



# **LIGHTHOUSE GREEN FUELS PROJECT**

## **Preliminary Environmental Information Report**

### **Chapter 9: Water Environment and Flood Risk**

The Inspectorate Reference: EN010150

**May 2024**

Volume 1



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## 9. WATER ENVIRONMENT AND FLOOD RISK

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### 9.1. INTRODUCTION

- 9.1.1. This Chapter considers the potential for significant impacts to the Water Environment and Flood Risk during the construction, operational and decommissioning phases of the Proposed Scheme. It sets out the proposed methodology for the Water Environment and Flood Risk assessment. All potential receptors within the Study Area that have been identified through desktop investigations and site walkovers will be considered in the assessment. The receptors include surface water features (main rivers, ordinary watercourses, other surface water bodies such as ponds, and abstractions), groundwater waterbodies (aquifers, source protection zones (SPZ), and abstractions), and flood risk (to the Site and elsewhere associated with tidal, fluvial, surface water, and other sources).
- 9.1.2. This Chapter should be read in conjunction with the following Chapters:
- **Chapter 7: Terrestrial Ecology (Volume 1);**
  - **Chapter 8: Freshwater and Marine Ecology (Volume 1);**
  - **Chapter 12: Climate Change Resilience (Volume 1);** and
  - **Chapter 19: Cumulative Effects (Volume 1).**
- 9.1.3. This Chapter will assess the potential impacts to the quality and flow of surface water and groundwater resources (including flows that support wetlands or Groundwater Dependent Terrestrial Ecosystems (GWDTEs)) but will not assess impacts to terrestrial and aquatic ecology, including wetlands and other aquatic habitats. These aspects will be discussed in **Chapter 8: Freshwater and Marine Ecology (Volume 1)**.
- 9.1.4. This should also be read in conjunction with **Appendix 9A: Water Framework Directive Screening and Scoping Assessment (Volume 3)**.

#### MATTERS SCOPED OUT

- 9.1.5. This Chapter will assess the effects of the quality and quantity of groundwater resources associated with surface borne pollutants (such as surface water runoff and spillages). The risk to the quality, quantity and flow of groundwater resources (controlled waters) associated with other aspects such as contaminated land are assessed in Chapter 17 Geology and Soils of the Environmental Impact Assessment (EIA) Scoping Report<sup>1</sup>. These risks have been scoped out at Environmental Statement (ES) stage on the basis that further ground investigation and risk assessment is inherent to progression of the Proposed Scheme such as via a DCO requirement alongside detailed design.

### 9.2. POLICY, LEGISLATION, AND GUIDANCE

- 9.2.1. The policy, legislation and guidance relevant to the assessment of the Water Environment and Flood Risk for the Proposed Scheme is detailed in **Appendix 4A: Policy, Legislation and Guidance (Volume 3)**. The policy, legislation and guidance relevant to this Chapter is set out below.

