely effects of climate change. This criteria includes a undertaking a site-specific flood risk assessment , no unacceptable increased risk of flooding to the development site or existing properties, the development will be safe during its lifetime, SuDS have been incorporated into</p>	<p>The FRA (Appendix 18,A [TR030008/APP/6.4]) sets out the policy and provides a summary of the Sequential Test/Exception Test undertaken to support the location of the Project in compliance with this policy. This is supported by Chapter 3: Need and Alternatives [TR030008/APP/6.2] and the Planning Statement [TR030008/APP/7.1] (submitted as part of the DCO application) which provides details on the site allocation. The FRA fulfils Element 3 of the NPSfP Exception Test requirement – "<i>an FRA must demonstrate that the project will be safe,</i></p>

Legislation/Policy/Guidance	Consideration within the ES
<p>the development unless their use has been deemed inappropriate, opportunities to provide NFM and mitigation through green infrastructure, arrangements for the adoption, maintenance and management of any mitigation measures, access to any watercourse or flood defence asset for maintenance, clearance, repair or replacement is not adversely affected; and the restoration, improvement or provision of additional flood defence infrastructure represents an appropriate response to local flood risk, and does not conflict with other Plan policies.</p> <p>Policy 34: Water Management. This policy outlines the requirements of development proposals in relation to potential impacts to surface and groundwater. Such requirements include sustainable and adequate water supplies on site, efficient water use, adequate foul water treatment and appropriate sewerage systems. The Humber River Basin Management Plan (“RBMP”) should be considered. The policy also refers to the importance of protecting groundwater within Source Protection Zones (“SPZ”) during construction and operational phases.</p> <p>Policy 40: Developing a green infrastructure network. This policy outlines the importance of green spaces and infrastructure within developments, as well as biodiversity, climate change mitigation and sustainable water management. As part of this policy, open areas between Immingham and the northern industrial development will be given specific protection.</p>	<p><i>without increasing flood risk elsewhere and, where possible, will reduce flood risk overall</i></p> <p>The FRA has been undertaken in accordance with the requirements of local policy outlining flood risks to and from the Project and includes mitigation measures where required so the Project remains safe over its lifetime.</p> <p>Flood risk information is provided within Sections 18.6 and 18.8.</p> <p>Discussions have taken place with Anglian Water regarding the supply of potable water to the site for the use of cooling. Solutions to providing this water are being investigated that would not introduce further stress into an already pressured water supply zone. These proposed options would see the use of sub-potable sources of water to meet the site’s needs.</p> <p>NELC policy has been considered alongside the requirements of the NELIDB to inform the Drainage Strategy (Appendix 18.B [TR030008/APP/6.4]).</p>
<p>Anglian Water’s draft Water Resources Management Plan (“WRMP”) December 2022 (Ref 18-19)</p> <p>Anglian Water’s Drought Management Plan (“DMP”), April 2022 (Ref 18-20)</p> <p>Anglian Water Drought Plan (“DP”) 2022 – Strategic Environmental Assessment (“SEA”) Environmental Report, April 2022 (Ref 18-20)</p>	<p>The draft WRMP, along with DMP, provides the latest water resources position for the Water Resource Zone in which IGET lies i.e. South Humber Bank. Anglian Water will have done their own assessment of the requested water needs from IGET in determining their ability to supply the project – see Paragraph 18.4.11.</p> <p>The DMP and SEA Environmental Report are statutory requirements for water undertakers under the Water Industry Act 1991, as amended in 2003 and 2014. The DP’s SEA report is the best available appraisal of environmental effects at periods of extreme drought. No drought schemes are envisaged for South Humber Bank and resources would not be lost for other uses if allocated to meet the operational needs of the project – see Section 18.6.</p>

Legislation/Policy/Guidance	Consideration within the ES
<p>Water Resources East – first full draft Regional Water Plan for Eastern England, November 2022 (Ref 18-21)</p> <p>WRE – Consultation on WRE’s draft Regional Plan, July 2023 (Ref 18-22)</p>	<p>The draft Regional WRMP provides a high level picture of water resources across a number of water undertakers in Eastern England. The picture which the consultation neatly summarises is one of east to west transfers, implying that resources in excess of demands are occurring. This point is made in Paragraph 18.4.11.</p>

18.4 Assessment Methodology

Assessment Methodology and Scope

- 18.4.1 There is no standard guidance in place for the assessment of the likely significant effects on the water resources and water environment from developments of this type. Based on professional judgement and experience of other similar schemes which have adopted best practice, a qualitative assessment of the likely significant effects on surface water quality, coastal protection, flood risk and drainage receptors has been undertaken.
- 18.4.2 The assessment of water resources is an integral part of Anglian Water’s WRMP process and trying to replicate for a water resource zone (such as South Humber Bank) would not be possible without commercially sensitive data being shared by the Company¹. Instead, the position taken is that given the commercial offer made by Anglian Water to Air Products, that in order to give this commitment, then Anglian Water must have already undertaken its own resources modelling and been satisfied that they could supply this even under drought conditions.
- 18.4.3 The classification and significance of effects has been determined using the principles of the guidance and the criteria set out in DMRB LA 113 (Ref 18-23) adapted to take account of hydromorphology. Although these assessment criteria were developed for road infrastructure projects, this method is suitable for use on any development project and provides a robust and well tested method for predicting the significance of effects. The methodology also considers advice set out in DfT TAG Unit A3, Environmental Impact Appraisal (Ref 18-24).
- 18.4.4 Following DMRB LA 113 (Ref 18-23), the importance of the receptor and the magnitude of impact is assessed based on **Table 18-3** and **Table 18-4**. The importance of the receptors is determined independently, and these are then used to determine the overall classification and significance of effects set out in **Table 18-5**.

¹ OFWAT’s final price determination for Anglian Water is expected in December 2023, at which point some more information may be available on the water resources availability situation.

- 18.4.5 Whilst other disciplines may consider ‘receptor sensitivity’, ‘receptor importance’ is considered here. This is because when considering the water environment, the availability of dilution means that there can be a difference in the sensitivity and importance of a water body. For example, a small drainage ditch of low conservation value and biodiversity with limited other socio-economic attributes, is very sensitive to impacts, whereas an important regional scale watercourse, that may have conservation interest of international and national significance and support a wider range of important socio-economic uses, is less sensitive by virtue of its ability to assimilate discharges and physical effects. Irrespective of importance, all controlled waters in England are protected by law from being polluted.
- 18.4.6 The approach to defining the importance of water receptors across surface water, hydromorphological and flood risk has been provided in **Table 18-3**.

Table 18-3: Evaluating the Importance for Surface Water, Flood Risk, and Water Resources

Importance	General Criteria	Key Attributes		
		Surface Water	Hydromorphology	Flood Risk
Very high	The receptor has little or no ability to absorb change without fundamentally altering its present character and is of very high environmental value, or of international importance.	Watercourse having a WFD classification as shown in a River Basin Management Plan (RBMP) and $Q95 \geq 1.0\text{m}^3/\text{s}$; Site protected/ designated under international or UK habitat legislation (SAC, SPA, SSSI, WPZ, Ramsar Site). Critical social or economic uses (e.g. public water supply and navigation).	Unmodified, near to or pristine conditions, with well-developed and diverse geomorphic forms and processes characteristic of river and lake type.	Floodplain or defence protecting more than 100 residential properties from flooding; Flood Zone 3b; Essential Infrastructure or highly vulnerable development; Human receptors – general public, site visitors Very high risk from non-fluvial/non- tidal flood sources; Offsite regional sewerage networks.
High	Receptor of national or regional importance with a low ability to absorb change without fundamentally altering its present character.	Watercourse having a WFD classification as shown in a River Basin Management Plan (RBMP) and $Q95 < 1.0\text{m}^3/\text{s}$; Major Cyprinid Fishery; Species protected under international or UK habitat legislation. Critical social or economic uses (e.g. water supply and navigation). Important social or economic uses such as water supply, navigation or mineral extraction.	Conforms closely to natural, unaltered state and would often exhibit well-developed and diverse geomorphic forms and processes characteristic of river and lake type. Deviates from natural conditions due to direct and/ or indirect channel, floodplain, bank modifications and/ or catchment development pressures.	Floodplain or defence protecting between 10 and 100 residential properties or industrial premises from flooding; Flood Zone 3a; More vulnerable development; Human receptors – construction workers and site operatives with knowledge of site conditions; Low lying land and local pumped drainage network.

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Importance	General Criteria	Key Attributes		
		Surface Water	Hydromorphology	Flood Risk
				High risk from non-fluvial/non-tidal flood sources.
Medium	Receptor of regional or local importance, with medium ability to absorb, adapt to or recover from change without significantly altering its present character.	Watercourse detailed in the Digital River Network but not having a WFD classification as shown in a RBMP. May be designated as a local wildlife Site (LWS) and support a small/ limited population of protected species. Limited social or economic uses.	Shows signs of previous alteration and/ or minor flow/ water level regulation but still retains some natural features or may be recovering towards conditions indicative of the higher category.	Floodplain or defence protecting 10 or fewer industrial properties from flooding; Flood Zone 2; Less vulnerable development; Surface water drainage network including drainage ditches. Medium risk from flooding from non-fluvial/non-tidal flood sources.
Low	The receptor is of local importance and tolerant of change without detriment to its character (i.e. has some ability to absorb, adapt to or recover from change).	Surface water sewer, agricultural drainage ditch; non-aquifer WFD Class 'Poor' or undesignated in its own right. Low aquatic fauna and flora biodiversity and no protected species. Minimal economic or social uses.	Substantially modified by past land use, previous engineering works or flow/ water level regulation. Likely to possess an artificial cross-section would probably be deficient in bedforms and bankside vegetation. May also be realigned or channelised with hard bank protection, or culverted and enclosed. May be significantly impounded or abstracted for water resources use. Could be impacted by navigation, with associated high degree of flow regulation and bank protection, and probable strategic need for maintenance	Floodplain with limited constraints and low probability of flooding of residential and industrial properties; Flood Zone 1; Water compatible development; Local drainage network (existing private site drainage or soakaway). Low risk from non-fluvial/non-tidal flood sources.

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Importance	General Criteria	Key Attributes		
		Surface Water	Hydromorphology	Flood Risk
			dredging. Artificial and minor drains and ditches would fall into this category.	
Negligible	Receptor is resistant to change and is of little or no environmental value.	Not applicable.	Not applicable.	Not applicable.
<p>Note 1: Professional judgement is applied when assigning an importance category to all water features. The WFD status of a watercourse is not an overriding factor and, in many instances, it may be appropriate to upgrade a watercourse which is currently at poor or moderate status to a category of higher importance to reflect its overall value in terms of other attributes and WFD targets for the watercourse. Likewise, a watercourse may be below Good Ecological Status, this does not mean that a poorer quality discharge can be emitted. All controlled waters are protected from pollution under the Environmental Permitting (England and Wales) Regulations 2016 (Ref 18-6) and the Water Resources Act 1991 (as amended) (Ref 18-4), and future WFD targets also need to be considered.</p> <p>Note 2: Based on the water body 'Reach Conservation Status' presently being adopted for a major infrastructure project (and developed originally by Atkins) and developed from Environment Agency conservation status guidance (Ref 18-25 and Ref 18-26) as LA113 does not provide any criteria for morphology.</p>				

- 18.4.7 The assessment of magnitude of potential change upon water quality, coastal protection, flood risk and drainage receptors take account of the scale of the predicted change to baseline conditions and where there are potential pathways between an impact source/ hazard and identified receptors. This takes into account the spatial scale of the impact, as well as its duration and reversibility (e.g., the impact magnitude may be moderated if the impacts are temporary rather than permanent; or are reversible rather than irreversible).
- 18.4.8 The magnitude of change on the identified receptors ranges from major adverse to major beneficial. The approach to defining the magnitude of impacts on water receptors is provided in **Table 18-4** below:

Table 18-4: Determining Magnitude of Impact on Water Receptors

Level of Magnitude	Definition of Magnitude and Examples
Major Adverse	Results in a loss of the identified attribute and/ or its quality and integrity. For example, loss of a fishery; decrease in surface water ecological or chemical WFD status or groundwater qualitative or quantitative WFD status. Change in flood risk to receptor from low or medium to high.
Moderate Adverse	Results in impact on integrity of attribute, or loss of part of attribute. For example, partial loss of a fishery; measurable decrease in surface water ecological or chemical quality, or flow; reversible change in the yield or quality of an aquifer; such that existing users are affected, but not changing any WFD status. Change in flood risk to receptor from low to medium.
Minor Adverse	Results in some measurable change in attribute's quality or vulnerability. For example, measurable decrease in surface water ecological or chemical quality, or flow; decrease in yield or quality of aquifer; not affecting existing users or changing any WFD status. Change in flood risk to receptor from no risk to low risk.
Negligible	Results in impact on attribute, but of insufficient magnitude to affect the use or integrity. For example, negligible change discharges to watercourse or changes to an aquifer which lead to no change in the attribute's integrity.
Minor Beneficial	Results in some beneficial impact on attribute or a reduced risk of negative impact occurring. For example, measurable increase in surface water ecological or chemical quality; increase in yield or quality of aquifer not affecting existing users or changing any WFD status. Change in flood risk to receptor from low risk to no risk.
Moderate Beneficial	Results in moderate improvement of attribute quality. For example, measurable increase in surface water quality or in the yield or quality of aquifer benefiting existing users but not changing any WFD status. Change in flood risk to receptor from medium to low.
Major Beneficial	Results in a gain of attribute and/or quality and integrity of the attribute. For example, change in flood risk to receptor from high to medium or low; The improvement of surface water quality or the increase in yield or quality of an aquifer benefiting existing users and a change in the WFD water body status to an improved category.

Level of Magnitude	Definition of Magnitude and Examples
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

18.4.9 The importance of the receptor (**Table 18-3** of this chapter) and the magnitude of change (**Table 18-4** of this chapter) are determined independently from each other and are then used in combination to determine the magnitude of the resultant effect and the overall significance of effects using **Table 18-5** below. Professional judgement has been used to determine the magnitude of the effects where two options are possible in the matrix. Effects which are large or very large are considered to be significant. Effects which are negligible or minor are not significant. Effects which are moderate may be significant or not significant and professional judgement is used to determine which is appropriate in a particular scenario.

Table 18-5: Significance Matrix

Receptor Importance	Magnitude of Impact				
	No Change	Negligible	Minor	Moderate	Major
Very High	Negligible	Minor	Moderate or large	Large or very large	Very large
High	Negligible	Minor	Minor or moderate	Moderate or large	Large or very large
Medium	Negligible	Negligible or minor	Minor	Moderate	Moderate or large
Low	Negligible	Negligible or minor	Negligible or minor	Minor	Minor or moderate
Negligible	Negligible	Negligible	Negligible or minor	Neutral or minor	Minor

Limitations and Assumptions

- 18.4.10 The information presented in this assessment is based on the proposed design for the Project and the maximum extents of land required for its construction and operation, in accordance with the application of the Rochdale Envelope approach.
- 18.4.11 The FRA for the Project is appended as **Appendix 18.A [TR030008/APP/6.4]** and considers the Environment Agency's Coastal Hazard Mapping and the residual risk from coastal flooding. The management of surface water runoff and its disposal from the Site is considered in the **Drainage Strategy** appended at **Appendix 18.B [TR030008/APP/6.4]**.

18.4.12 Water use needs for the Project are defined in **Chapter 2: The Project [TR030008/APP/6.2]**. The only requirement for potable supply would be for offices (including fire sprinkler systems), welfare facilities and site safety showers. A non-potable supply is required for operational processes of the hydrogen production facility including for cooling purposes as well as fire water for emergencies. On the basis that a commercial offer is in place with Anglian Water for provision of these resources, no further assessment is required of any impacts associated with water demand or supply, including any environmental impacts which might be associated of the provision of resources including any new abstractions. Anglian Water as part of their Water Resources Management Planning (WRMP24) process would have made their own assessment in order to give this response.

18.5 Study Area

18.5.1 The Site location is shown on **Figure 1.1 [TR030008/APP/6.3]**, whilst **Figure 2.3 [TR030008/APP/6.3]** shows the Site plan for the Project, outlining the location of the West Site, Pipeline Corridor, East Site, Temporary Construction Areas (including a concrete batching plant on the East Site (Work No. 5a)) and Jetty sites.

18.5.2 For the purposes of the water quality assessment, a study area of approximately 1km around the Site Boundary (**Figure 18.1 [TR030008/APP/6.3]**) has been considered as this distance is judged to include those surface water bodies that could reasonably be affected (directly or indirectly) by the Project. However, since watercourse flow and water quality impacts may propagate downstream, where relevant, the assessment also considers a wider study area based on professional judgement.

18.5.3 As coastal protection, flood risk and drainage impacts can impact upstream and downstream, this chapter and the FRA (**Appendix 18.A [TR030008/APP/6.4]**) considers a wider study area, where relevant. Professional judgement around hydrological linkages is applied to identify the extent to which such features are considered in the next section.

18.6 Baseline Conditions

Current Baseline

18.6.1 A desk-based study was undertaken in May 2023 to inform the baseline for the Project. The study included analysis of baseline water quality, coastal protection, flood risk and drainage which forms the baseline on which the impact assessment is based. The following data sources were reviewed:

- a. Catchment Data Explorer website (Ref 18-27).
- b. Multi-Agency Geographic Information for the Countryside (“MAGIC”) website (Ref 18-28).
- c. Flamborough Head to Gibraltar Point Shoreline Management Plan (Ref 18-29).