- Policy:
  - Overarching National Policy Statement (NPS) for Energy EN-1 (2023)<sup>2</sup>;
  - NPS for Natural Gas Electricity Generating Infrastructure EN-2 (2023)<sup>3</sup>;
  - NPS for Electricity Networks Infrastructure EN-5 (2023)<sup>4</sup>;
  - National Planning Policy Framework (NPPF) (2023)<sup>5</sup>;
  - Stockton-on-Tees Local Flood Risk Management Strategy (2016)<sup>6</sup>;
  - Stockton-on-Tees Borough Council (STBC) Local Plan (2019)<sup>7</sup>;
  - Middlesbrough Local Flood Risk Management Strategy (2016)<sup>8</sup>;
  - Middlesbrough Local Development Framework: Core Strategy (2008)<sup>9</sup>;
  - Middlesbrough Council Draft Local Plan (2024)<sup>10</sup>;
  - Redcar and Cleveland Local Plan 2018<sup>11</sup>.
- Legislation:
  - Flood and Water Management Act (2010)<sup>12</sup>;
  - Flood Risk Regulations (2009)<sup>13</sup>;
  - Environmental Permitting (England and Wales) Regulations (2016, as amended)<sup>14</sup>;
  - Land Drainage Act (1991)<sup>15</sup>;
  - The Water Resources Act (1991)<sup>16</sup>;
  - The Environment Act (2021)<sup>17</sup>;
  - The Water Environment (Water Framework Directive) (England and Wales) Regulations (2017)<sup>18</sup>;
  - The Water Industry Act (1991)<sup>19</sup>;
  - The Water Act (2003)<sup>20</sup>;
  - The Water Act (2014)<sup>21</sup>;
  - The Groundwater (Water Framework Directive) (England) Direction (2016)<sup>22</sup>.
- Guidance:
  - Planning Practice Guidance (2014, as amended)<sup>23</sup>;
  - Environment Agency’s (EA) Climate Change Allowance Guidance (2022)<sup>24</sup>;
  - Environment Agency’s (EA) Approach to Groundwater Protection (2018)<sup>25</sup>;
  - Guidance for Pollution Prevention (GPP)<sup>26</sup>;
  - Planning Inspectorate Guidance Note 18: Water Framework Directive (2017)<sup>27</sup>;
  - Clearing the Waters for All (2016)<sup>28</sup>;
  - STBC Level 1 Strategic Flood Risk Assessment (2018)<sup>29</sup>;
  - STBC Level 2 Strategic Flood Risk Assessment (2018)<sup>30</sup>;
  - Middlesbrough Borough Council Level 1 Strategic Flood Risk Assessment (2018)<sup>31</sup>;

- Non-Statutory Technical Standards for Sustainable Drainage Systems (2015)<sup>32</sup>;
- Tees Valley Authorities Sustainable Drainage Systems (SuDS) Guidance (2019)<sup>33</sup>;
- STBC Preliminary Flood Risk Assessment (2011)<sup>34</sup>;
- Design Manual for Road and Bridges (DMRB) LA113 Road Drainage and the Water Environment (2019, as amended)<sup>35</sup>;
- CIRIA C753 The SuDS Manual (2015)<sup>36</sup>;
- CIRIA 532 Control of Water Pollution from Construction Sites (2001)<sup>37</sup>; and
- Natural England Water Quality and Nutrient Neutrality Advice (NE785) (2022)<sup>38</sup>.

### 9.3. SCOPING OPINION AND CONSULTATION

- 9.3.1. The Applicant received an EIA Scoping Opinion<sup>39</sup> from the Planning Inspectorate (on behalf of the Secretary of State) on the 01 September 2023, including formal responses from statutory consultees. The comments from the Planning Inspectorate and other statutory consultees with relevance to the Water Environment are summarised in **Table 9-1** below.

**Table 9-1: Overview of the EIA Scoping Opinion with relevance to the Water Environment**

| ID    | Description     | Scoping Opinion Comments   | Response   |
|-------|-----------------|--|--|
| 3.5.2 | Decommissioning | <p><i>“It is stated that potential impacts during decommissioning are considered to be the same as during the Construction Phase. The basis for this assumption is unclear considering decommissioning is proposed to take place up to 30 years in the future. The ES should assess the potential for effects on the water environment based on future scenarios which consider climate changes or provide justification as to why decommissioning impacts would be the same as during construction when considering the baseline environment.”</i></p>  | <p>At this stage, decommissioning is assumed to consist of the removal of all above ground infrastructure and retention of below ground elements (as described in <b>Chapter 2: Site and the Proposed Scheme (Volume 1)</b>). An Outline Decommissioning Plan will be prepared and submitted alongside the application for development consent. For the purposes of this PEIR, review of expected activities indicates that these impacts are likely to be equivalent or less than those identified in the Construction Phase.</p>   |
| 3.5.3 | Methodology     | <p><i>“A qualitative assessment of potential impacts to surface water and groundwater receptors is proposed which is stated to “broadly follow” the Design Manual for Road and Bridges (DMRB) guidance. It is stated that no water quality sampling is proposed at this time. Considering the methodology set out within the DMRB guidance (specifically DMRB Volume 11 Section 3 Part 10 (LA113)) is aimed at road schemes (as noted in Paragraph 9.4.1 of the Scoping Report<sup>1</sup>), the ES should justify the suitability of this methodology or identify another methodology. The Applicant should seek to agree the methodology with relevant consultees.</i></p> <p><i>Impacts to water quality from pollution incidents are highlighted as potential impacts for both the Construction and Operation Phases (as stated in</i></p> | <p>The Applicant acknowledges that DMRB guidance is not directly applicable to the nature of the Proposed Scheme. However, it provides a good general basis for assessing the effects of schemes on the water environment and is used widely in the EIA process across different sectors. The methodology will be adapted as appropriate to better reflect the specifics of the Proposed Scheme.</p> <p>A Code of Construction Practice (CoCP) will be prepared by the appointed contractor. Application of the provisions included in the CoCP will ensure that appropriate pollution control procedures are implemented during the Construction Phase to manage impacts on the wider</p> |

| ID | Description | Scoping Opinion Comments  | Response  |
|----|-------------|---|---|
|    |             | <p><i>paragraphs 9.8.1 and 9.8.2 and Table 9-7[of the Scoping Report<sup>1</sup>]). The ES should justify the approach used and ensure that the baseline is sufficiently robust to allow the assessment of significant effects to be undertaken.”</i></p> | <p>environment, including surface water and groundwater resources. This will include measures to monitor the success of these procedures. It is expected that the CoCP will be informed by consultation with the relevant authorities (including the EA).</p> <p>An Outline Drainage Strategy will be prepared for the Proposed Scheme and submitted with the application for development consent. The drainage strategy will incorporate appropriate pollution control measures to manage potential impacts on the water environment during the Operational Phase of the Proposed Scheme. This will include procedures to monitor and respond to pollution risks. The drainage strategy will be informed by consultation with the relevant authorities (including the EA).</p> <p>Baseline monitoring of water quality is not currently proposed as the Proposed Scheme will incorporate systems to manage risk as described above. Given the existing use of the Site and surrounding land uses, monitoring of baseline water quality within receiving waterbodies may not provide significant value compared to procedures to manage risk within the Site itself.</p> <p>The approach to the proposed assessment will be discussed with the EA</p> |

| ID    | Description                 | Scoping Opinion Comments  | Response  |
|-------|-----------------------------|---|---|
|       |                             |   | <p>during consultation and presented in the ES.</p> <p>Available water quality monitoring data was requested from the EA to inform the WFD assessment. This will be summarised in the WFD assessment and submitted to support DCO examination.</p>  |
| 3.5.4 | Construction Phase drainage | <p><i>“It is stated that the management of surface water flood risk during construction will not be discussed in the Flood Risk Assessment (FRA) or drainage strategy report but will instead form part of the Code of Construction Practice (CoCP). The Inspectorate is broadly content with this approach however the ES should describe the specific measures in place to reduce the likelihood of impacts from surface water flooding during construction, cross-referencing to other documents where appropriate.”</i></p> | <p>Mitigation measures to reduce the surface water flooding during the construction phase will be described in the ES and OCoCP, which will be submitted with the application for development consent. The appointed contractor will describe more detailed measures within the full CoCP that will be based upon the measures described within the ES and OCoCP. It is assumed that this will form a Requirement of the DCO and be developed in consultation with the relevant authorities. Typical pollution control measures that are expected to be included in this the ES and OCoCP, but are not limited to, are described this PEIR and further detail will be proved within the ES.</p> |
| 3.5.5 | Wastewater treatment        | <p><i>“The EA highlights in its response (Appendix 2 of this Opinion) that the flows of trade effluent to Bran Sands Wastewater Treatment Plant (WWTP) are subject to agreement with Northumbrian Water. Should the use of Bran Sands WWTP not be agreed the ES should include an assessment</i></p>  | <p>The Applicant is in consultation with Northumbrian Water. The outcome from this consultation will be reported in the ES. If discharge to the Wastewater Treatment Plant (WWTP) cannot be made, the assessment will be revised accordingly. At this stage the alternative approach is</p>   |