- d. Humber Flood Risk Management Strategy (note that this strategy is currently being updated and will be incorporated into the assessment should the update be completed and made publicly available) (Ref 18-35).
 - e. Environment Agency Flood Maps for Planning ([https:// flood-map-for-planning.service.gov.uk](https://flood-map-for-planning.service.gov.uk)) (Ref 18-31).
 - f. Environment Agency Long-term Information Service Check the long term flood risk for an area in England – GOV.UK (www.gov.uk) (Ref 18-32).
 - g. Environment Agency Data Request Response (Product 4 and 8) including Coastal Hazard Maps (**Appendix 18.A: Flood Risk Assessment [TR030008/APP/6.4]**).
- 18.6.2 A Site walkover was undertaken on 15 February 2023 by a surface water quality specialist and hydromorphologist in cold, dry, and fair conditions. The walkover focused on surface waterbodies in the study area, observing their current character and condition, the presence of existing risks and any potential pathways for construction and operational impacts from the Project.
- 18.6.3 Two rounds of water quality sampling were undertaken on 31 March 2023 and 18 May 2023. These results provided confirmation of condition in the two watercourses nearest to the Site i.e. Habrough Marsh Drain (SW1 & 2) and North Beck Drain (SW3). The results are presented in **Appendix 17.A [TR030008/APP/6.4]**.
- 18.6.4 A WFD assessment has been undertaken to determine the potential implications of the Project on the objectives of the relevant water bodies. This assessment is based on the information and analysis provided within the ES in relation to changes in physical processes, water and sediment quality, and impacts on marine and terrestrial ecological receptors. The WFD assessment can be found in **Appendix 17.A [TR030008/APP/6.4]** and follows the specified methodology outlined in the latest *Clearing the Waters for All* guidance (Ref 18-33). The **Figure 18.4 [TR030008/APP/6.3]** is included to show the WFD Surface Water Bodies within the ZOI.
- 18.6.5 A FRA has been prepared in accordance with the NPSfP, NPS EN-1 and NPPF due to the size (over 1ha) and location of the Project (in Flood Zone 3). The FRA (presented as **Appendix 18.A [TR030008/APP/6.4]**) assesses the flood risk both to and from the Project and demonstrates how that flood risk would be managed over the Project's lifetime, to satisfy the requirements of the Sequential Test and Exception Test. The FRA has given due regard to climate change in accordance with Environment Agency guidance (Ref 18-34) which has informed the design of the Project (including finished ground and floor levels) as well as the water environment impact assessment reported in this ES.
- 18.6.6 A Drainage Strategy is provided as **Appendix 18.B [TR030008/APP/6.4]** outlining how surface water runoff would be managed on-site post development. The strategy includes details on surface water attenuation, consideration of climate change and proposed discharge rates to the local land drainage system (the discharge rates have been agreed with the NELIDB).

- 18.6.7 A qualitative assessment of the water available in the South Humber Bank Water Resources Zone is based on publicly available information contained in Anglian Water's draft WRMP24 (Ref 18-19). The WRMP24 publication indicates that a net surplus of water will be available within the newly formed South Humber Bank water resource zone ("WRZ"). Anglian Water have indicated that approximately 60 MI/d of water is to be made available for industrial developments within the South Humber Bank WRZ. The WRMP has outlined the future provision for water within the region are suitable for maintaining security of supply from 2025-2050.

Topography

- 18.6.8 The topography of the Site is low-lying and flat with many areas being as historically reclaimed land. The Site is generally flat and lies between 1.48m Above Ordnance Datum ("AOD") and 3.83m AOD. However, there are high spots between 6.21m AOD and 9.92m AOD in the pipeline corridor section.
- 18.6.9 At the East Site (**Works No.5**), the ground elevations range from 3.0m – 4.0m AOD. At the East Site (**Works No.3**), ground elevations range from 3.0m - 4.5m AOD. Both sites gradually slope downwards to the south-east, towards an unnamed drainage ditch running to the north-east.
- 18.6.10 For the West Site (**Works No.7**), the ground elevations range from the highest point of 3.0m AOD at the north-east corner, to 2.0m AOD at the lowest point in the south-west corner. The ground levels slope towards the southern boundary, and a small drainage ditch.

Existing Land Use

- 18.6.11 The Site is situated to the east of the Port of Immingham, 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 the town of Immingham approximately 1km from the western edge of the Site.
- 18.6.12 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 today.
- 18.6.13 Further information on existing land use, both on Site and in the surrounding area is provided in **Chapter 2: The Project [TR030008/APP/6.2]**.

Surface Watercourses

- 18.6.14 The following local water features have been identified within or in close proximity to the Site through the inspection of OS 1:10,000 mapping and are presented on **Figure 18.2 [TR030008/APP/6.3]**.
- 18.6.15 The Site is located on the Humber Estuary (River Humber, a tidal watercourse) which originates at Trent Falls, by the confluence of the tidally influenced rivers Ouse and Trent and flows south-east into the North Sea.

- 18.6.16 Stallingborough North Beck Drain (referred to a North Beck Drain), an Environment Agency Main River lies to the east and south of the Site Boundary. The Drain, an embanked upland river, originates at Little London and receives pumped surface water runoff from south, central and east Immingham as well as land drainage run off from West Lindsey. The North Beck Drain discharges by gravity, via a sluice gate, into the Humber Estuary.
- 18.6.17 NELIDB are operational within the area and have flood risk management responsibilities over the following Ordinary Watercourses:
- a. Habrough Marsh Drain - located to the north and northwest Site Boundary and directly adjacent to the north-northwest boundary of the Pipeline Corridor and East Site. The watercourse drains a significant proportion of Immingham Dock. The watercourse largely skirts the southern and western perimeters of the Port estate and flows from west to east to the north of the Site. The watercourse discharges partly to the Humber Estuary (gravity discharge via sluice gates) and partly to the North Beck Drain via the Immingham Pump Drain and the Immingham Pumping Station, (located approximately 715m south of the West Site, to the west of Kings Road where the road crosses the watercourse).
 - b. Immingham Pump Drain, located to the west of the Kings Road/A1173, the drain flows from north to south parallel with the road towards the North Beck Drain. The drain receives flows from Haborough Marsh Drain and is pumped into the North Beck Drain via the Immingham Pumping Station.
 - c. A series of minor land drainage ditches are present within the Site Boundary and in close proximity to the Site Boundary and convey surface water run-off discharges from the Site to the IDB network and the Humber Estuary. These include a drainage ditch along the southern boundary of the West Site (**Work No. 7**), flowing generally from north east to south west, and a drainage ditch along the southern boundary of the East Site (**Work No. 3** and **Work No. 5**), flowing generally from south west to north east. Both drainage ditches ultimately discharge to the North Beck Drain.

Water Quality

- 18.6.18 The following key water environment receptors have been identified in the vicinity of the Project:
- a. The Humber Estuary (Humber Estuary TraC Operational Catchment) and in particular the Lower Humber (GB530402609201) which forms the eastern boundary of the Site Boundary. The review of this waterbody's importance is contained in **Chapter 17: Marine Water and Sediment Quality [TR030008/APP/6.2]**.
 - b. North Beck, Habrough Marsh drain and local drains (a NELIDB watercourse which skirts the southern and western perimeters of the port estate flowing from south to north) are all located in the vicinity of the Site Boundary (part of Becks Northern Operational Catchment). A summary of WFD data for 2019 for these water bodies is provided in **Table 18-6**.

- c. On-shore WFD water bodies: North Beck Drain (GB104029067575) and North Lincolnshire Chalk Unit waterbody (GB40401G401500). The conditions of these waterbodies are Moderate ecological status and Poor overall status, respectively. These classifications by the Environment Agency are based on 'lowest' category, which for the surface waterbody is ecological status and for groundwater is based on resources. A summary of WFD data for 2019 for North Beck Drain and North Lincolnshire Chalk Unit waterbody is provided in **Table 18-6**.
 - d. Various ecological sites:
 - i. Humber Estuary (Ramsar, SPA and SAC). The review of these protected sites is included in **Chapter 17: Marine Water and Sediment Quality [TR030008/APP/6.2]**.
 - ii. On-shore limited conservation value apart from small patches of Priority Habitat (Coastal and Floodplain Grazing Marsh and Good quality semi-improved grassland: Non-Priority).
- 18.6.19 There are a number of large source protection zones ("SPZ") local to the Project, including an SPZ1 (inner zone) lying very close to the edge of the Immingham Docks site. The other SPZs are located west of the coastal strip (presumably designed to minimise saline intrusion). The various abstraction licences associated with these SPZs are described in **Chapter 21: Ground Conditions and Land Quality [TR030008/APP/6.2]**.
- 18.6.20 Lying further to the west of the coast (west of A180) are various Drinking Water Safeguard Zones (Groundwater) associated with catchments of the SPZs as described above. There are no Drinking Water Safeguard Zones (Surface Waters) in the vicinity of the Site. The Drinking Water Safeguard Zones (Groundwater) are considered in **Chapter 17: Marine Water and Sediment Quality [TR030008/APP/6.2]**.
- 18.6.21 The water quality of a non-potable supply, referenced in **18.4.12**, is excluded from baseline as this water is coming from outside the catchment areas of the North Beck, Habrough Marsh Drain and other local drains. Further details of this supply are included in **Section 18.7**.
- 18.6.22 The WFD Screening Assessment identifies one WFD surface water body (North Beck Drain) as being present within the proposed work area of the Project, as well as a number of unnamed drainage channels. The North Beck Drain WFD water body is indicated to be heavily modified with a moderate ecological status and previous Environment Agency sampling has shown that the water body failed its chemical assessments. Due to the limited data that was available from the water bodies a limited sampling program was implemented to obtain a defined baseline. The **WFD Compliance Assessment** is provided as **Appendix 17.A [TR030008/APP/6.4]**.

Table 18-6: Summary of WFD Data for On-shore Water Bodies (2019)

Classification Item	North Beck Drain (GB104029067575)
Ecological	Moderate
Biological quality elements	N/A
Invertebrates	N/A
Physico-chemical quality elements	N/A
Ammonia (Phys-Chem)	N/A
Hydromorphological supporting elements	Supports good
Supporting elements (surface water)	Moderate
Specific pollutants	High
Chromium (VI)	High
Chemical	Fail
Priority hazardous substances	Fail
Priority substances	Good
Other pollutants	Does not require assessment
Classification Item	North Lincolnshire Chalk Unit waterbody (GB40401G401500)
Overall Water Body	Poor
Quantitative	Poor
Quantitative Status element	Poor
Quantitative dependent surface water body status	Poor
Quantitative Groundwater Dependent Terrestrial Ecosystems (GWDTEs) test	Good
Quantitative saline intrusion	Good
Quantitative water balance	Good
Chemical (GW)	Poor
Chemical status element	Poor
Chemical dependent surface water body status	Good

Classification Item	North Beck Drain (GB104029067575)
Chemical drinking water protected area	Poor
Chemical GWDTEs test	Good
Chemical saline intrusion	Good
General chemical test	Poor
Supporting elements (groundwater)	N/A
Prevent and limit objective	Active
Trend assessment	Upward trend

- 18.6.23 The area surrounding the Site is drained via a network of small land drainage ditches that convey surface water from the surrounding areas located near to the Site to the Humber Estuary.
- 18.6.24 The smaller land drains and NELIDB drains, whilst shown on the Digital Rivers Network Map, do not have ecological and chemical classification under the WFD.
- 18.6.25 A detailed description of the water quality results is contained in **Appendix 18.C [TR030008/APP/6.4]**. The locations from which samples were taken is shown in **Figure 18.5**. Specifically in relation to suspended sediments, the results at the two sampling points (defined in **Paragraph 18.6.3** above) are as shown in **Table 18-7**:

Table 18-7: Suspended Sediment Quality (2023)

Location	TSS (mg/l)/Turbidity (NTU) on 31 March 2023	TSS (mg/l)/Turbidity (NTU) on 18 May 2023
Un-named drain (U/S from port) (SW2)	28.4 / 25.1 (labs) n/a (field)	89.6 / 73.7 (labs) 116.68 (field)
North Beck Drain (SW3)	9.8 / 8.12 (labs) 18.8 (field turbidity avg)	21.7 / 13.3 (labs) 25.61 (field turbidity avg)

Note: Total Suspended Solids ("TSS") and turbidity measured in the labs. Also turbidity recorded using a field meter probe

Coastal Protection

Tidal Flood Defences

- 18.6.26 There are tidal flood defences in place along the entire south bank of the Humber Estuary (**Figure 18.2 [TR030008/APP/6.3]**). Information provided by the Environment Agency shows the tidal flood defences protecting this Site consist of a combination of concrete sheet piled walls and concrete/stone slab revetment walls topped with rock filled gabion baskets and earth embankment topped by a concrete wave return wall comprising a smooth concrete or asphalt seaward

face. The flood defences are in 'good' condition and reduce the risk of flooding currently up to a 0.5% AEP (1 in 200 chance in any year) event, based on Still Tidal Water Levels. The Environment Agency inspects these defences annually to ensure defects are identified.

- 18.6.27 The Applicant owns and is responsible for the sea walls around its land at Immingham Docks which consist of concrete sheet piled walls and concrete revetment walls topped with rock filled gabion baskets. Information from the Environment Agency shows the flood defences, along the Port of Immingham frontage up to Habrough Marsh Drain, have a crest elevation of 5.05m AOD and a wall height of 0.84 m resulting in a total defence elevation of 5.89m AOD.
- 18.6.28 To the east of Habrough Marsh Drain, the existing Environment Agency flood defences consist of an earth embankment topped by a concrete wave return wall comprising a smooth concrete or asphalt seaward face.
- 18.6.29 The flood defences along the wider Humber Estuary south bank frontage are maintained by the Environment Agency. The Environment Agency is responsible for inspecting the condition of all flood defences, including those maintained by Associated British Ports and thus inspections are undertaken annually to ensure confirmed that the condition of the flood defences adjacent to the Site Boundary are classed as 'fair' (Condition Grade 3).
- 18.6.30 The initial draft Humber Flood Risk Management Strategy (2021 – 2027) (Ref 18-35) advises that improvements to Humber Estuary modelling have been completed as part of the developing Humber 2100+ project, which is redefining the strategic approach to managing tidal risk on the Humber. A further phase of improvements to the tidal defences adjacent to the Port is planned between 2022 - 2024, in continuation of the defence improvements carried out in 2017.

Fluvial Flood Defences

- 18.6.31 The Environment Agency have confirmed that the existing fluvial defences reducing the risk of flooding from the main river along the North Beck Drain consist of earth embankments. They are in fair condition and reduce the risk of flooding to a 2% (1 in 50) chance of occurring in any year. The Environment Agency inspect these defences routinely to ensure potential defects are identified.
- 18.6.32 The Environment Agency Asset Management Database identifies that the flood defence embankment levels along the North Beck Drain are between 3.85m – 3.94m AOD along the channel to the south of the Site.
- 18.6.33 The Habrough Marsh Drain outfall comprises hanging gates and is inspected regularly and maintained by the Environment Agency. The Environment Agency replaced the hanging gates in April 2022. The NELIDB also undertake maintenance work on the Habrough Marsh Drain channel (removal of vegetation and dredging of the channel). The outfall and channel are accessed through the Port of Immingham, via an access road known as East Riverside and sufficient space is currently provided for access.

Flood Risk

Flood Map for Planning

- 18.6.34 The Environment Agency Flood Map for Planning (“FMfP”) available online (accessed May 2023) identifies areas subject to fluvial (main river)/tidal flood risk for the present day but does not include the benefits or impacts of any existing flood defences or climate change respectively.
- 18.6.35 Mapping shows the terrestrial area of the Project Site is located entirely in Flood Zone 3a (high risk of flooding) – refer to **Figure 18.2 [TR030008/APP/6.3]**. Definitions of Environment Agency flood zones (as defined in Table 1 of the NPPG (Ref 18-14)) are presented in **Table 18-8**.

Table 18-8 Environment Agency Flood Zone Definitions

Flood Zone	Definition	Risk of flooding
Flood Zone 1	Land that has a low probability of flooding (less than 1 in 1,000 annual probability of river or sea flooding (<0.1%))	Low
Flood Zone 2	Land that has a medium probability of flooding (between 1 in 100 and 1 in 1,000 annual probability of river flooding (0.1-1%), or between 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.1-0.5%))	Medium
Flood Zone 3a	Land that has a high probability of flooding (1 in 100 year or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%))	High
Flood Zone 3b (Functional Floodplain)	<p>This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise:</p> <ul style="list-style-type: none"> • land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or • land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding). 	Very high

Flood Risk from Tidal Sources

- 18.6.36 Tidal flooding occurs during extreme high tide and/or storm surge events which may cause wave overtopping or the unlikely event of a breaching scenario of existing tidal defences. High water levels within tidally influenced estuaries and rivers may also contribute to tidal flooding.

18.6.37 As defined in **Table 18-8** the terrestrial area of the Site is located in Flood Zone 3a. Although not indicated on the Environment Agency FMfP, the Site is protected from flooding associated with tidal sources up to and including a 0.5 % AEP flood event due to the presence of tidal flood defences along the south bank of the Estuary (see Coastal Protection subsection above). However, areas behind the defences are still considered to be at residual risk of flooding through overtopping or failure of the flood defences, although the likelihood of either occurring is low.

Modelled Tidal Water Levels

18.6.38 The Environment Agency provided modelled tidal peak water levels for the South Humber Bank area. The Environment Agency model demonstrated that during a 0.1% AEP (1 in 1000 chance) event based upon the existing (2017) scenario, tidal levels in the Humber Estuary could rise up to 5.97m AOD at the Habrough gauge and 6.01m AOD at the Immingham gauge.

18.6.39 **Table 18-9** details the modelled tidal water levels provided by the Environment Agency. These are the current best estimate for extreme tide levels in the vicinity of the Site.

Table 18-9: Coastal Flood Boundary Extreme Still Tidal Levels for Immingham and Habrough Marsh

Annual Exceedance Probability	Extreme Still Tidal Levels (m AOD)	
	Immingham (NGR 520440,417625)	Habrough Marsh (NGR 522100,416512)
100%	4.19	4.17
10%	4.62	4.60
2%	5.00	4.97
1%	5.19	5.16
0.5%	5.41	5.38
0.1%	6.01	5.97

18.6.40 Based on the information in **Table 18-9**, the extreme still tidal level for Immingham is 5.41m AOD for a 0.5% (1 in 200 year) AEP event. For Habrough Marsh the extreme still tidal level for a 0.5% (1 in 200 year) AEP event is 5.38m AOD.

Residual Risk – Breach of Defences

- 18.6.41 The Environment Agency has provided breach location and associated breach flood extent maps from the Northern Area Tidal Mapping Study (presented in Annex 1 of **Appendix 18.A FRA [TR030008/APP/6.4]**). The Northern Area Tidal Mapping Study involved a modelled representation of tidal breaches along the east coast and the south bank of the Humber Estuary, with breaches in the hard defences set at 20m wide with the defences assumed to breach down to the ground level behind the defence. The defences were raised within the model to create reservoir cells, ensuring that the most precautionary volumes of water were driven through the breach opening. The breach location nearest the Site is located along the frontage of **Work No. 9** (Temporary Construction Area off Laporte Road).
- 18.6.42 The breach modelling is based on the Still Water Tidal Levels from the Northern Area Tidal Mapping Study including a 100 % (1 in 1) AEP wave height allowance.
- 18.6.43 The Breach Hazard Mapping shows the following:
- a. For a 2006 (current day) 0.5% AEP breach event the development is located across ‘Significant’ and ‘Extreme’ hazard areas with a maximum water depth of between 1- 1.6m and a maximum velocity of between 0.3-1.0 m/s.
 - b. For a 2006 (current day) 0.1% AEP breach event the development is predominantly located in the ‘Extreme’ hazard area with a maximum water depth of between 1- 1.6m, increasing to greater than 1.6m directly behind the flood defences and areas of low topography within the Site, and a maximum velocity of between 0.3-1.0 m/s.
- 18.6.44 The Environment Agency has provided additional breach data information for the Site based on the modelling outputs. The maximum breach flood water level for the Site for a 0.5% AEP event is 5.5m AOD and for a 0.1% AEP event this increases to 5.6m AOD. Both breach events have an approximate time to inundation from the modelled locations of less than 2 hours.

Residual Risk – Overtopping of Defences

- 18.6.45 The Northern Area Tidal Mapping Study also included the modelled representation of current baseline tidal overtopping along the east coast and the south bank of the Humber Estuary. Overtopping of the flood defences has the potential to occur when wave heights exceed the Still Water Tidal including a 100 % (1 in 1) AEP wave height allowance.
- 18.6.46 The Overtopping Hazard Mapping shows the following:
- a. For a 2006 (current day) 0.5% AEP overtopping event the eastern area of the Site is located across ‘Low’ and ‘Moderate’ hazard areas with a maximum water depth of between 0-0.5m and a maximum velocity of between 0-1.0 m/s. The Pipeline Corridor and the western area of the Site are not located within a hazard area.
 - b. For a 2006 (current day) 0.1% AEP breach event the eastern area of the Site is located across ‘Low’, ‘Moderate’ and ‘Significant’ hazard areas with a maximum water depth of between 0.3-1.0m, and a maximum velocity of between 0.3-1.0 m/s.

Flood Risk from Fluvial Sources

- 18.6.47 Fluvial flooding occurs when the capacity of a river is exceeded either due to high flows from the catchment draining into the river or a combination of high flows and high tides, which causes raised water levels due to backwater effects.
- 18.6.48 The FMfP, refer to **Figure 18.2 [TR030008/APP/6.3]** illustrates that the Site is located predominantly within Flood Zone 3a (high risk of flooding) defined as land having a >1 %/ 0.5 % AEP (greater than a 1 in 100/ 1 in 200 chance in any year) of river or sea flooding.
- 18.6.49 The FMfP does not differentiate between the tidal and fluvial sources of flood risk, however, due to the proximity of the Humber Estuary and the tidal flood defences not being taken into account on the FMfP, the Flood Zone 3 extent represents flooding from predominantly tidal sources along the East Coast and Humber Estuary.
- 18.6.50 Flood risk from fluvial sources, when considered in isolation from tidal flooding, is not represented on the Environment Agency FMfP along the South Humber Bank. However, mapping in Section 2.4 of the North East Lincolnshire Preliminary Flood Risk Assessment (“PFRA”) (Ref 18-36) gives some indication of fluvial flood zones and suggests that the Site is located in Flood Zone 1.

Main Rivers

- 18.6.51 The closest Main River to the Site is the North Beck Drain, situated immediately south of the Site Boundary.
- 18.6.52 The Environment Agency have confirmed that the existing fluvial defences reducing the risk of flooding from the Main River along the North Beck Drain consist of earth embankments. They are in fair condition and reduce the risk of flooding to a 2% (1 in 50) chance of occurring in any year. The Environment Agency inspect these defences routinely to ensure potential defects are identified.

Modelled Water Levels

- 18.6.53 Modelled flood water levels for the North Beck Drain from the Stallingborough and Oldfleet 2020 model have been provided by the Environment Agency. For the 1% AEP event, maximum modelled flood water levels are 2.52 – 2.55m AOD. The water also remains in channel for both the 0.5% AEP flood event.
- 18.6.54 The Environment Agency Asset Management Database identifies that the flood defence embankments levels along the North Beck Drain are between 3.85m – 3.94m AOD adjacent to the Site Boundary. When compared to the modelled flood water levels there is a freeboard of approximately 1.3m, which indicates that the water remains in bank during the 1% AEP event.
- 18.6.55 During the and 0.1% AEP flood events water remains in channel along the majority of the length of the watercourse, however modelled levels suggest that a small area of Work Area 9, towards the south east adjacent to the watercourse, is located within Flood Zone 2.
- 18.6.56 Mapping outputs from the Stallingborough and Oldfleet 2020 model show the Site is at low risk of flooding from the North Beck Drain.

Ordinary Watercourses

- 18.6.57 Ordinary Watercourses include every river, stream, brook, cut, dyke and sluice which do not form part of a Main River network. Where applicable, the Riparian Owner, IDB or LLFA have a lead responsibility for managing the risk of flooding from ordinary watercourses. The location of the identified watercourses is shown on **Figure 18.2 [TR030008/APP/6.3]**.
- 18.6.58 Habrough Marsh Drain, under the jurisdiction of NELIDB, lies immediately north and north-west of the Site Boundary and coincides with the Port of Immingham boundary. The watercourse flows from west to east adjacent to the Site Boundary and discharges partly to the Humber Estuary and when water levels are high, discharges partly to the North Beck Drain through the Immingham Pumping Station.
- 18.6.59 Immingham Pump Drain lies south-west of the Site Boundary and receives flows from Habrough Marsh Drain when water levels are high. Water in the Immingham Pump Drain discharges into the North Beck Drain via the Immingham Pumping Station.
- 18.6.60 The area surrounding the Site is drained via a network of small land drainage ditches that convey surface water from the surrounding greenfield areas located between the Project and the Humber Estuary.

Modelled Water Levels

- 18.6.61 Habrough Marsh Drain and the smaller watercourses have no associated hydraulic model or modelled flood water data available to inform the assessment. As a proxy, for catchment areas less than 3km², the Environment Agency Risk of Flooding from Surface Water (“RofSW”) maps, primarily used to represent surface runoff; can also be used to identify flooding from Ordinary Watercourses. RofSW mapping (refer to **Figure 18.3 [TR030008/APP/6.3]**) identifies that the Habrough Marsh Drain largely remains in bank, with small, localised extents out of bank during higher return periods adjacent to the East Site and Pipeline Corridor.
- 18.6.62 The smaller drains across the Site also largely remain in bank, with small, localised extents out of bank during higher return periods within the West Site and East Site.
- 18.6.63 The NELC SFRA (Ref 18-18) states that “*the drainage system managed by the NELIDB is understood to be able to accommodate events with 0.1% AEP by a combination of storage and pumping, without flooding the surrounding area*”.
- 18.6.64 The risk of fluvial flooding to the Project is considered to be low.

Residual Risk – Tide-locking

- 18.6.65 Tide-locking is a common problem in watercourses where defences occur. Habrough Marsh Drain (Ordinary Watercourse) and North Beck Drain (Main River) are both gravity drainage systems with a flapped outfall into the Humber to prevent the incoming tide from entering the channel when water levels in the Estuary are high. When high tides prevent the watercourses from discharging into the Humber Estuary, water levels within the drains increase temporarily until the tidal level has decreased sufficiently to allow the outfall to operate again.
- 18.6.66 Correspondence with the NELIDB (Annex 1 of **Appendix 18.A FRA [TR030008/APP/6.4]**) indicates that when there are high water levels in the Habrough Marsh Drain, the Habrough Slide control structure allows water to discharge via the Immingham Pump Station when the gravity system is tide locked, but only if there is capacity available in the pumped system. The NELIDB note that the Habrough Marsh Drain during events when it is tide locked backs up with increasing water levels and can cause ‘out of bank’ flooding. The IDB have not stated if flooding from the Habrough Marsh Drain occurs in proximity to the Site, however, the NELC LFRMS (Ref 18-37) and SFRA (Ref 18-18) indicate that flooding is more prevalent in the upstream region of the watercourse rather than near the Site itself.
- 18.6.67 Areas of the Site located directly adjacent to Habrough Marsh Drain are at residual risk of fluvial flooding during tide-locking events.

Residual Risk – Failure of Immingham Pumping Station

- 18.6.68 Should Immingham Pumping Station fail, water from the Immingham Pump Drain would be unable to discharge to the North Beck Drain and, similar to the tide-locking scenario, water levels within the drains would increase temporarily until such a time that the pumping station is repaired and operational.
- 18.6.69 There is potential for flooding from Immingham Pump Drain and Habrough Marsh Drain (the drain discharges to Immingham Pump Drain when water levels are high) to the Site along the areas directly adjacent to the Site and surrounding land.

Groundwater Flooding

- 18.6.70 Groundwater flooding occurs when water levels in the ground rise above surface elevations. It is most likely to occur in low-lying areas underlain by permeable rocks (aquifers).
- 18.6.71 The NELC SFRA (Ref 18-18) states “*Generally the risk of flooding from groundwater is in the coastal areas from Immingham to Humberston, i.e. the lower lying parts of the Borough. This is caused by artesian spring flows from confined chalk where high groundwater pressures force an upward flow path through the confining clay*” (Page 26).
- 18.6.72 Groundwater levels tend to get re-charged during the winter and high groundwater levels can cause flooding as the water table rises. This rise in water table levels can be very slow, dependent on rainfall patterns. There is no reference to groundwater flooding events in the NELC SFRA (Ref 18-18) for the Eastern Coastal Area where the Project is located.

- 18.6.73 There are no historical flood records of groundwater flooding within the Site or the wider Port of Immingham area.
- 18.6.74 **Chapter 21: Ground Conditions and Land Quality [TR030008/APP/6.2]** provides details of the geology and hydrogeology at the Site.
- 18.6.75 Previous ground investigations undertaken at the Site are summarised in **Chapter 21: Ground Conditions and Land Quality [TR030008/APP/6.2]** which indicate that perched groundwater is present within all geological units beneath the Site. Groundwater has previously been encountered in the Tidal Deposits beneath the East Site between 1.63m AOD and 3.97m AOD. Within the corridor area groundwater was struck at between 16 – 18 m below ground level (“bgl”) with groundwater seepage encountered in boreholes and test trenches between 1.7m bgl – 4m bgl.
- 18.6.76 The Immingham Ammonia Import Terminal Ground Investigation Report (**Appendix 21.B Phase II Ground Investigation Interpretative Report [TR030008/APP/6.4]**) provides details of fieldwork undertaken at the Site between 8 November 2022 and 16 February 2023 (with groundwater monitoring continuing to May 2023).
- 18.6.77 The groundwater level monitoring data indicates that groundwater is present in all geological units beneath the Site. Perched groundwater was encountered within Made Ground, mostly within the East Site. No monitoring boreholes were installed within Made Ground in the West Site. Groundwater levels within Made Ground varied between ground level and 2.5m bgl. The groundwater levels in boreholes screened within Tidal Flat Deposits within the East Site varied between 3.3.97m OD to 1.63m OD. Groundwater levels within Glacial Till Deposits varied between 0.5m OD and 1.06m OD in the West Site and 1.82m OD and 2.65m OD in the East Site. Groundwater levels within monitoring wells within the Flamborough Chalk Formation varied between 0.72m OD and 3.1m OD in the East Site. All nine Chalk monitoring boreholes installed recorded artesian conditions during the monitoring period, except W-BH17 which recorded slightly lower levels (up to 1.46m bgl) on two occasions.
- 18.6.78 The groundwater generally flows in a north-easterly direction towards the Humber Estuary.
- 18.6.79 Given the information on groundwater and potential for groundwater flooding in the area, the baseline condition for the risk of flooding from groundwater sources at the existing Site is currently assessed as a medium risk.

Surface Water (Pluvial) Flooding

- 18.6.80 The Environment Agency RoFSW maps (accessed online 26 May 2023) indicate areas at risk from surface water flooding when rainwater does not drain away through the normal drainage systems or soak into the ground, but instead lies on or flows over the ground.
- 18.6.81 The risk of surface water is defined by the Environment Agency, with these risks being defined in accordance with **Table 18-10**.

Table 18-10: Definition of Risk from Surface Water Flooding

Risk of flooding	Definition
Very low	Each year, the area has a chance of flooding of less than 1 in 1000 (0.1%).
Low	Each year, the area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%).
Medium	Each year, the area has a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%).
High	Each year, the area has a chance of flooding greater than 1 in 30 (3.3%).

- 18.6.82 The RoFSW map (**Figure 18.3 [TR030008/APP/6.3]**) identifies the vast majority of the Site as at ‘very low’ risk of surface water flooding (<0.1% AEP event). Small areas along the roads and along adjacent land drains within the Site are identified to be at a ‘low’, ‘medium’ and ‘high’ risk from surface water flooding (>0.1% AEP, 3.3% to 1% AEP event and >3.3% AEP event respectively).
- 18.6.83 Within the West Site (**Work No. 7**), there is ponding during higher return period events and there are isolated areas at ‘low’, ‘medium’ and ‘high’ risk of surface water flooding within the East Site (**Work Nos. 3 and 5**) and temporary construction area (**Work No. 9**). These areas at risk are considered to reflect areas at topographic low points.
- 18.6.84 Additionally, this information is supported by the fact that there are no significantly raised ground levels adjacent to the Site that could generate sufficient rates/ volumes of surface water runoff to pose a risk of overland flow coming onto the Site. No overland flow routes into or across the Project Site have been identified on the RoFSW map.
- 18.6.85 The risk to the Site from overland flow of surface water generated adjacent to the Site, or from waterbodies located within the Site is considered to be ‘low’, ‘medium’ and ‘high’ in small areas, but largely ‘very low’.

Flooding from Artificial Sources

Reservoirs

- 18.6.86 Reservoir failure can be particularly dangerous as it causes the release of large volumes of water at a high velocity, which can result in deep and widespread flooding. However, reservoir inspection and design procedures are very rigorous such that the probability of failure is generally regarded as extremely low.
- 18.6.87 The Environment Agency has produced maps based on mathematical modelling showing the extent of flooding in the unlikely event of large reservoir breaching in England and Wales (accessed online May 2023). The Environment Agency Long-Term Flood Risk Map shows the Site is not at risk of flooding from reservoir failure. Flooding from reservoirs is therefore not considered further in this assessment.

Canal Systems

- 18.6.88 Canals do not pose a direct flood risk given they are regulated water bodies with controlled water levels; however, flooding can still occur through a breach or overtopping. Control structures such as weirs or locks could experience a blockage or failure resulting in rising water levels and overtopping. Structural failure could lead to a breach which can potentially be hazardous as they may involve the rapid release of large volumes of water at high velocity.
- 18.6.89 A review of the Canal and River Network Mapping from the Canal and River Trust indicates there are no active canal systems in proximity to the Project. As such, there is no flood risk posed to the Project Site from this source. Flooding from canals is therefore not considered further in this assessment.

Flooding from Drainage Infrastructure

- 18.6.90 Flooding from drains, sewers and surface water can be interconnected. Insufficient or reduced drainage capacity within the sewer network can result in drainage capacity being exceeded causing extensive surface water flooding. Likewise, increased volumes of surface water can overload sewers and drains, causing the drainage network to backup and surcharge causing surface water flooding.

Existing Drainage Infrastructure

- 18.6.91 Anglian Water asset mapping shows there is no surface water drainage infrastructure for which Anglian Water have responsibility located within the Site. Drainage of surface water and foul water within the wider Port of Immingham is privately owned and does not discharge to the wider Anglian Water surface water or foul water drainage network beyond the Port of Immingham.
- 18.6.92 The following Anglian Water assets are present in the proximity to the Site:
- a. A domestic sewer beneath Kings Road.
 - b. A trade effluent sewer beneath Queens Road.
 - c. A domestic sewer beneath the access road to a Water Treatment Works.
 - d. A Water Treatment Works, located to the south of the Long Strip, accessed off Queens Road.
 - e. Final effluent sewer from the Water Treatment Works, passing under the main Temporary Construction Area and discharging to the Humber Estuary via the Immingham Sea Outfall located at OS NGR TA2141715599, downstream of the Port of Immingham.
- 18.6.93 There are no predicted morphological changes in or around the outfall due to changes to physical processes in the Estuary. Further details are provided in **Chapter 16: Physical Processes [TR030008/APP/6.2]**.
- 18.6.94 Discussions with NELIDB to inform the outline drainage strategy for the Site indicate that the Site drains via infiltration to the local watercourses and land drains. The Site drains predominantly to the south to the North Beck Drain via local land drains or via the Immingham Pump Drain.