| ID  | Description                                | Scoping Opinion Comments  | Response  |
|---|--|---|---|
|   |  | <i>of any alternative arrangement for the effluent discharge and assess the associated impacts.”</i>  | expected to comprise the transport of trade effluent to an alternative WWTP. The assessment of effects from the proposed discharge to Bran Sands WWTP is presented in <b>Section 9.8</b> of this Chapter.   |
| EA Scoping Response reference NA/2023/116392/01-L01 | Chapter 9 Water Environment and Flood Risk | <p><i>“Flood Risk Assessment<br/>Parts of the proposed scheme are located within the flood zones 2 and 3, which is at high risk of flooding. This includes the proposed heavy haul road, pipeline corridor, conveyor corridor, bulk liquid storage areas, jetties and rail terminal. We therefore welcome the provision of Flood Risk Assessment (FRA) as part of the DCO submission.<br/>The FRA must assess flood risk from all sources of flooding and identify the mitigation measures that will be implemented to ensure a safe development for the design flood event (1 in 200 year including climate change). It must also demonstrate that flood risk will not be increased elsewhere. As the proposed scheme is at risk from tidal flooding, sea level allowances will need to be applied to the 1 in 200-year level for the 75 years of the development using both higher central and upper end allowances.”</i></p> | The FRA will assess the risk of flooding from all sources of flooding and will identify appropriate mitigation measures. The FRA will support the ES and be submitted for DCO examination. Consultation with the EA will be ongoing throughout the assessment. This includes seeking agreement of the appropriate climate change allowances and design life most applicable to the Proposed Scheme. |
| EA Scoping Response reference NA/2023/116392/01-L01 | Chapter 9 Water Environment and Flood Risk | <p><i>“Flood risk vulnerability<br/>No information has been provided on the flood risk vulnerability classification within the Scoping Report<sup>1</sup>. Therefore, we are unable to advise on our policy position in relation to flood risk and the flood risk vulnerability. It should be noted that ‘highly vulnerable’ uses, requiring a Hazardous</i></p>  | The vulnerability classification of the Proposed Scheme will be assessed in accordance with Annex 4 of the NPPF and PPG ‘Flood Risk and Coastal Change’. It will consider a range of different types of activities/usage proposed within the  |

| ID  | Description                                | Scoping Opinion Comments   | Response  |
|---|--|--|---|
|   |  | <i>Substance Consent, would not be appropriate within flood zones 3. In accordance with Table 2 of the flood risk and coastal change section of the Planning Practice Guidance (PPG), 'highly vulnerable' developments are not appropriate in flood zone 3 and should not be permitted."</i>   | Proposed Scheme. The vulnerability classification will be subject of discussion with the EA and will cover the siting of the development and options to manage and mitigate the flood risk. The vulnerability of the Proposed Scheme to flood will be summarised in the FRA that will be submitted for DCO examination. |
| EA Scoping Response reference NA/2023/116392/01-L01 | Chapter 9 Water Environment and Flood Risk | <i>"Onsite Flood Risk Flood risk mitigation measures will need to ensure it can remain safe for its' lifetime. The applicant has stated their proposed operational lifespan of 30 years for the development. 30 years is less than the PPG of 75 years. We would therefore expect the FRA assesses the development for 75 years climate change for sea level rise."</i>            | The operational design life of the Proposed Scheme is 50 years. An assessment of the Proposed Scheme for 75 years with climate change is subject to ongoing consultation with the EA.   |
| EA Scoping Response reference NA/2023/116392/01-L01 | Chapter 9 Water Environment and Flood Risk | <i>"In 2013 there was significant flooding in Seal Sands due to a breach of flood defences. Lidar data suggests part of the proposed Lighthouse Green Fuels SAF Plant is 2m AOD. Although this area did not flood in 2013, this area needs assessing and where necessary mitigation measures put in place."</i>  | Information on this historical breach event at Seal Sands has been requested from the EA and will be included in the FRA that will be submitted within the application for development consent.   |
| EA Scoping Response reference NA/2023/116392/01-L01 | Chapter 9 Water Environment and Flood Risk | <i>"Offsite Flood Risk If ground raising is proposed and the existing ground levels are below the design flood event, an assessment will be required to confirm there is no increase in offsite flood risk. Given current topographical levels of the main site and if ground raising is significant and which is below the design flood event, then flood modelling should be</i> | Consultation with the EA on the required scope for hydraulic modelling is ongoing.  |