- 18.6.95 The East Site is considered a formerly developed brownfield land. The East Site (**Work No. 3**) appears to not have any impermeable surface but was likely a stockpile area and may have been compacted or paved previously. The East Site (**Work No. 5**) is artificially raised and contains a drainage system.
- 18.6.96 The West Site (**Work No. 7**) is considered as undeveloped land and is crossed by local watercourses forming part of the wider managed low land drainage network. These discharge to the existing drainage ditch along the southern boundary.
- 18.6.97 Further details on existing drainage are provided in **Appendix 18.B Drainage Strategy [TR030008/APP/6.4]**.
- 18.6.98 As part of the NELC SFRA (Ref 18-18), Anglian Water provided records from their Floods Registers which are used to record flood incidents attributable to their sewer networks, whether that be from foul and/ or surface water sewers. The historical mapping, included within the SFRA, shows that the Site is not located in an area that is known to flood from sewer networks.
- 18.6.99 In addition, there are no historical records of flooding from the private drainage system within the wider Port of Immingham and the lack of drainage infrastructure within the Site suggests a limited probability of flooding from this source.
- 18.6.100 On the basis of the available information, the Site is considered to be at low risk of flooding from drainage and sewerage infrastructure.

Future Baseline

- 18.6.101 The future baseline is a prediction of baseline conditions in the future, assuming that the Project is not constructed. In the absence of the Project, it is anticipated that future baseline conditions would be similar to the existing baseline as described above, subject to the caveats detailed below.
- 18.6.102 Generally, there is an improving trend in water quality and the environmental health of waterways in the UK since the commencement of significant investment in sewage treatment in the 1990s, the adoption of the WFD from 2003, and the application of ever more stringent planning policies. In terms of water quality impacts, the future baseline assumes that all WFD waterbodies achieve their planned target status by 2027.
- 18.6.103 With regards to future water use, there are expected to be other developments around the North East & Yorkshire Net Zero Hub which may have water needs but at present few of these projects have been consented. In the case of those that have been, their supplies will most probably come from the proposed 59 Ml/d non-potable water supply Anglian Water have dedicated within the South Humber Bank Water Resource Zone for developments. Where small amounts of potable supplies are required, these will have been accounted for in the Water Companies' WRMPs.

- 18.6.104 In the future baseline scenario (taken as 2100 (75 years lifetime of the development) based on requirements of the NPPF), the existing coastal defence and drainage structures would be maintained and improved, as appropriate, and hydrodynamic and sedimentary processes will continue to be influenced by natural and human-induced variability, ongoing cyclic patterns, and trends (e.g. ongoing maintenance dredging and disposal).
- 18.6.105 The future baseline will also be influenced by climate change. It is anticipated that the impact of climate change will include:
- Changes in storminess/storm surges, wave heights, and sea levels, posing an increased risk of coastal damage and tidal flooding.
 - Changes in rainfall intensity increasing peak river flows, posing an increased risk of fluvial flooding and property damage.
 - Changes in rainfall intensity increasing surface water runoff (overland flow), posing an increased risk of pluvial and drainage/sewer flooding.
- 18.6.106 An increase in both tidal and fluvial water levels will occur as a consequence of climate change (climate change is assessed over a 75-year period for non-residential development in line with the NPPF). It is estimated that tidal water levels will increase by 0.85 m (based on the higher central climate change allowance) and fluvial peak flows in North Beck Drain, Habrough Marsh Drain, Immingham Pump Drain and the local drainage ditches will increase by 12% by 2115 (based on the higher central peak river flow allowance).
- 18.6.107 In addition, rainfall intensity will increase by up to 40% by the year 2125 placing increased pressure on drainage infrastructure and increasing the risk of surface water flooding.
- 18.6.108 It is likely that through the action of new legislative requirements and more stringent planning policy and regulation, the health of the water environment will continue to improve post-2027. However, there are significant challenges such as adapting to a changing climate (i.e. in general drier summers, wetter winters, and an increased frequency of significant storms are forecast for the UK); and the pressures of population/economic growth could have a retarding effect on the water environment if it is not managed carefully through the design of projects, mitigation and the maintenance of mitigating solutions. However, it is difficult to forecast these changes to water quality with any certainty.
- 18.6.109 The design life of the landside development (the hydrogen production facility) is 25 years however the terminal (the jetty and related topside infrastructure) would likely be retained beyond this 25 year timeframe and become part of the permanent port infrastructure, refurbished accordingly as required. Following the guidance in the PPG (Ref 18-14) the lifetime of the development has been assessed as 75 years (taken from the commencement of Phase 1 of the Project in 2025). The flood risk future baseline is therefore taken as the year 2100. This provides a conservative approach to the assessment of flood risk to and from the development.

Importance of Receptors

18.6.110 The importance of the local water resource receptors within the Study Area is described in **Table 18-11**. Importance is based on the criteria outlined above in **Table 18-3**. Note that the Humber Estuary is considered within **Chapter 17: Marine Water and Sediment Quality [TR030008/APP/6.2]**.

Table 18-11: Importance of Receptors

Receptor	Importance Descriptions
North Beck Drain (Water Quality)	The importance of the North Beck Drain is considered to be Low, this is a non-WFD surface water body with limited aquatic fauna and biodiversity with no associated economic or social use.
North Drain (Flood Risk)	The importance of the North Beck Drain is considered to be High with regards surface water drainage. The watercourse drains low lying land and is part of the local pumped drainage network.
Habrough Marsh Drain (Water Quality)	The importance of the Marsh Drain is considered to be Low, this is a non-WFD surface water body with limited aquatic fauna and biodiversity with no associated economic or social use.
Habrough Marsh Drain (Flood Risk)	The importance of the Habrough Marsh Drain is considered to be High with regards surface water drainage. The watercourse drains low lying land and is part of the local pumped drainage network.
Immingham Pump Drain (Water Quality)	The importance of the Pump Drain is considered to be Low, this is a non-WFD surface water body with limited aquatic fauna and biodiversity with no associated economic or social use.
Immingham Pump Drain (Flood Risk)	The importance of the Immingham Pump Drain is considered to be High with regards surface water drainage. The watercourse drains low lying land and is part of the local pumped drainage network.
Land Drainage Network (Water Quality)	The importance of the unnamed drains which in the vicinity of the Site constitute the Land Drainage network is considered to be Low, these are non-WFD surface water bodies with limited aquatic fauna and biodiversity with low associated economic or social use.
Land Drainage Network (Flood Risk)	The importance of the Land Drainage Network is considered to be Medium with regards surface water drainage. The small drainage ditches form part of a localised drainage network.
Construction workers/Site Operatives	Construction workers and site operatives are considered to be of High Importance. Construction workers and operatives on-site are at risk as human health receptors due to the proximity to flood risk sources. However, given prior knowledge of site conditions there is an increased awareness of flood risk issues and evacuation procedures
Site Visitors	Site visitors are considered to be of Very High Importance. Visitors on-site are at risk as human health receptors due to the proximity to flood risk sources but have little/no prior knowledge of site conditions or awareness of flood risk and evacuation procedures.

Receptor	Importance Descriptions
Flood Defences	The importance of the flood defences is considered to be Very High as the defences provide protection from tidal flooding to a significant area along the South Humber Bank
Proposed Development	The landside development aspects of the Project are considered to be receptors of Very High Importance as it is classified as Essential Infrastructure under both the NPSfP and NPPF. The marine side aspects of the Project are considered to be Water Compatible and therefore a receptor of Low Importance.
Existing development off-site	Existing development off-site consists of port related storage/ commercial/ industrial and residential use classified as a mixture of Less Vulnerable/ More Vulnerable, Water Compatible and Essential Infrastructure development. Dependent of the flood risk vulnerability classification the importance of the receptors ranges from Low to Very High.
Coastal and floodplain grazing marshes	These areas of good quality semi-improved grassland, although not designated, they are in terms of water quality a Low importance receptor.

Floodplain Importance for Impact Assessment

- 18.6.111 For the construction assessment, the key receptor in terms of all forms of flood risk are the construction workers who would be present on Site and who are considered to be of High Importance. It is considered that the risk to surrounding residential, commercial and ecological receptors arising from construction of the Project is no greater than in the baseline scenario.
- 18.6.112 For the operational assessment, the importance of the receptors is based on understanding of the receptors present within areas at risk of flooding (i.e. the Project and other infrastructure) and the existing risk of flooding from all sources. The floodplain around the Humber in the Study Area and the entirety of the Project is in Flood Zone 3a, where importance of the floodplain for impact assessment purposes is considered High. The Project, in EIA terms, is of Very High importance to tidal and fluvial flooding due to of the classification as essential infrastructure (see **Table 18-2**).

18.7 Development Design and Impact Avoidance

Embedded Mitigation Measures

- 18.7.1 The Project has been designed, as far as possible, to avoid and minimise impacts and effects to water quality, coastal protection, water use flood risk and drainage through the process of design development, and by embedding mitigation measures into the design.
- 18.7.2 One of the project objectives is water conservation. The majority of the Project demand is for non-potable water for process cooling. Within the Project design various water reduction and reuse measures have been incorporated based on BAT and also water re-use potential. Embedded measures include use of

recirculating cooling water system rather than once pass through cooling water, reuse and segregation of water streams and process control of chemical dosing and cooling water and boiler blow down systems

- 18.7.3 In line with best practice, the following flood resilience measures would be used in the design of the Project to minimise the amount of damage and reduce recovery time in the unlikely case of the site becoming inundated:
- a. Finished floor level raising.
 - b. Use of flood resistant building materials.
 - c. Use of water-resistant coatings
 - d. Use of galvanised and stainless-steel fixings.
 - e. Raising electrical sockets and switches.
 - f. Provision of an appropriate safe refuge.
- 18.7.4 The resilient construction measures listed above would be included in the Project design during both the construction and operational phases and have been taken into account in the assessment.
- 18.7.5 Further details regarding the management of flood risk are presented within Section 6.9 of the FRA at **Appendix 18.A [TR030008/APP/6.4]**.

Water Use

Non-potable Water

- 18.7.6 The operational Project is estimated to require approximately 3,640m³ /day of non-potable water to support the hydrogen production facility. The non-potable supply is primarily required to provide cooling water makeup.
- 18.7.7 The hydrogen production facility would also require non-potable water for periodic use including fire water storage, utility stations and for Amine solution make-up but these would be small quantities and would not impact the overall water demand.
- 18.7.8 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. This water is to be transferred to the site from an existing Anglian Water source. 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 through an agreement with Anglian Water (see also the **Utilities Statement, [TR030008/APP/7.7]**). The offer received from Anglian Water meets the full requirements for the Project (see **Paragraph 18.7.6**). It is assumed that in order to make this offer, Anglian Water would have taken account of their choice of source selection in any longer-term Water Resources Management Planning context.

Potable Water

- 18.7.9 The operational Project would also require a limited potable water supply for offices (including fire sprinkler systems), welfare facilities 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 No.s 1, 3 and 5) (see the **Utility Statement, [TR030008/APP/7.7]**). 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.

Standard Mitigation Measures

- 18.7.10 Standard mitigation measures have been identified for implementation by the contractor during the construction, operation and decommissioning phases of the Project. Throughout all Project phases, the contractor will be required to comply with all relevant Health and Safety legislation when undertaking works, activities and operations within the Site.

Construction Phase

- 18.7.11 During construction, water pollution may occur directly from spillages of polluting substances into waterbodies, or indirectly by being conveyed in runoff from hard standing, other sealed surfaces or from construction machinery. Fine sediment may also be disturbed in waterbodies directly or also wash off working areas and hard standing (including approach roads) into waterbodies indirectly via existing drainage systems or overland. Due to past industrial activity, this sediment may not be inert and may potentially contain contamination that could be harmful to the aquatic environment. However, potential impacts to the water environment during the construction phase would tend to be temporary and short term.
- 18.7.12 An **Outline CEMP** has been prepared as part of the DCO application **[TR030008/APP/6.5]**. This document describes the measures identified to limit uncontrolled run-off and accidental releases of potential contaminants together with measures to manage flood risk from all sources. Example measures are summarised in the sections below.
- 18.7.13 The contractor will be required to prepare a final Construction Environmental Management Plan. The final CEMP would outline the measures necessary to avoid, prevent and reduce adverse effects where possible upon the local surface water environment. These measures would be detailed further within a Water Management Plan (“WMP”) that would form a technical appendix to the final CEMP.
- 18.7.14 The final CEMP would be reviewed, revised and updated as the Project progresses towards construction to ensure all potential impacts and residual effects are considered and addressed as far as practicable, in keeping with available good practice at that point in time.

- 18.7.15 The principles of the mitigation measures set out below are the minimum standards that the Contractor would implement. However, it is acknowledged that for some issues, there are multiple ways in which they may be addressed. In addition, the methods of dealing with pollutant risk would need to be continually reviewed on Site and adapted as construction works progress in response to different types of work, weather conditions, and locations of work.
- 18.7.16 The potential for adverse impacts would be avoided, minimised and reduced by the adoption of the general mitigation measures which are outlined in the following sections, and which will be described in the WMP in the final CEMP.

Best Practice Guidance

- 18.7.17 Best practice guidance and mitigation measures will be adhered to during construction, in order to prevent or minimise spillage risks and impacts on the water environment during the construction phase. The measures also address treatment and disposal of wastewater, dewatering, accidental spillages associated with building construction, foundations, concrete usage and the management of concrete batching.
- 18.7.18 The following relevant Guidance for Pollution Prevention (“GPPs”) have been released to date on the NetRegs website (NetRegs, n.d.) and are listed below. While these are not formal regulatory guidance in England, it is a useful resource for best practice to inform the CEMP.
- a. GPP 1: Understanding your environmental responsibilities – good environmental practices.
 - b. GPP 2: Above ground oil storage.
 - c. GPP 3: Use and design of oil separators in surface water drainage systems.
 - d. GPP 4: Treatment and disposal of wastewater where there is no connection to the public foul sewer.
 - e. GPP 5: Works and maintenance in or near water.
 - f. GPP 8: Safe storage and disposal of used oils.
 - g. GPP 13: Vehicle washing and cleaning.
 - h. GPP 19: Vehicles: Service and Repair.
 - i. GPP 20: Dewatering underground ducts and chambers.
 - j. GPP 21: Pollution Incident Response Plans.
 - k. GPP22: Dealing with spills.
 - l. GPP26: Safe storage – drums and intermediate bulk containers.

- 18.7.19 Where new GPPs are yet to be published, previous Environment Agency Pollution Prevention Guidance (“PPGs”) provide useful advice on the management of construction to avoid, minimise and reduce environmental impacts, although they should not be relied upon to provide accurate details of the current legal and regulatory requirements and processes. Construction phase operations would be carried out in accordance with relevant guidance contained within the following PPG:
- a. PPG6: Working at construction and demolition sites.
 - b. PPG7: Safe storage – the safe operation of refuelling facilities.
 - c. PPG18: Managing fire water and major spillages.
- 18.7.20 Additional good practice guidance for mitigation to protect the water environment can be found in the following key CIRIA documents and British Standards Institute documents:
- a. British Standards Institute (2009) BS6031:2009 Code of Practice for Earth Works.
 - b. British Standards Institute (2013) BS8582 Code of Practice for Surface Water Management of Development Sites.
 - c. C753 (2015) The SuDS Manual (second edition).
 - d. C744 (2015) Coastal and marine environmental site guide (second edition).
 - e. C741 (2015) Environmental good practice on site guide (fourth edition).
 - f. C648 (2006) Control of water pollution from linear construction projects, technical guidance.
 - g. C609 (2004) Sustainable Drainage Systems, hydraulic, structural and water quality advice.
 - h. C532 (2001) Control of water pollution from construction sites – Guidance for consultants and contractors.

Management of Construction Site Run-off

- 18.7.21 There are a wide range of measures that can be adopted by the Contractor to reduce the risk of excessive fine sediment in runoff (timing of works, minimising earthworks and seeding or covering them), to intercept runoff to prevent uncontrolled runoff from the Site (e.g. by using cut off drains, fabric silt fences, bunds and straw bales, designated areas for cleaning plant and equipment, wheel washes and road sweepers), and to treat runoff to remove excessive levels of fine sediment (e.g. settlement lagoons, sumps, spraying on to land or even proprietary measures such as lamella clarifiers).
- 18.7.22 Temporary drainage facilities will be provided within the Work No. areas, including the Temporary Construction areas (including around the concrete batching plant in the East Site (Works No.5a), throughout the construction phases, where necessary, to ensure controlled discharge of surface water run-off. Measures that would be considered for temporary drainage include:
- a. Installation of measures such as swales, silt fences and appropriately sized settlement tanks/ ponds to reduce sediment load.

- b. Cut-off ditches or geotextile silt-fences, installed around excavations, exposed ground.
- c. Stockpiles to prevent uncontrolled release of sediments from the proposed development.
- d. Site access points will be regularly cleaned to prevent build-up of dust and mud.
- e. A valve will be installed to isolate the settlement tank/ ponds in the event of a polluted discharge.
- f. Oil interceptors to be installed (notably the outflow from the settlement pond/ tank) to reduce the potential risk for contamination of groundwater and surface water.

18.7.23 It would be for the Contractor to continually monitor the need for measures depending on the nature of the works being undertaken the weather conditions, and the performance of sustainable drainage systems installed.

Management of Construction Spillage Risk

18.7.24 Best practice guidance and mitigation measures would be implemented to manage the risk of accidental spillages on site and potential conveyance to nearby waterbodies via surface runoff or land drains. These measures relating to the control of spillages and leaks are summarised in the **Outline CEMP [TR030008/APP/6.5]** and would be included in the WMP in the final CEMP and adopted during the construction works. Measures would be in accordance with prevailing pollution prevention legislation and following best practice guidance summarised earlier. They would include details of how fuel and other chemicals (including cement) would be stored, used on site, and equipment and plant cleaned, as well as how leaks and spillages would be prevented or remediated if needed. This would also include the implementation of a Pollution Prevention Plan and an Emergency Response Plan. In addition, any site welfare facilities would be appropriately managed, and all foul waste disposed of by a licensed contractor to a suitably permitted facility.

18.7.25 Measures include:

- a. Containment measures will be implemented, including drip trays, bunding or double-skinned tanks of fuels and oils; all chemicals will be stored in accordance with their Control of Substances Hazardous to Health (“COSHH”) guidelines, whilst spill kits will be provided in areas of fuel/ oil storage.
- b. An Emergency Spillage Plan will be produced, which site staff will have read and understood.
- c. The mixing and handling of materials will be undertaken in designated areas and away from surface water drains.
- d. Plant and machinery will be kept away from surface water bodies wherever possible and will have drip trays installed beneath oil tanks/ engines/ gearboxes and hydraulics, which will be checked and emptied regularly. Refuelling and delivery areas will be located away from surface water drains.

- 18.7.26 **Chapter 17: Marine Water and Sediment Quality [TR030008/APP/6.2] and Chapter 21: Ground Conditions and Land Quality [TR030008/APP/6.2]** discuss further standard mitigation measures to be implemented in order to prevent and minimise potential pollution to surface watercourses, including the use of an oil spill contingency plan and spill kits on site.

Management of Flood Risk

- 18.7.27 Temporary Construction Areas for laydown and construction compounds (**Work No. 8** and **Work No. 9**) would be suitably enclosed with fencing in order to stop construction plant etc becoming buoyant and floating away should flooding from a breach or overtopping event occur.
- 18.7.28 Within the Temporary Construction Area (**Work No.9**) an 8m clear strip from the landward toe of the fluvial defence along the North Beck Drain will be retained to allow for maintenance and access by the Environment Agency. Any compound or storage area located within the Temporary Construction Area (Work No.9) would therefore be located further than 8m from the landward toe and outside of the area shown to be located in Flood Zone 2 to the south of the Temporary Construction Area.
- 18.7.29 Construction materials would be suitably stored in line with best practice and COSHH/COMAH regulations. In the event of extreme weather and a flood warning being in place works would be stopped and construction plant would be removed from the Site for the duration of the flood warning event.
- 18.7.30 During the construction phase, the Contractor would monitor weather forecasts on a monthly, weekly and daily basis, and plan works accordingly. For example, works adjacent to the flood defences, works adjacent to the channel of any watercourse etc would be avoided or halted were there to be a risk of high flows or even flooding. In addition, the Contractor would sign up to Environment Agency flood warning alerts and produce an Emergency Response Plan which details the actions it would take in the event of a possible flood event. These actions would be hierarchal meaning that as the risk increases the Contractor would implement more stringent protection measures. This is important to ensure all workers, the construction site and third-party land, property and people are adequately protected from flooding during the construction phase.
- 18.7.31 Works adjacent to the flood defences or within or adjacent to the channel of any watercourse will require a Flood Risk Activity Permit (works within 16m of tidal flood defences or tidal Main River, within 8m of a fluvial Main River) or Ordinary Watercourse consent (within 9m of an Ordinary Watercourse) in line with NELIDB drainage byelaws. The Applicant is in discussion with the NELIDB and the Environment Agency about disapplication of the land drainage consent and Flood Risk Activity Permits within the DCO. See Article 3 of the **draft DCO [TR030008/APP/2.1]**.
- 18.7.32 If groundwater is encountered during below ground construction, suitable dewatering methods would be used. A dewatering scheme will be prepared and implemented to manage groundwater arising from the operations and water treatment prior to controlled discharge. Any significant volumes of groundwater dewatering required, dependent on disposal methods, would require an Environmental Permit. Potential for groundwater emergence in excavations

would be assessed prior to commencing works on site to establish volumes and points of discharge, and ultimately any residual flood risks.

- 18.7.33 Safe egress and exits would be maintained at all times when working in excavations. When working in excavations a banksman would be present at all times.
- 18.7.34 All construction workers would undergo site induction training prior to being allowed access onto site. This would include instructions on what to do in the event of emergency incidents such as flooding, access and egress routes and the location of safe refuge, if required.
- 18.7.35 As part of the proposed works, the standard of protection afforded by the existing flood defences in proximity to the jetty access road and pipe rack would be increased as the crest height of the new section of flood defence wall would be increased to 7.0m AOD.
- 18.7.36 During the construction period piling will be located a sufficient distance away from the flood defence and designed so that the defence is not adversely affected.
- 18.7.37 There is one pile proposed through the embankment at the rear of the flood defences. The following surveys and monitoring would be undertaken:
- A pre, post and a year post construction topographical survey of the defence at monitoring points (cross sections).
 - A pre, post and a year post construction photographic survey of the defence (landward, crest, wall and seaward face).
 - During construction monitoring and notification procedures for structural movement.
- 18.7.38 Any structural movement or damage to the embankment will be rectified and the Environment Agency notified.
- 18.7.39 On the landward side, temporary works and contingency measures will be put in place, as necessary, for the construction of the proposed the ramps and new section of flood defence to ensure the continuity of the flood defence throughout the works. The contractor will be required to provide a contingency plan for deployable or temporary flood defence works methods, approved by the Environment Agency, prior to the commencement of the works, or through structuring the works in such a way that the existing defence wall can remain in-situ until the new structure is completed.
- 18.7.40 Further information will be provided and consultation with the Environment Agency undertaken when the design and construction methods are finalised. Mitigation measures will include a combination of detailed weather forecasting with works only undertaken at low tide and use of temporary barriers. The contractor will be required to have a contingency plan in place, for the deployment of flood protection measures within a timescale agreed with the Environment Agency.
- 18.7.41 Further details regarding the management of flood risk are presented within the FRA (refer to **Appendix 18.A [TR030008/APP/6.4]**). A requirement of the **draft DCO [TR030008/APP/2.1]** ensures compliance with the FRA during construction

and operation of the Project - the FRA outlines the relevant mitigation measures to be complied with for the purposes of that requirement and in order for the Project to remain safe, should a flood event occur.

- 18.7.42 Subject to the grant of the DCO, construction of the Project (save certain enabling works) will not be able to commence until the final CEMP has been prepared by the contractor and approved in writing by the Planning Authority. This will be secured by a requirement included in the **draft DCO [TR030008/APP/2.1]** and will contain the measures detailed in the **Outline CEMP [TR030008/APP/6.5]**.

Operational Phase Mitigation Measures

- 18.7.43 The Project will operate in accordance with and comply with relevant legislation and regulations, and the hydrogen production facility will be regulated by the EA through an Environmental Permit.
- 18.7.44 Appropriate emergency environmental management plans and procedures, in accordance with legislation, regulations and industry best practice, will be in place for the operational stage.
- 18.7.45 Potential impacts associated with the accidental spillage of polluting materials during the operational phase will be mitigated by way of process monitoring and implementation of an Environmental Management System.

Surface Water Drainage

- 18.7.46 Sources of potential water contamination from the terminal (**Work No. 1**), the jetty access road and the pipe-rack (**Work No. 2**) would be limited to rainwater falling on any impermeable surfaces. Surface water on the jetty and terminal building would discharge at an unrestricted rate, via over edge drainage, directly into the River Humber. Surface water on the jetty access road would drain directly to the small drainage ditch which is located directly beneath the road corridor where the road rises to pass over the flood defences.
- 18.7.47 Sources of potential water contamination from the hydrogen production facility would be limited as both liquid ammonia and liquid hydrogen are refrigerated gases. However, the plant would require the use of ammonia solution as well as oil, diesel and water treatment chemicals which are all potential water pollutants. The hydrogen production facility is designed to prevent or minimise fugitive emissions to water. The process equipment would be situated on an impervious hard standing area, which would be subject to regular visual inspection. Liquid chemicals and equipment and associated pipework would be located above ground in an impervious bunded areas sized for 110% of the contents to prevent accidental discharges to groundwater or drains. Containment would be sized to contain the maximum foreseeable fire water event. Leaks or losses from valves pumps etc would be minimised by design of the equipment and by ongoing maintenance. Plans to install cathodic protection on pipework within the pipeline corridor to protect against saline corrosion, will not result in any detectable changes to the surface water quality.
- 18.7.48 A new surface water drainage network and management system would be provided for the terrestrial areas of the Site that would provide adequate

interception, conveyance and treatment of surface water runoff from buildings and hard standing, with foul systems for welfare facilities and process wastewater generated by the site operations. Gravity drainage would be used wherever practicable. The Pipeline Corridor (**Work No. 6**) linking the East and West Sites would not require additional drainage as it would be installed underground. The drainage system would also hold all design flows within the Site boundary, so there would be no negative impact to the flood risk of areas surrounding the Site. The drainage strategy will also not impact existing underground services. The Drainage Strategy for the operational development is appended at **Appendix 18.B: Drainage Strategy [TR030008/APP/6.4]**.

- 18.7.49 The proposed surface water drainage system includes the use of SuDS, including permeable gravel beds and retention basins to provide attenuation storage and suitable water quality management for treatment of runoff from impermeable areas where there is a low risk of contamination by any chemicals used by the energy generation processes, to ensure potential adverse effects on water quality and habitat of receiving water bodies are avoided. Further information is provided in **Appendix 18.B: Drainage Strategy [TR030008/APP/6.4]**.
- 18.7.50 The drainage system would be designed to be inherently safe and protect the local environment from urban diffuse pollutants that may be present. The drainage system would segregate clean surface water, oily water and water that may have contamination from liquid chemicals (water treatment chemicals, or amine solution). Contaminated or potentially contaminated water would be directed to the on-site package treatment plant or, in the case of amine contaminated water, to off-site disposal. All effluent from the Site would be collected prior to discharge and only discharged if consent requirements are met.
- 18.7.51 Sanitary waste water from welfare facilities on the jetty and the jetty control room will be collected in cess tanks located at the jetty head. The land side development will be drained via conventional foul sewer and treated through the local sewage treatment work. The Project's sewerage requirements in respect of the number of users has been provided to Anglian Water.

Management of Hazardous Substances on Site

- 18.7.52 As stated above, sources of potential water contamination would be limited as both liquid ammonia and liquid hydrogen are refrigerated gases. However, the plant would require the use of ammonia solution as well as oil, diesel and water treatment chemicals which are all potential water pollutants. The use of the chemical products at the Site would follow relevant product-specific environmental guidelines, as well as the legislative requirements set out in the Control of Substances Hazardous to Health Regulations.
- 18.7.53 The storage of hazardous substances during the operational phase will be approved by NELC through a Hazardous Substances Consent and regulated by the Health and Safety Executive (as the competent authority) through COMAH. Further information relating to these measures is presented in **Chapter 22: Major Accidents and Disasters [TR030008/APP/6.2]**.
- 18.7.54 A site Emergency Response Plan (prepared pursuant to Regulation 9 of the COMAH Regulations) would be in place for dealing with emergency situations

involving loss of containment of hazardous substances. This would detail how to contain and control incidents to minimise the effects and limit danger to persons, the environment and property. The Emergency Response Plan would set out the emergency spill control procedure that will include the actions adapted from the Health and Safety Executive's Emergency Response/ Spill Control Technical Measures Document.

- 18.7.55 Further guidance which would be referenced in the development of the site Emergency Response Plan would include:
- a. HS(G)191 Emergency planning for major accidents. Control of Major Accident Hazards Regulations 1999 (Health and Safety Executive, 1999).
 - b. HS(G)71 Chemical warehousing: the storage of packaged dangerous substances (Health and Safety Executive, 1992).
 - c. BS 5908: Fire and explosion precautions at premises handling flammable gases, liquids and dusts. Code of practice for precautions against fire and explosion in chemical plants, chemical storage and similar premises (British Standards Institute, 1990).
- 18.7.56 These measures would also be applicable to ensure protection of the water environment during the Project's decommissioning phase and it is expected that the final DEMP would draw on the same guidance or any further guidance that is developed prior to the decommissioning of the hydrogen production facility.

Flood Risk Management

- 18.7.57 Mitigation measures to manage the current and future flood risk during operation are described in detail in Section 6.9 of the FRA (**Appendix 18.A [TR030008/APP/6.4]**).
- 18.7.58 Measures include the evacuation of workforce and vehicles from the Site should a flood warning be in place. In the event of extreme weather and a flood warning being in place the Applicant's approach will be to shut the facility down, make equipment safe and relocate road tankers present on the Site elsewhere. This would be undertaken on a precautionary basis once a flood warning is received.
- 18.7.59 Provision of safe refuge within the Site (it is currently proposed that the control room building and Toxic Safe Haven building on the West Site, and the control room building on the East Site, will be designated as areas of safe refuge) and the production of a flood response plan for the development to ensure the residual risk to the Site is sufficiently managed and mitigated. A management system will be implemented to respond to a variety of emergency situations both during normal hours (24/7) and over holiday periods.
- 18.7.60 In order to protect all critical equipment assets on site, where possible these items are elevated above the 2115 0.1% AEP breach flood water level of 6m AOD. It is the intention of the Applicant to shut down the operation of the facility should extreme weather be forecasted and a flood warning is put in place. However, the following pieces of critical equipment have been identified:
- a. Boil off gas and flare system.
 - b. Control systems and electrical switch gear.

- c. Pressure relief system.
- d. Pressure control feedback and liquid level control (alarm and trip).

- 18.7.61 It is proposed that the boil off gas and flare system will be constructed in such a way that it remains above the breach flood water level or will be protected from flooding whilst the control systems, electrical switch gear, and alarm and trips for the pressure control feedback and liquid level control are located at height above the maximum flood level.
- 18.7.62 These mitigation measures would minimise the potential for building damage and ensure the safety of the workforce to an acceptable level.

Decommissioning

- 18.7.63 The terminal including the jetty (**Work No. 1**) and the jetty access road (**Work No. 2** in part) would be maintained and become part of the long-term port infrastructure and would not be decommissioned. At the end of the design life all above-ground equipment associated solely with the hydrogen production facility (**Work Nos. 3, 4, 5, 6 and 7**) would be decommissioned and removed. At the end of its design life decommissioning of the hydrogen production facility would see the removal of all above ground equipment down to ground level.
- 18.7.64 It is assumed that all underground infrastructure would remain in-situ; however, all connection and access points would be sealed or grouted to ensure disconnection. The decommissioning impacts are expected to be similar to the construction impacts.
- 18.7.65 An **Outline Decommissioning Environmental Management Plan** (“DEMP”) [**TR030008/APP/6.6**] has been prepared as part of the DCO application to explain how impacts associated with the decommissioning of hydrogen production facility will be minimised or avoided.
- 18.7.66 The DEMP will consider in detail all potential environmental risks and contain guidance on how risks can be removed, mitigated or managed. This will include details of how surface water drainage should be managed at the Site during decommissioning and demolition.
- 18.7.67 A final DEMP will be prepared by the demolition contractor, and will contain the measures detailed in the **outline DEMP [TR030008/APP/6.6]**. The final DEMP will be secured by way of requirement in the **draft DCO [TR030008/APP/2.1]**.

18.8 Assessment of Likely Impacts and Effects

- 18.8.1 The sections below consider the potential water environment impacts during Project construction, operation and decommissioning. The potential risks to the water environment may include deterioration in water quality due to contaminants in surface water runoff etc, increased flood risk and over-whelming the drainage network. Such impacts have the potential to lead to a deterioration in water body status (Ref 18-8).
- 18.8.2 The potential impacts are considered generically first, in the absence of Site context and without any mitigation assumptions, in **Paragraph 18.8.3 to 18.8.14**. The likely impacts are then considered in greater detail from **Paragraph 18.8.15** to determine the likelihood for significant effects to arise, with the assumption that

the mitigation measures defined in **Section 18.7** have been applied to the Project.

- 18.8.3 **Chapter 25: Cumulative and In-Combination Effects [TR030008/APP/6.2]** considers the in-combination effects relating to the topic of water quality, coastal protection, flood risk and drainage which could arise from the Project.

Pathways

- 18.8.4 Potential water environment impact pathways associated with the construction phase of the Project without mitigation include:
- Contamination from suspended solids or other chemical contaminants that may find their way into site runoff, infiltrate to ground, or be spilt directly into waterbodies when there are works within or adjacent to them.
 - The effects of diffuse urban pollutants in surface water runoff (that may contain metals, hydrocarbons, and inert solids etc.).
 - The risk of pollution from chemical spillages or fire.
 - Increase in risk to aquatic life from potential water use and discharges to the environment.
 - Floodplain inundation, increased risk of tidal and fluvial flooding to the Project and surrounding area due to loss of floodplain storage.
 - Changes to flow regimes and/or water levels resulting in an increase in flood risk (fluvial, surface water and drainage infrastructure) due to changes in fluvial and overland flow paths, as a result of storing construction materials, earthworks, and changes in land use.
 - Changes to surface water run-off rates and volumes.
 - Changes in tidal regime due to dredging (and associated disposal activity).
 - Exposure to flood water - increased risk to human receptors being exposed to flood water during the construction phase.
- 18.8.5 Construction activities such as earthworks, excavations, site preparation, levelling and grading operations may result in the disturbance of soils and, potentially, mobilise contamination. Construction works within, along the banks and across watercourses can also be a direct source of fine sediment mobilisation, and this sediment could contain contaminants given the past industrial activities within the Site Boundary. Watercourses across the Study Area may also contain contaminated sediments due to the past industry in this area and the limited erosion and conveyance ability of these watercourses. Other potential sources of fine sediment during construction works include water runoff from earth stockpiles, dewatering of excavations (surface and groundwater), mud deposited on site and local access roads, and that which is generated by the construction works themselves or from vehicle washing.
- 18.8.6 Allowing such substances to enter a watercourse could be in breach of the Environmental Permitting (England and Wales) Regulations 2016 and the Water Resources Act 1991 (as amended), and therefore measures to control the storage, handling and disposal of such substances will need to be in place prior to and during construction.