| ID  | Description                                      | Scoping Opinion Comments   | Response  |
|---|--|--|---|
|   |  | <i>undertaken. If the pipeline or heavy haul road involves any ground raising or is above ground and could impact local flood mechanisms, an assessment will be required to understand any increase in offsite flood risk and the provision of mitigation measures. This assessment may require the provision of hydraulic modelling.”</i>   |   |
| EA Scoping<br>Response reference<br>NA/2023/116392/01-<br>L01 | Chapter 9 Water<br>Environment and<br>Flood Risk | <i>“Flood Risk Mitigation<br/>Flood risk mitigations will need to be included within the development to ensure it can remain safe for its’ lifetime. This includes raising the finished floor levels above the design flood event plus a freeboard allowance of 600mm.”</i>  | The requirement has been noted and appropriate mitigation will be considered in the developing design of the Proposed Scheme. The recommended mitigation will be reported in the ES and supporting FRA. The EA will be consulted to inform the development of appropriate mitigation. |
| EA Scoping<br>Response reference<br>NA/2023/116392/01-<br>L01 | Chapter 9 Water<br>Environment and<br>Flood Risk | <i>“Flood Risk Sources<br/>The main source of potential flooding is from the tidal stretch of the River Tees, but there could be other local sources of flooding such as groundwater and surface water. We have published a suite of interactive maps that indicate where possible flooding from different sources could occur Check the long term flood risk for an area in England - GOV.UK (www.gov.uk). Our maps are not suitable for a detailed FRA, but they can indicate where further assessment may be needed.”</i> | The resource of the EA’s flood risk maps has been noted.  |
| EA Scoping<br>Response reference<br>NA/2023/116392/01-<br>L01 | Chapter 9 Water<br>Environment and<br>Flood Risk | <i>“In December 2013 large areas of Seal Sands were affected by flooding which resulted in a large scale multi-agency emergency response which included military support. Flooding did occur within the proposed DCO boundary. The made</i>  | Information on this historical breach event at Seal Sands has been requested from the EA and will be included in the FRA  |

| ID   | Description                                       | Scoping Opinion Comments   | Response  |
|--|---|--|---|
|  |   | <p><i>ground and raised ground within Seal Sands is of poor quality. Therefore, there could be risks of further breaches during future tidal events. It is noted some of the site does have ground levels which if a breach did occur could become rapidly inundated.”</i></p>   | <p>submitted with the application for development consent.<br/>The FRA will also include risks associated with breach in flood defence infrastructure.</p>  |
| <p>EA Scoping Response reference NA/2023/116392/01-L01</p> | <p>Chapter 9 Water Environment and Flood Risk</p> | <p><i>“Impact on EA flood defences<br/>There are a variety of permanent and demountable defences in this location. Below is a list of the defences:</i></p> <ul style="list-style-type: none"> <li><i>• Port Clarence Road Ramp</i></li> <li><i>• Port Clarence Embankment</i></li> <li><i>• Port Clarence Transporter Bridge Road Hump</i></li> <li><i>• Port Clarence Transporter Bungalow Floodwall</i></li> <li><i>• Port Clarence Transporter Bridge Road Floodwall</i></li> <li><i>• Port Clarence Wilton Works D/S Floodwall</i></li> <li><i>• Port Clarence Wilton Works Demountable Defence</i></li> <li><i>• Port Clarence Wilton Works Middle Floodwall</i></li> <li><i>• Port Clarence Wilton Works D/S Embankment</i></li> <li><i>• Port Clarence Wilton Works U/S Floodwall</i></li> <li><i>• Port Clarence Wilton Works U/S Embankment</i></li> <li><i>• Stobart's Slab</i></li> </ul> <p><i>The proposed heavy haul road may have an impact on existing EA flood defences, assets and our future schemes. Therefore, the impact of the DCO on our assets must be fully assessed. Further details are outlined below:<br/>Heavy haul road: We require the existing flood standard of protection, provided by the defences, to be maintained both during the construction of</i></p> | <p>Any works proposed within 16m of the existing flood defences or that could affect maintenance access during construction or operation will be assessed in the FRA. In accordance with the Environmental Permitting (England and Wales) Regulations 2016, appropriate environmental permits will be obtained as required prior to works commencing. It is assumed that these would be secured via protective provision or as Requirements to the DCO.</p> <p>Potential impacts of the Proposed Scheme on other EA assets, including those associated with the heavy haul road, rail terminal and Wilton Engineering Wharf, will be assessed as part of the ES and supporting FRA.</p> |

| ID | Description | Scoping Opinion Comments  | Response |
|----|-------------|---|----------|
|    |             | <p><i>the heavy haul road and after completion of the scheme.</i></p> <p><i>If the heavy haul road crosses our flood defence structure, the change in loading to our asset will need to be considered. The design must not impede access for routine maintenance and inspections of the flood defence structure.</i></p> <p><i>Where ground levels near a flood defence are to be disturbed on either a permanent or temporary basis, designs must not allow additional water to pond at the toe of the flood defence.</i></p> <p><i>In terms of construction, excavations near the footprint of a flood defence must remain a safe distance away from the toe of the defence to ensure stability of the defence, this is to be demonstrated in submitted designs.</i></p> <p><i>With regards to maintenance, repairs or future improvement works will be subject to an Environmental Permit if taking place within 16m of a flood defence. Details on the permit requirements are outlined further below.</i></p> <p><i>Rail terminal: The applicant must ensure that the proposed scheme will not negatively impact the Culvert, Sluice Gate and Trash Screen at the Railway embankment on the Holme Fleet.</i></p> <p><i>Works in and near Wilton Engineering Wharf: It's noted that the DCO boundary for the heavy haul road is located within the defences at the Wilton Engineering Wharf and to the East of the Transporter Bridge. The Scoping Report<sup>1</sup> makes reference to some works which maybe undertaken to provide additional structural</i></p> |          |

| ID   | Description                                       | Scoping Opinion Comments   | Response   |
|--|---|--|--|
|  |   | <p><i>integrity. A permit from the EA may be required for these works.”</i></p>  |  |
| <p>EA Scoping Response reference NA/2023/116392/01-L01</p> | <p>Chapter 9 Water Environment and Flood Risk</p> | <p><i>“River Holme Culvert Holme Fleet (main river) flows through a culvert under the proposed Haul Road. The proposed route of the heavy haul road will cross the Holme Fleet Culvert. This culvert is currently inaccessible to assess its condition. However, we consider it unlikely to be able to cope with any additional loading. The EA has a capital scheme to re-align the Holme Fleet further to the East (still within the DCO boundary) to reduce flood risk to Port Clarence community. We are attempting to accelerate this project with delivery within the next two years if funding can be sourced. Below are some options outlined for the Culvert/Haul Road:</i></p> <p><i>Option A: Culvert is in its current condition and alignment at the time of your works.</i></p> <ul style="list-style-type: none"> <li><i>• Assessment of additional loads from haul road to determine if any additional protection needs to be provided at the culvert crossing; and provision for this as part of the works. (This is highly likely); and</i></li> <li><i>• Access to the inlet, outlet and inspection chambers to be retained.</i></li> <li><i>• Option B: Culvert has been upgraded by the EA prior to your works taking place.</i></li> <li><i>• Assessment of additional loads from haul road to determine if any additional protection needs to be provided at the</i></li> </ul> | <p>The Applicant has initiated consultation with the EA regarding Holme Fleet and will take the existing culvert and proposed works into consideration. The expected alignment of the new culvert has been discussed; it is understood that this remains largely outside of the Site but will be crossed by the haul road between Wilton Engineering Wharf and Clarence Wharf. The potential impacts of this crossing will be assessed in the ES and supporting FRA.</p> |