18.8.7 Construction works and topographical changes in Flood Zone 3a also have the potential to increase the rate and volume of surface water runoff, change surface water, fluvial and tidal flow pathways, and increase the risk of blockages in watercourses that could lead to flow being impeded, and a potential rise in flood risk.

Operational Phase

- 18.8.8 The potential water environment impact pathways during the Project's operational phase are as follows:
- a. Potential operational pollution of surface watercourses from accidental spillages.
 - b. Potential pollution incident from hazardous firefighting chemicals if a fire was to occur on the Site.
 - c. Floodplain inundation, increased risk of tidal and fluvial flooding to the Project and surrounding area due to loss of floodplain storage.
 - d. Changes to flow regimes and/or water levels resulting in an increase in flood risk (fluvial, surface water and drainage infrastructure) due to changes in fluvial and overland flow paths.
 - e. Changes to surface water run-off rates and volumes.
 - f. Changes in tidal regime due to dredging and development in the marine environment.
 - g. Exposure to flood water, increased risk to human receptors being exposed to flood water should overtopping or breach of the flood defences occur.
- 18.8.9 The water supply and foul water requirements for the Project have been shared with the statutory undertakers so that these can be managed accordingly by the public water company and sewage undertaker, Anglian Water. A response received by Air Products from Anglian Water in late July 2023 indicates that a commercial offer has been made which would provide the water needs for the full Project (Phases 1 to 6).
- 18.8.10 The potential impact from the foul water discharges is not assessed within the ES as the discharges would be collected by the local sewage system and then treated at existing facilities to the required standards, before release to the receiving waterbodies, under existing consents.
- 18.8.11 Furthermore, water supply and sewage treatment is a highly regulated industry with existing processes and mechanisms to ensure the supply of services for major developments. Statutory requirements are also placed upon statutory wastewater undertakers to upgrade their infrastructure when required, whilst ensuring they operate within requirements of water abstraction licences and water activity permits to discharge to rivers.

Decommissioning Phase

- 18.8.12 The terminal including the jetty (**Work No. 1**) and the jetty access road (**Work No. 2** in part) would be maintained and become part of the long-term port infrastructure. These elements of the Project would not be decommissioned and therefore impacts related to receptors associated with changes in tidal regime (i.e. flood defences and Habrough Marsh Drain across the intertidal area) will remain as assessed for the operational phase.
- 18.8.13 At the end of its 25 year design life all above-ground equipment associated solely with the hydrogen production facility (**Work No. 3, Work No. 5 and Work No. 7**) would be decommissioned and removed from the Site. It is assumed that all underground infrastructure (**Work No. 4 and Work No. 6**) associated with the hydrogen production facility would remain in-situ, however, all connection and access points would be sealed or grouted to ensure disconnection.
- 18.8.14 On this basis, decommissioning impacts are expected to be limited to waterbodies in close proximity to the Project Site (i.e. Humber Estuary, North Beck Drain, Habrough Marsh Drain and local land drains), and would be similar to the impacts reported for the construction phase, but with fewer earthworks and excavations to manage.

Construction Impacts and Effects

- 18.8.15 A qualitative assessment of the likely significant effects on surface waterbody and flood risk receptors during the construction of the Project is presented in the following paragraphs.

Unnamed Drainage Channels within the Site

- 18.8.16 The **WFD Compliance Assessment**, presented in **Appendix 17.A [TR030008/APP/6.4]** indicates that during the construction stages, there would be potential for the overall water quality in the unnamed drainage channels located within the proposed construction areas on the site to be impacted by the proposed activities. The main risks are increased run off carrying sediment and chemical contamination into the drainage channels.
- 18.8.17 There is limited connectivity between these drains and the North Beck Drain and the risk of adverse effects to the WFD body is considered to be low. These drains outflow into the Humber Estuary where high levels of dilution, as discussed further in **Chapter 17: Marine Water and Sediment Quality [TR030008/APP/6.2]**, would disperse any contaminants that have been transported by the drainage channels. With the implementation of standard mitigation measures, which are included within the **Outline CEMP [TR030008/APP/6.5]**, it is reasonable to conclude that the effects to the water environment during construction would be **negligible / minor adverse** are not likely to be significant.

Water Quality impacts to North Beck, Habrough Marsh Drain and Local Drains

- 18.8.18 There is the potential for the following events to impact on the North Beck, Middle and Marsh drains as a result of the Project and the significance of any such impact and proposed mitigation is considered in the following paragraphs:

- a. Direct spillage
- b. Runoff contamination
- c. Alteration in fluvial and overland flowpaths and potential increase in flood risk
- d. Blockage of drains

- 18.8.19 Direct spillage, whereby contamination from suspended solids or other chemical contaminants may find their way into site runoff or infiltrate to the ground, or may be spilt directly into waterbodies when there are works within or adjacent to them, could have an impact on the North Beck Drain, Habrough Marsh drain and local drains as a result of the construction phase of the Project. Without appropriate mitigation, this impact would be expected to be moderate to major adverse. Mitigation measures, as outlined in **Section 18.7** are detailed in the outline CEMP and include the use of bunded operations and spill kits on Site. Following the implementation of these mitigation measures, the residual effect of direct spillage on the water quality of the North Beck Drain and Habrough Marsh drain and local drains is anticipated to be **negligible/minor adverse** and not significant.
- 18.8.20 Impacts on these receptors may also arise from runoff contamination, as a result of diffuse urban pollutants (from vehicle tyres, exhausts and chimney stacks) in surface water runoff (that may contain metals, hydrocarbons and inert solids). In the absence of mitigation measures, the effect would be minor/moderate adverse. Mitigation measures, as outlined in **Section 18.7** are detailed in the outline CEMP and include the use of bunded operations for all chemicals and fuels needed on site. Following the implementation of these mitigation measures, the residual effect of runoff contamination, on the water quality of the drains is anticipated to be **negligible/minor adverse** and not significant.
- 18.8.21 Alterations in fluvial and overland flowpaths, as well as potential increase in flood risk as a result of storing construction materials in the floodplain could also have an impact on water quality by runoff interacting with materials before entering into the North Beck Drain and Habrough Marsh drain and local drains. Without mitigation, this impact is expected to be minor to moderate adverse. Mitigation measures, as specified in the **Outline CEMP [TR030008/APP/6.5]** are therefore required to reduce this potential impact. A specific mitigation measure that will be implemented will be the careful consideration and appropriate siting of areas for the storage of construction materials. With mitigation measures in place, the residual impact will be **negligible/minor adverse** and not significant.
- 18.8.22 If unmitigated, an increase in materials such as sand and gravels could be transported in runoff from the Site during construction and there would be an increased risk of possible blockage of drains. In the absence of mitigation, this impact is considered to be minor/moderate adverse. A proposed measure to mitigate this impact will be the appropriate management of surface water runoff on site such as soakaways or collection of runoff in settlement ponds for tankering off-site, which is detailed in the **Outline CEMP [TR030008/APP/6.5]**. With the appropriate mitigation in place, the residual effect of the risk of drain blockage as a result of increased materials transported in runoff is **negligible/minor adverse** and not significant.

Water Quality impacts to Coastal and Floodplain Grazing Marsh and Good quality semi-improved grassland

18.8.23 Direct spillage, whereby contamination from suspended solids or other chemical contaminants that may find their way into site runoff, infiltrate to the ground, or are spilt directly into non-priority habitat when there are works within or adjacent to them could have an impact on coastal and floodplain grazing marsh and good quality semi-improved grassland during the construction phase of the Project. Without appropriate mitigation, this impact is anticipated to be negligible/minor adverse. Impacts could also arise from runoff contamination, whereby diffuse urban pollutants (metals, hydrocarbons and inert solids) escape into surface water runoff. Appropriate mitigation measures for these impacts, as specified within the **Outline CEMP [TR030008/APP/6.5]**, include the use of bunded operations for all chemicals and fuels needed on site, as well as the use of spill kits. Following the implementation of these mitigation measures, the residual effect of direct spillage and runoff contamination on coastal and floodplain grazing marsh and good quality semi-improved grassland is anticipated to be **negligible** and not significant.

Floodplain inundation from flooding sources

- 18.8.24 During periods of inclement weather there is the potential that flooding to the Site could occur from tidal, fluvial, surface water, groundwater and drainage sources during the construction phase.
- 18.8.25 The Site and the surrounding area are afforded protection by tidal flood defences up to and including the 0.5% AEP flood event and is therefore considered to be at low risk of tidal flooding. However, the residual risk of site inundation remains should the defences overtop (during a storm surge) or breaching of the defences occur.
- 18.8.26 Inundation of the floodplain can also cause damage to existing development and construction equipment, and disrupt site operations, both within the Site and the surrounding area. Construction activities, stockpiles of construction material and structures located on the Site has the potential to change flood flow routes, reduce floodplain storage and increase the risk of flooding to residential and commercial receptors on neighbouring sites.
- 18.8.27 Development under construction for the Project (i.e. within the defined Site Boundary) during the construction phase comprises landside essential infrastructure (assessed as a receptor of very high importance) and marine side water compatible infrastructure (assessed as a receptor of low importance).
- 18.8.28 Existing development on neighbouring sites comprises mixed use development, including commercial, residential, industrial/warehouse uses, and tanked bulk storage uses with hazardous substance consents etc., assessed as receptors of low importance to very high importance (based on the PPG (Ref 18-14) development vulnerability classifications outlined in **Table 18-11**).
- 18.8.29 The Site is considered to be at low risk of flooding from all other sources with the exception of groundwater flooding which is assessed as a medium risk. Flooding from these sources, although considered to be temporarily disruptive on site should flooding occur, are not considered significant when compared to the impact of a tidal flood event.

- 18.8.30 The most recent significant flood event at the Port of Immingham occurred in 2013 when a storm surge event flooded the Port of Immingham. The Site did not flood during this event, however, should a tidal breach flood event occur during the construction period the baseline flood risk assessment indicates that the Site and surrounding areas could flood to a maximum water level of 5.6m AOD.
- 18.8.31 The probability of a surge event, overtopping or a breach of the flood defences with a localised or regional effect is low, however, should an event occur it is considered, given the extent and depth of flooding along the South Humber Bank, , that the construction works at the Site would increase the risk of flooding off- site or increase the hazard mapping classification (currently Danger to Some to Danger to Most), to surrounding development as these areas are likely to be flooded to a similar depth as the Site. Given the extensive nature of the residual tidal flood risk extent, any increase in flood water level is likely to be insignificant, therefore the magnitude of change is considered negligible when compared to the current baseline.
- 18.8.32 In the absence of mitigation, floodplain inundation from tidal flooding has been assessed to have a **minor adverse** effect on the existing development on-site, during the Project's construction phase and a **minor adverse** effect on the existing off-site receptors (based on the highest importance receptor – essential infrastructure (very high importance)), during the Project's construction phase.
- 18.8.33 Proposed mitigation measures would include designating storage areas for construction materials and ensuring they are stored in line with best practice. Best practice measures to achieve this would be specified by the contractor in the final CEMP. The establishment of the Temporary Construction Compounds would require a Flood Risk Activity Permit, obtained under protective provisions from the Environment Agency as part of the DCO. This would require an additional FRA for the compound areas as part of the permit application.
- 18.8.34 Mitigation also includes signing up to the Environment Agency Flood Warning Service, and the production of a Flood Emergency Response Plan. When extreme weather results in a flood warning being in place, construction plant would be removed from the Site for the duration of the warning and construction work would cease.
- 18.8.35 On the landward side of the development, temporary works and contingency measures will be put in place, as necessary, for the construction of the proposed access ramps and new section of flood defence to ensure the existing flood defence is available as required. During construction on the seaward side of the defences, piling activities will be located a sufficient distance away from the flood defence and designed so the defence is not adversely affected.
- 18.8.36 In addition, measures will also include a combination of detailed weather forecasting with works only undertaken at low tide and use of temporary barriers. The contractor will be required to have a contingency plan in place, for the deployment of flood protection measures within a timescale agreed with the Environment Agency. These are described further in the FRA (**Appendix 18.A [TR030008/APP/6.4]**) and above in **Section 18.7**.

18.8.37 Following implementation of mitigation measures, the residual effect would remain a **minor adverse** effect for development both on-site and off-site, and therefore not significant.

Changes to flow regimes and/or water levels

- 18.8.38 The fluvial and surface water baseline flood risk could be exacerbated during the construction phase from an increase in impermeable areas such as compacted soils, and the presence of stockpiled materials and equipment temporarily stored on the floodplain. In addition, changes in existing flood flow routes due to the presence of stockpiles and equipment also has the potential to exacerbate the risk of flooding from fluvial, surface water sources.
- 18.8.39 The construction phase of the Project would involve works close to the North Beck Drain (**Work No.9** only), Habrough Marsh Drain (East Site), Immingham Pump Drain (West Site), plus small land drainage ditches within and in close proximity to the Site.
- 18.8.40 In addition, within **Work No. 2**, where the jetty access road crosses the existing land drainage ditch, up to three new culverted sections are proposed. Works in the channel associated with installation of the culverts during the construction phase have the potential to restrict flow causing water levels to increase in the channel upstream and could also temporarily reduce the capacity of the channel. Elsewhere within **Work No. 2**, the existing land drainage ditch will be cleared of vegetation, re-lined and have a grated cover installed to allow access for maintenance of the pipe rack. Grating ensures the open nature of the watercourse is retained. The available flow area of the channel will be maintained and even improved by the removal of vegetation.
- 18.8.41 In the absence of mitigation, the baseline fluvial flood risk could be exacerbated during construction works by the short term, temporary increases in the rate and volume of surface water runoff from an increase in impermeable areas such as compacted soils and the presence of stockpiled materials and equipment temporarily stored on the floodplain. Sediment, construction materials and equipment may also be washed downstream where it may block the channel and lead to or increase the risk of fluvial flooding during the construction phase.
- 18.8.42 Given the potential for fluvial flood risk to increase from North Beck Drain, Habrough Marsh Drain, Immingham Pump Drain (receptors of high importance), and the local land drains (receptors of medium importance) the magnitude of change during the construction phase is considered to be moderate adverse, therefore the significance of effect is assessed, in the absence of mitigation, **moderate adverse** and therefore significant.
- 18.8.43 However, with the implementation of standard construction methods and mitigation, as described **Section 18.7**, the short-term temporary increase in water level can be effectively managed for example by monitoring weather forecasts and Environment Agency flood warnings, by undertaking works close to or within watercourses during periods of dry weather. The contractor will ensure an adequate temporary drainage system is in place and maintained throughout the construction phase.

18.8.44 The design approach to sizing of the new culverts is to match or exceed the existing cross section of the relevant land drain. The final design of the culverts will be undertaken in consultation with NELIDB and confirmed through protective provisions via the DCO. The final designs will ensure that there is no decrease in channel capacity or conveyance along the drains to prevent any obstruction to flow within the channel, therefore flows up and downstream of the proposed culvert locations would not be adversely affected. Removal of vegetation from the channels of the land drains where works will occur will also improve storage capacity within the watercourses.

18.8.45 With mitigation in place, the magnitude of change for short term, temporary increases in water levels and changes to flow regimes during the construction phase is considered to be negligible compared to the current baseline. This results in a **minor adverse** effect for North Beck Drain, Habrough Marsh Drain and Immingham Pump Drain and a **negligible** effect for the local land drains, not significant.

Changes to surface water runoff rates and volumes

18.8.46 The Site is classed as a mixture of brownfield land (i.e. previously developed) and greenfield land (i.e. undeveloped land) and comprises predominantly of permeable surfacing, including areas of vegetation and areas of compacted ground which were previously used for stockpile storage or were previously paved.

18.8.47 The Site is in general considered to be at very low risk from surface water flooding, although in some areas associated with watercourse corridors and low topographic areas there are areas of low, medium and high risk as outlined in the baseline conditions and the FRA (**Appendix 18.A [TR030008/APP/6.4]**).

18.8.48 During the construction works, existing surface water flow paths may be disrupted and altered due to site clearance, earthworks, and excavation work. The exposure and compaction of bare ground and the construction of new embankments, structures, and impermeable surfaces may increase the rates and volume of runoff and increase the risk from surface water flooding.

18.8.49 A temporary increase in surface water runoff and changes in existing surface water flow paths has the potential to temporarily exacerbate the risk of flooding from fluvial sources via temporary uncontrolled discharges to North Beck Drain (adjacent to Works No. 9), Habrough Marsh Drain, Immingham Pump Drain and the local land drains within and adjacent to the Site Boundary.

18.8.50 The Site drains predominantly to the south to North Beck Drain either via local field drains or via the Immingham Pump Drain. Drainage to the north to Habrough Marsh Drain from the Site is limited to the areas in close proximity to the watercourse.

18.8.51 Given the potential for increased surface water run-off during the construction phase increasing the risk of fluvial flooding from North Beck Drain, Habrough Marsh Drain, Immingham Pump Drain (receptors of high importance), and the local land drains (receptors of medium importance) the magnitude of change during the construction phase is considered to be moderate adverse, therefore the significance of effect is assessed, in the absence of mitigation, **moderate adverse** and therefore significant.

18.8.52 Temporary drainage facilities would be provided by the contractor during the construction phase, where necessary, to ensure controlled discharge of surface water run-off. Temporary management of surface water runoff together with the implementation of best practice construction methods (see **Section 18.7**), means this risk can be effectively managed. As such, the magnitude of change for surface water flooding is considered to be negligible resulting in a **minor adverse** effect for North Beck Drain, Habrough Marsh Drain and Immingham Pump Drain and a **negligible** effect for the local land drains, not significant.

Changes to tidal regime

- 18.8.53 Dredging associated with the marine element of the Project would change seabed levels and has the potential to change wave heights, tidal water levels and the rates of erosion or accretion on the foreshore in proximity to the flood defences during the construction phase.
- 18.8.54 Construction of new infrastructure in the Humber near to the gravity outfall of Habrough Marsh Drain has the potential to increase accretion rates which could result in siltation which would impede the discharge from the watercourse across the intertidal area.
- 18.8.55 Impacts from the Project on the tidal hydrodynamic regime are discussed in detail in **Chapter 16: Physical Processes [TR030008/APP/6.2]**.
- 18.8.56 During the construction phase Physical Processes assessment (in **Chapter 16: Physical Processes [TR030008/APP/6.2]**) concludes that overall, the increase in suspended sediment concentration (“SSC”) and potential sedimentation in the marine environment is likely to be the same as that which already occurs from existing maintenance dredging in the area (which has been occurring for many years). Moreover, peak increases will remain within the envelope of natural variability in background SSC. In addition, it is considered unlikely that there would be any notable impact on local flows across the adjacent intertidal area and, by association, no likely impact on local accretion or erosion processes.
- 18.8.57 Given the spatial extent of the physical processes acting within the Humber Estuary, there is considered to be a negligible change in the magnitude of any local changes in tidal regime as a result of the Project. Therefore, the significance of effect on the flood defences (very high importance) is considered to be a **minor adverse** effect and not significant. The significance of effect on the Habrough Marsh Drain (high importance), in terms of accretion/erosion rates impacting the drainage across the intertidal area is considered a **minor adverse** effect and not significant.

Exposure to Flood Water

- 18.8.58 The Site is situated in Flood Zone 3a. However, it is protected by flood defences, and the baseline assessment suggests a low risk of flooding from all sources, with the exception of groundwater flooding which is assessed as a medium risk.

- 18.8.59 The location of the Site (immediately adjacent to the Humber Estuary and directly behind flood defences) presents a risk to site workers and visitors to the Site during the construction phase from predominantly tidal sources. Should a storm surge, overtopping or breach of the flood defences occur exposure of construction workers/ site visitors to floodwater includes risk of drowning, risk of injury, risk of swallowing contaminated water and risk of hyperthermia.
- 18.8.60 Overtopping or a breach of flood defences would represent a significant to extreme hazard at the site, however, the likelihood of an overtopping or breach event occurring is low.
- 18.8.61 The Project would include the installation of a surface water and foul drainage network and the Laporte Road culvert (an underground culvert, containing pipelines and cables and other conducting media, under Laporte Road, to link infrastructure in the East Site). No significant below ground structures are proposed.
- 18.8.62 Based on the observed groundwater levels at the Site, excavation of cuttings and below ground excavations have the potential to release groundwater in some areas, and open excavations in some locations may also be more prone to becoming inundated by groundwater. The risk of injury and contact with contaminated water is also associated with exposure to groundwater and flooding from other sources, should they occur.
- 18.8.63 As receptors, site workers are considered as being of high importance (site workers with prior knowledge of the risks of flooding and what to do in the event of a flood as part of their site induction, as defined in **Table 18-11** Table 18-2 whilst site visitors who are less aware of possible flood risks, as defined in **Table 18-11** Table 18-2, are considered to be receptors of very high importance.
- 18.8.64 With no mitigation in place, should a tidal breach or overtopping flood event occur during the construction phase exposure to floodwater, would have a major impact on human health (construction workers and operatives, site visitors) and therefore a significance of effect of **large adverse** (site workers) and **very large adverse** (site visitors), a significant effect during the construction phase of the Project.
- 18.8.65 Should flooding from other sources (fluvial, groundwater, surface water and drainage) occur during the construction phase, exposure to floodwater would have a minor impact on human health (construction workers and operatives, site visitors) and therefore a significance of effect of **minor adverse** (site workers) not significant, and **moderate adverse** (site visitors), a significant effect.
- 18.8.66 Proposed mitigation measures that would reduce this effect include construction works would be carried out in accordance with the **Outline CEMP [TR030008/APP/6.5]**, including the Flood Emergency Response Plan. A site induction would be given, including outlining evacuation routes, safe refuge, access and egress areas prior to works commencing. The construction site would be registered with the Environment Agency Flood Warnings Direct Service. There will also be no work taking place on site during periods of extreme weather when a flood warning is received from the Environment Agency.

18.8.67 Following implementation of these mitigation measures, the impact would be reduced to negligible and the residual effect of exposure to floodwater from all sources of flooding on human receptors would be **minor adverse** and not significant.

Operational Impacts and Effects

18.8.68 A qualitative assessment of the likely significant effects on surface water quality and flood risk receptors during the operational phase of the Project is presented in the following paragraphs:

Water Quality impacts to North Beck, Habrough Marsh Drain and Local Drains

- 18.8.69 There are several impact pathways that have been assessed to have a potential impact on the North Beck Drain, Habrough Marsh drain and local drains as a result of the operational phase of the Project. These are as follows and are discussed in the following paragraphs:
- a. Potential operational pollution of surface watercourses from accidental spillages.
 - b. Potential run off of hazardous fire-fighting chemicals to surface watercourses.
- 18.8.70 The North Beck Drain, Habrough Marsh drain and local drains could be impacted by potential operational pollution of surface watercourses as a result of accidental spillages (e.g. infrastructure breakages or vehicle accidents, should they occur). The effect is assessed to be minor to moderate adverse, however mitigation measures are proposed which would be to implement containment areas and to employ bunded operations, as well as mandating the use of spill kits on site. With this proposed mitigation in place, the residual effect would be **negligible/minor adverse**, which is not significant.
- 18.8.71 The potential for run off of hazardous firefighting chemicals to surface watercourses would impact the North Beck Drain, Habrough Marsh drain and local drains during operation of the Project and has been assessed to have a major adverse impact. Mitigation would take place in the form of designated containment areas including a bunded operational area as well as the use of spill kits and the treatment/removal of liquids. With these measures in place, the residual effect would be **negligible/minor adverse** and not significant.
- #### **Water Quality impacts to Coastal and Floodplain Grazing Marsh and good Quality Semi-improved Grassland**
- 18.8.72 Potential operational pollution of surface water courses from accidental spillages would impact Coastal and Floodplain Grazing Marsh and good quality semi-improved grassland during operation of the Project. This effect would be negligible / minor adverse. Containment measures and bunded operations, as well as the use of spill kits on site would be implemented to mitigate this effect and as a result, the residual effect would be **negligible** and not significant.

Floodplain inundation from flooding sources

- 18.8.73 With rainfall intensity, peak water levels, sea water level and wave heights set to increase, as a consequence of climate change, over the operation of the Project lifetime, the likelihood of flooding occurring to the Project and the surrounding areas from all sources will increase compared to the current baseline. This potential increase in flood risk could result in damage to the development and disruption of site operations. In addition, the presence of newly built structures located on the Site has the potential to change flood flow routes and increase the risk of flooding to neighbouring sites through displacement of flood water.
- 18.8.74 In line with Shoreline Management Plan (“SMP”) (Ref 18-39) and Humber Flood Risk Management Plan (“FRMP”) (Ref 18-35) ‘Hold the Line’ management policy it is assumed that the crest height of the Environment Agency flood defences will be raised to maintain the 0.5% AEP standard of protection afforded by the flood defences over the operation of the development. Flood defences will have been raised locally (in proximity to the jetty access ramp/pipe rack) during the construction phase. However, the residual risk of flooding from overtopping and breach events will remain. By the year 2115, should a breach event occur, the Site and the surrounding areas will be located in a ‘Danger to All’ hazard area and flooded to a depth of 6m AOD during a 0.1% AEP breach event.
- 18.8.75 It is possible that the Project could have an impact on tidal flooding during a breach or overtopping event due to an alteration of flood mechanism and flows due to land raising. As part of the Drainage Strategy (appended at Appendix 18.B [TR030008/APP/6.4]) design ground levels within the East Site (would be raised during construction by 0.3m (**Work No. 5**) and 0.6m (**Work No. 3**) respectively, giving finished ground levels of approximately 3.8m AOD and 3.6m AOD. In addition, the West Site (**Work No. 7**) would be raised to a final ground level of approximately 2.5m AOD.
- 18.8.76 The proposed ground levels are located below the breach flood water levels for both the 0.5% AEP and 0.1% AEP 2115 flood events, approximately 5.9m AOD and 6m AOD respectively, and therefore floodplain storage would be lost which could potentially increase the risk of tidal flooding off site.
- 18.8.77 The Site is considered to be at low risk of flooding from all other sources with the exception of groundwater flooding which is assessed as a medium risk. Flooding from these sources, although considered to be temporarily disruptive on site should flooding occur, are not considered significant when compared to the impact of a tidal flood event.
- 18.8.78 The landside development within the defined Site Boundary during the operation phase comprises “essential infrastructure” (assessed as a receptor of very high importance) whilst the marine side development comprises development classed as “water compatible” (assessed in **Table 18-3** as a receptor of “low importance”).
- 18.8.79 Existing development on neighbouring sites comprises mixed use development, including commercial, residential, industrial/warehouse uses, and tanked bulk storage uses with hazardous substance consents etc., assessed as receptors of low importance to very high importance (based on the PPG (Ref 18-14) development vulnerability classifications outlined in **Table 18-11**).

- 18.8.80 Compensatory storage for the loss of floodplain behind tidal flood defences is not required given the residual risk and the extensive nature of flooding should overtopping or a breach of the flood defences occur. It is unlikely, given the extent and depth of flooding along the South Humber Bank should a breach occur, that the Project would increase the risk of flooding off-site to surrounding land as these areas are likely to be flooded to a similar depth as the Site. Both the Site and the surrounding area are predominantly located in the hazard category 'Danger for All' and this is unlikely to change with the Project in-situ. Given the extensive nature of the residual tidal flood risk extent, any increase in flood water level is likely to be insignificant, therefore the magnitude of change is considered negligible.
- 18.8.81 In the absence of mitigation, floodplain inundation from tidal flooding has been assessed to have a **minor adverse** effect on the development on-site, during the Project's operation phase and a **minor adverse** effect on the existing off-site receptors (based on the highest importance receptors – essential infrastructure (very high importance)), during the Project's operational lifetime.
- 18.8.82 Appropriate mitigation measures are therefore required to be implemented at the Site to mitigate this risk. Mitigation embedded in the development design (**See Section 18.7**), site operation and shutdown procedures, elevating critical plant equipment above the breach flood water level, and Flood Emergency Response Plans allow the development to remain safe should a flood event occur. These are described further in the FRA (**Appendix 18.A [TR030008/APP/6.4]**) and above in **Section 18.7**.
- 18.8.83 Following implementation of mitigation measures, the residual effect would remain a **minor adverse** effect for development both on-site and off-site, and therefore not significant.

Changes to flow regimes and/or water levels

- 18.8.84 As a consequence of climate change an increase in rainfall intensity will increase surface water runoff rates and volumes from impermeable surfaces on site. There is a potential for an increased risk of flooding from fluvial, surface water sources if provision for surface water management is not put in place. In addition, changes in existing flood flow routes due to the presence of the built development also has the potential to exacerbate the risk of flooding from fluvial and surface water sources.
- 18.8.85 Mapping of fluvial flood extents presented in the NELC PFRA (Ref 18-36) indicates that for flood risk from fluvial sources the Site is located in Flood Zone 1 and therefore at 'low' risk of fluvial flooding. Modelled water levels for North Beck Drain provided by the Environment Agency (See **Section 18.5**) indicate that flood water levels for the 0.5% AEP plus climate change flood event stay within the channel and does not impact the Site.
- 18.8.86 RoFSW mapping used as a proxy for flood risk from ordinary watercourses shows that the risk of flooding from Habrough Marsh Drain, Immingham Pump Drain and the land drainage system is also low, however the Site is at residual risk of flooding should the local watercourses become tide-locked for an extended period of time.

- 18.8.87 As part of the Drainage Strategy (appended at **Appendix 18.B [TR030008/APP/6.4]**) design ground levels within the East Site (would be raised during construction by 0.3m (**Work No. 5**) and 0.6m (**Work No. 3**) respectively, giving finished ground levels of approximately 3.8m AOD and 3.6m AOD. In addition, the West Site (**Work No. 7**) would be raised by approximately 1 m, giving a final ground level of approximately 2.5m AOD. During a future flooding scenario resulting from climate change the Site would remain at 'low' risk of fluvial flooding.
- 18.8.88 As the Site is located within Flood Zone 1 and the areas where ground raising is proposed in the East and West Sites are not at risk of flooding from fluvial sources, the Project would not result in a loss of fluvial floodplain storage. There is also limited potential for alterations to fluvial flood mechanisms and fluvial flood flow routes both on and off-site.
- 18.8.89 With the absence of mitigation, given the potential for fluvial flood risk to increase from North Beck Drain, Habrough Marsh Drain, Immingham Pump Drain (receptors of high importance), and the local land drains (receptors of medium importance) the magnitude of change is considered to be moderate adverse, therefore the significance of effect is assessed, in the absence of mitigation, as **moderate adverse** and therefore significant.
- 18.8.90 The Project would include a surface water drainage network able to accommodate up to and including the 1% AEP plus 40% climate change event with no surface water flooding. A combination of permeable gravel beds and retention basins would be used on the East and West Sites to manage surface water runoff. Retention basins would provide temporary attenuation before flows are restricted to 70% of the existing discharge rates for all storm events from the East Site and greenfield runoff rates from the West Site (as agreed with the NELIDB) and discharged to the surrounding land drains via new discharge outfalls. The West Site drains to the Immingham Pump Drain via the drainage ditch to the south and the East Site drains via two separate discharges, one to a drain that flows south to North Beck Drain and the second to the drainage ditch to the east that ultimately discharges into North Beck Drain. Permeable gravel beds would provide an element of attenuation storage in addition to suitable water quality management for areas at low risk of contamination. Areas at high risk of contamination are located within bunded areas within the Site. Further details of the proposed approach can be found in **Appendix 18.B Drainage Strategy (TR030008/APP/6.4)**.
- 18.8.91 With mitigation in place the magnitude of change is considered to be negligible resulting in a **minor beneficial** effect which is not significant.
- Changes to surface water runoff rates and volumes**
- 18.8.92 Impermeable surfacing across the Site would increase as a consequence of the Project therefore it is likely that the rates of surface water run-off would increase above those of the baseline scenario.

- 18.8.93 An increase in rainfall intensity by 40%, in line with Environment Agency climate change guidance (Ref 18-34) would occur over the operation of the Project (assessed to be 75 years). As a consequence of climate change surface water runoff rates and volumes from impermeable surfaces on site would increase with potential for the increased risk of flooding from fluvial, surface water and drainage infrastructure sources if provision for surface water management is not put in place.
- 18.8.94 Given the potential for increased surface water run-off over the operational lifetime of the Project and the potential for increased fluvial flood risk from Habrough Marsh Drain, Immingham Pump Drain (receptors of high importance), and the local land drains (receptors of medium importance) the magnitude of change is considered to be moderate, therefore significance of effect is assessed, in the absence of mitigation, to be **moderate adverse** and therefore significant.
- 18.1.2 However, a **Drainage Strategy (Appendix 18.B [TR030008/APP/6.4])**. has been prepared for the Project which includes the use of SuDS, site discharge rates restricted to 70% of the existing run-off rate from the East Site and greenfield runoff rates from the West Site, and surface water management/exceedance flows. A combination of permeable gravel beds and retention basins would be used on the East and West Sites to manage surface water runoff up to and including the 1% AEP plus 40% climate change event.
- 18.8.95 The West Site drains to the Immingham Pump Drain via the drainage ditch to the south and the East Site drains via two separate discharges, one to a drain that flows south to North Beck Drain and the second to the drainage ditch to the east that ultimately discharges into North Beck Drain. The implementation of this strategy would result in surface water from the Project being carefully managed, treated, and directed to the land drainage ditches at controlled rates.
- 18.8.96 Given the management of surface water runoff from the development there would likely be a reduction in the surface water run-off to the surrounding watercourses and land drainage ditches and therefore fluvial flood risk in comparison to existing conditions. It is therefore considered that the Project would have a minor beneficial magnitude of change, resulting in a **minor beneficial** effect which is not significant.

Changes in Tidal Regime

- 18.8.97 The marine development and associated maintenance dredging would change seabed levels and, in addition to the predicted increases in wave height and peak water levels associated with climate change, has the potential to change the rates of erosion and/ or accretion on the foreshore in proximity to the flood defences over the operation of the Project.
- 18.8.98 Impacts relating to the marine development and changes to the tidal regime for the operational phase are discussed in detail within **Chapter 16: Physical Processes [TR030008/APP/6.2]**.

- 18.8.99 There is potential for the current hydrodynamic processes to change over the operation of the Project. It is possible that flow speeds and wave heights may decrease in the area between the berth pocket and the Project frontage as well as along the wider Port of Immingham frontage. Any change is, however, predicted to be negligible and unlikely to affect the integrity of the flood defences in these areas. It is unlikely that changes to tidal water levels and the rates of erosion or accretion on the foreshore (above natural variations) both on-site (along the frontage of the Project) and off-site (along the frontage of the wider Port of Immingham) would increase above that which would currently occur when climate change is taken into account.
- 18.8.100 Mitigation measures are outlined in **Chapter 16: Physical Processes [TR030008/APP/6.2]** and no mitigation measures specific to flood risk are required.
- 18.8.101 The magnitude of change for changes in tidal regime is considered to be negligible and therefore the significance of effect for the flood defences (very high importance) is considered to be a minor adverse effect and not significant. The significance of effect on the Habrough Marsh Drain (high importance), in terms of accretion/erosion rates impacting the drainage across the intertidal area is considered a minor adverse effect and not significant.

Exposure to floodwater

- 18.8.102 Given the location of the Project the risk of human receptors being exposed to flood water over the operation of the development remains. As with the construction phase, overtopping or a breach of the flood defences would represent a significant to extreme hazard at the Site during the operation phase, however, the likelihood of an overtopping or breach event occurring remains low. Should a breach or overtopping event occur the depth of tidal flooding, flood water velocity and flood hazard will increase both on the Site and across the surrounding area.
- 18.8.103 As receptors, site workers are considered as being of high importance (site workers with prior knowledge of the risks of flooding and what to do in the event of a flood as part of their site induction), as defined in **Table 18-11**, whilst site visitors (who are less aware of possible flood risks), as defined in **Table 18-11**, are considered to be receptors of very high importance.
- 18.8.104 The probability of a surge event, overtopping or a breach of the flood defences with a localised or regional effect is low, but the magnitude of change is considered to be a major impact on human health (site operatives, site visitors) and therefore a significance of effect of **large adverse** (site workers) and **very large adverse** (site visitors), a significant effect during the operational phase of the Project.
- 18.8.105 Proposed mitigation measures that would reduce this effect would include the development of a Flood Response Plan which would be adhered to. A site induction would also be given to all site operatives and workforce, including outlining evacuation routes, safe refuge, and access and egress areas. The operational Site would be registered with the Environment Agency Flood Warnings Direct Service. There will also be full closure of the Site and therefore no operatives/site visitors on site for the duration of a flood warning period.

18.8.106 Following implementation of these mitigation measures the impact would be reduced to negligible and the residual effect of exposure to floodwater on human receptors would be **minor adverse** and **not significant**.

Decommissioning

18.8.107 A qualitative assessment of the likely significant effects on surface water quality and flood risk receptors during decommissioning of the landside infrastructure has been undertaken. With the implementation of standard mitigation measures, which would mirror those that would be implemented during the construction phase and would be contained in the **Outline DEMP [TR030008/APP/6.6]**, effects on the water environment are expected to be similar to the construction phase, with the exception of changes to tidal regime effects on flood defences and Habrough Marsh Drain which would remain similar to the operational phase, and would not be significant. Similarly, significant flood risk effects are not anticipated as standard flood risk mitigation measures would be effectively implemented.

18.9 Additional Mitigation

18.9.1 No significant adverse effects are predicted in **Section 18.8** and there is no need to apply additional mitigation to reduce the effects.

18.10 Residual Effects

18.10.1 Given that no additional mitigation is applied, the residual effects remain the same as reported in **Section 18.8**, in each case.

18.11 Summary of Assessment

18.11.1 **Table 18-12** provides a summary of the likely significant effects of the Project on water quality, coastal protection, flood risk and drainage assets, taking into account the embedded mitigation measures detailed in **Section 18.7**. The table confirms that the residual effects would be negligible or minor adverse and would be not significant.

Table 18-12: Summary of Impacts, Mitigation Measures and Residual Effects during the Construction Phase

Receptor (Importance)	Impact Pathway	Effect (Unmitigated)	Mitigation Measure	Effect/Residual Effect	Confidence
North Beck, Habrough Marsh drain and local drains (Water quality/ Water flow – Medium)	Direct spillage: Contamination from suspended solids or other chemical contaminants that may find their way into site runoff, infiltrate to ground, or be spilt directly into waterbodies when there are works within or adjacent to them.	Moderate/Major adverse	Bunded operations and spill kits to be used on Site (As specified in Table 3.16 of the outline CEMP [TR030008/APP/6.5]).	Negligible/Minor adverse (Not Significant)	High
	Runoff contamination: The effects of diffuse urban pollutants in surface water runoff (that may contain metals, hydrocarbons, and inert solids etc.).	Minor/Moderate adverse	Bunded operations for all chemicals and fuels needed on Site (to be specified in the CEMP).	Negligible/Minor adverse (Not Significant)	High
	Alteration in fluvial and overland flow paths, and potential increase in flood risk, as a result of storing construction materials in the floodplain	Minor/Moderate adverse	Areas for storage of construction materials to be carefully considered (to be specified in the CEMP).	Negligible/Minor adverse (Not Significant)	High
	Increased risk of blockage of drains as a result of increased material (sands, gravels etc.) transported in runoff from Site.	Minor/Moderate adverse	Surface water runoff to be managed on site (to be specified in CEMP).	Negligible/Minor adverse (Not Significant)	High
Coastal and floodplain grazing marsh and good quality semi-improved grassland (Water quality – Low)	Direct spillage: Contamination from suspended solids or other chemical contaminants that may find their way into site runoff, infiltrate to ground, or be spilt directly into non-priority habitat when there are works within or adjacent to them.	Negligible/Minor adverse	Bunded operations and spill kits to be used on Site (to be specified in the CEMP).	Negligible (Not Significant)	High

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Receptor (Importance)	Impact Pathway	Effect (Unmitigated)	Mitigation Measure	Effect/Residual Effect	Confidence
	Runoff contamination: The effects of diffuse urban pollutants in surface water runoff (that may contain metals, hydrocarbons, and inert solids etc.).	Negligible/Minor adverse	Bunded operations for all chemicals and fuels needed on Site (to be specified in the CEMP).	Negligible (Not Significant)	High
Existing Development on-site (Very High)	Floodplain inundation from tidal flooding due to a breach/overtopping event, alteration in fluvial and overland flow paths, and potential increase in flood risk, as a result of storing construction materials in the floodplain	Minor adverse	Areas for storage of construction materials to be carefully considered (to be specified in the CEMP). Flood resilience and resistant measures embedded in design. Overland flow paths maintained and temporary drainage to control surface water discharge.	Minor adverse (Not Significant)	High
Existing Development off-site (Very High)	Floodplain inundation from tidal flooding due to a breach/overtopping event, alteration in fluvial and overland flow paths, and potential increase in flood risk to the surrounding areas, as a result of storing construction materials in the floodplain	Minor adverse	Areas for storage of construction materials to be carefully considered (to be specified in the CEMP). Overland flow paths maintained and temporary drainage to control surface water discharge.	Minor adverse (Not Significant)	High
North Beck Drain (High)	Increase in risk of fluvial/surface water flooding due to changes in surface water	Moderate Adverse	Temporary drainage facilities (swales etc)	Minor Adverse (Not Significant)	High

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Receptor (Importance)		Impact Pathway	Effect (Unmitigated)	Mitigation Measure	Effect/Residual Effect	Confidence
Surface Waterbodies	Habrough Marsh Drain (High)	runoff rates/volumes due to compaction of soil, increases in impermeable area, disruption/alteration of existing surface water flow paths, works/structures within watercourses.		provided during the construction phase to control discharge of surface water run-off.		
	Imminhgam Pump Drain (High)					
	Local land drainage ditches (Medium)				Negligible (Not Significant)	
Flood Defences (Very High)		Potential changes in tidal regime including wave height, water velocities and erosion/accretion rates.	Minor Adverse	None required beyond those outlined in Chapter 16: Physical Processes [TR030008/APP/6.2] and the ongoing inspection and maintenance programme undertaken by the Environment Agency.	Minor Adverse (Not Significant)	High
Habrough Marsh Drain (High)		Potential changes in tidal regime including wave erosion/accretion rates resulting in siltation of the Habrough Marsh Drain outfall, increasing fluvial flood risk	Minor Adverse	None required beyond those outlined in Chapter 16: Physical Processes [TR030008/APP/6.2] .	Minor Adverse (Not Significant)	High

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Receptor (Importance)	Impact Pathway	Effect (Unmitigated)	Mitigation Measure	Effect/Residual Effect	Confidence
Human Health Construction workers and operatives (High)	Exposure to floodwater via flooding from predominantly tidal sources e.g. overtopping, such as surge events or breach of defences	Large adverse.	Construction works would be carried out in accordance with the CEMP, including the Flood Response Plan. Site induction, including evacuation routes, safe refuge, access, and egress. Site will be registered with the Environment Agency Flood Warnings Direct Service. No visitors or access during periods of inclement weather. No work onsite during a flood warning period	Minor Adverse (Not Significant)	High
Human Health Site Visitors (Very High)		Very Large Adverse		Minor Adverse (Not Significant)	High

Table 18-13: Summary of Impacts, Mitigation Measures and Residual Effects during the Operational Phase

Receptor (Importance)	Impact Pathway	Effect (Unmitigated)	Mitigation Measure	Effect/Residual Effect	Confidence
North Beck, Habrough Marsh drain and local drains (Water quality/ Water flow – Medium)	Potential operational pollution of surface watercourses from accidental spillages.	Minor/Moderate adverse	Containment areas and Bunded operations and spill kits to be used on Site.	Negligible/Minor adverse (Not Significant)	High
	Potential run off of hazardous firefighting	Major adverse	Containment areas and Bunded operational area	Negligible/Minor adverse	High

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Receptor (Importance)	Impact Pathway	Effect (Unmitigated)	Mitigation Measure	Effect/Residual Effect	Confidence
	chemicals to surface water course		with spill kits to be used and treatment/removal of liquids	(Not Significant)	
Coastal and floodplain grazing marsh and good quality semi-improved grassland (Water quality – Low)	Potential operational pollution of surface watercourses from accidental spillages.	Negligible/ Minor adverse	Containment areas and Bunded operations and spill kits to be used on Site.	Negligible (Not Significant)	High
Existing Development on-site (Very High)	Floodplain inundation from tidal flooding due to a breach/overtopping event, alteration in fluvial and overland flow paths, and potential increase in flood risk	Minor adverse	Embedded mitigation in the development design site operation and shutdown procedures, elevating critical plant equipment above the breach flood water level, and Flood Emergency Response Plans allow the development to remain safe should a flood event occur. Provision of a drainage strategy to manage surface water run-off and retain surface water within the Project boundary.	Minor adverse (Not Significant)	High

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Receptor (Importance)		Impact Pathway	Effect (Unmitigated)	Mitigation Measure	Effect/Residual Effect	Confidence
Existing Development off-site (Very High)		Floodplain inundation from tidal flooding, alteration in tidal and fluvial overland flow paths, and potential increase in flood risk to the surrounding areas, as a result of land raising in the West and East Sites.	Minor adverse	Site/surrounding area registered with the Environment Agency Flood Warnings Direct Service. Provision of a drainage strategy to manage surface water run-off up to and including the 1% AEP plus 40% climate change allowance. Surface water is stored and retained within the Project boundary.	Minor adverse (Not Significant)	High
Surface Waterbodies	North Beck Drain (High)	Increase in risk of fluvial/surface water flooding due to changes in surface water runoff rates/volumes due to increases in impermeable area, disruption/alteration of existing surface water flow paths,	Moderate adverse	Site/surrounding area registered with the Environment Agency Flood Warnings Direct Service. Provision of a drainage strategy to manage surface water run-off up to and including the 1% AEP plus 40% climate change allowance. Surface water is stored and retained within the Project boundary.	Minor beneficial (Not Significant)	High
	Habrough Marsh Drain (High)					
	Immingham Pump Drain (High)					

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Receptor (Importance)		Impact Pathway	Effect (Unmitigated)	Mitigation Measure	Effect/Residual Effect	Confidence
	Local land drainage ditches (Medium)					
	North Beck Drain (High)	Increase in risk of surface water flooding due to changes in surface water runoff rates/volumes due to increases in impermeable area, disruption/alteration of existing surface water flow paths,	Moderate adverse	Provision of a drainage strategy to manage surface water run-off up to and including the 1% AEP plus 40% climate change allowance. Surface water is stored and retained within the Project boundary.	Minor beneficial (Not Significant)	High
	Habrough Marsh Drain (High)					
	Immingham Pump Drain (High)					
	Local land drainage ditches (Medium)					
Flood Defences (Very High)		Potential changes in tidal regime including wave height, water velocities and erosion/accretion rates	Minor Adverse	None Required	Minor adverse (Not Significant)	High

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Receptor (Importance)	Impact Pathway	Effect (Unmitigated)	Mitigation Measure	Effect/Residual Effect	Confidence
Habrough Marsh Drain (High)	Potential changes in tidal regime including wave erosion/accretion rates resulting in siltation of the Habrough Marsh Drain outfall, increasing fluvial flood risk	Minor Adverse	None required beyond those outlined in Chapter 16: Physical Processes [TR030008/APP/6.2] .	Minor adverse (Not Significant)	High
Human Health Site operatives and future workforce	Exposure to floodwater via flooding from predominantly tidal sources e.g. overtopping, such as surge events or breach of defences	Large adverse.	Flood Response Plan. Site induction, including evacuation routes, safe refuge, access, and egress. Site registered with the Environment Agency Flood Warnings Direct Service. No work or visitors onsite during a flood warning period.	Minor adverse (Not Significant)	High
Human Health Site Visitors (Very High)	Exposure to floodwater via flooding from predominantly tidal sources e.g. overtopping, such as surge events or breach of defences	Very Large adverse.	Flood Response Plan. Site induction, including evacuation routes, safe refuge, access, and egress. Site registered with the Environment Agency Flood Warnings Direct Service. No work or visitors onsite during a flood warning period.	Minor adverse (Not Significant)	High

Table 18-14: Summary of Potential Impacts, Mitigation Measures and Residual Effects during Decommissioning

Receptor (Importance)	Impact Pathway	Effect (Unmitigated)	Mitigation Measure	Effect/Residual Effect	Confidence
North Beck, Habrough Marsh drain and local drains (Water quality/ Water flow – Medium)	Direct spillage: Contamination from suspended solids or other chemical contaminants that may find their way into site runoff, infiltrate to ground, or be spilt directly into waterbodies when there are works within or adjacent to them.	Moderate/Major adverse	Bunded operations and spill kits to be used on Site (to be specified in the DEMP).	Negligible/Minor adverse (Not Significant)	High
	Runoff contamination: The effects of diffuse urban pollutants in surface water runoff (that may contain metals, hydrocarbons, and inert solids etc.).	Minor/Moderate adverse	Bunded operations for all chemicals and fuels needed on Site (to be specified in the DEMP).	Negligible/Minor adverse (Not Significant)	High
Coastal and floodplain grazing marsh and good quality semi-improved grassland (Water quality – Low)	Direct spillage: Contamination from suspended solids or other chemical contaminants that may find their way into site runoff, infiltrate to ground, or be spilt directly into non-priority habitat when there are works within or adjacent to them.	Negligible/Minor adverse	Bunded operations and spill kits to be used on Site (to be specified in the DEMP).	Negligible (Not Significant)	High
	Runoff contamination: The effects of diffuse urban pollutants in surface water	Negligible/Minor adverse	Bunded operations and spill kits to be used on Site (to be	Negligible (Not Significant)	High

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Receptor (Importance)	Impact Pathway	Effect (Unmitigated)	Mitigation Measure	Effect/Residual Effect	Confidence
	runoff (that may contain metals, hydrocarbons, and inert solids etc.).		specified in the DEMP).		
Existing Development on-site (Very High)	Floodplain inundation from tidal flooding due to a breach/overtopping event, alteration in fluvial and overland flow paths, and potential increase in flood risk, as a result of storing materials in the floodplain	Minor adverse	Areas for storage of materials to be carefully considered (to be specified in the DEMP). Overland flow paths maintained and surface water drainage system to remain in-situ.	Minor adverse (Not Significant)	High
Existing Development off-site (Very High)	Floodplain inundation from tidal flooding due to a breach/overtopping event, alteration in fluvial and overland flow paths, and potential increase in flood risk to the surrounding areas, as a result of storing materials in the floodplain	Minor adverse	Areas for storage of materials to be carefully considered (to be specified in the DEMP). Overland flow paths maintained and surface water drainage system to remain in-situ.	Minor adverse (Not Significant)	High
Surface Waterbodies:		Moderate Adverse		Minor adverse (Not Significant)	High

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Receptor (Importance)	Impact Pathway	Effect (Unmitigated)	Mitigation Measure	Effect/Residual Effect	Confidence
North Beck Drain (High)	Increase in risk of fluvial/surface water flooding due disruption/alteration of existing surface water flow paths, works/structures within watercourses.		Overland flow paths maintained and surface water drainage system to remain in-situ.		
Habrough Marsh Drain (High)					
Immingham Pump Drain (High)					
Local land drainage ditches (Medium)				Negligible (Not Significant)	
Flood Defences (Very High)	Potential changes in tidal regime including wave height, water velocities and erosion/accretion rates.	Minor Adverse	None required beyond the ongoing inspection and maintenance programme undertaken by the Environment Agency	Minor adverse (Not significant)	High
Habrough Marsh Drain (High)	Potential changes in tidal regime including wave erosion/accretion rates resulting in siltation of the Habrough Marsh Drain outfall, increasing fluvial flood risk	Minor Adverse	None required beyond those outlined in Chapter 16: Physical Processes [TR030008/APP/6.2] .	Minor adverse (Not Significant)	High

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Receptor (Importance)	Impact Pathway	Effect (Unmitigated)	Mitigation Measure	Effect/Residual Effect	Confidence
Human Health Construction workers and operatives (High)	Exposure to floodwater via flooding from predominantly tidal sources e.g. overtopping, such as surge events or breach of defences	Large adverse.	Construction works would be carried out in accordance with the DEMP, including the Flood Response Plan. Site induction, including evacuation routes, safe refuge, access, and egress.	Minor adverse (Not Significant)	High
Human Health Site Visitors (Very High)	Exposure to floodwater via flooding from predominantly tidal sources e.g. overtopping, such as surge events or breach of defences	Very Large Adverse	Site will remain registered with the Environment Agency Flood Warnings Direct Service. No visitors or access during periods of inclement weather. No work onsite during a flood warning period	Minor adverse (Not Significant)	High

18.12 References

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