| ID                            | Description                                | Scoping Opinion Comments   | Response   |
|-------------------------------|--|--|--|
|                               |  | <p><i>culvert crossing; and provision for this as part of the works;</i></p> <ul style="list-style-type: none"> <li>• <i>Any inspection chambers located within the haul road area must remain accessible during operation;</i></li> <li>• <i>Access to the inlet and outlet to be retained, both during construction and operation;</i></li> <li>• <i>Pre works internal survey to confirm condition of culvert and identify defects; and</i></li> <li>• <i>Post works internal survey to confirm condition of culvert; and any remedial works carried out if required by the EA.</i></li> </ul> <p><i>If our works are delivered ahead of the heavy haul road, it will be cost beneficial to consider assessing loading ahead of works, so that our design could be modified to accommodate any additional loading. Any increase in costs would need to be covered by the applicant but may be a much lower than providing additional protection post EA construction. We would welcome a discussion to see if there are any opportunities to work together on this scheme.</i></p> <p><i>If you are looking to offset any environmental losses, we may re-evaluate our scheme and instead our replacing the culvert, you could contribute to an open cut solution for the Holme Fleet.”</i></p> |  |
| EA Scoping Response reference | Chapter 9 Water Environment and Flood Risk | <p><i>“Flood defence maintenance<br/>The EA requires continued access to continue routine maintenance of the existing and planned</i></p>  | Potential impacts to access for maintenance of the existing and planned flood defences will be considered during |

| ID  | Description                                | Scoping Opinion Comments  | Response  |
|---|--|---|---|
| NA/2023/116392/01-L01                               |  | <i>defences in order to continue the standard of protection. Any permissions or legal agreements to allow these works to go ahead to be agreed in advance of pipeline construction. It should be noted that we have statutory powers to carry out works to our assets.</i>  | Construction and Operational Phases and reported in the ES and supporting FRA.  |
| EA Scoping Response reference NA/2023/116392/01-L01 | Chapter 9 Water Environment and Flood Risk | <i>Flood Risk Information the EA holds As well as data regarding our flood defence assets, we also hold information relating to the River Tees 2020 hydraulic model and previous flood outlines. Requests for data should be sent to northeast-newcastle@environment-agency.gov.uk”</i>   | The River Tess 2020 hydraulic model was received from the EA, and will be used to assess baseline and post-development conditions in the FRA and the ES.  |
| EA Scoping Response reference NA/2023/116392/01-L01 | Chapter 9 Water Environment and Flood Risk | <i>“For an appropriate controlled waters risk assessment, a minimum of three rounds of monitoring of groundwater and surface waters should be undertaken, along with appropriate testing of soils (total concentrations and soil leachate). Groundwater monitoring should be both level and quality. The DCO should include a plan which clearly indicates where the groundwater and surface monitoring points are located. With respect to Controlled Waters Risk Assessment, the Generic Assessment Criteria (GAC) hierarchy should be determined by the receptor at risk. The GAC hierarchy for assessment of groundwater should be Drinking Water Standards (DWS), followed by Environmental Quality Standards (EQS) and where no appropriate GAC are available, laboratory detection limits should be used. The GAC hierarchy for assessment of surface waters</i> | <b>Appendix 3C: Geology and Soils Technical Note (Volume 3)</b> summarises how these assessments will be undertaken and the relevant mitigations to reduce impact as part of the EIA and consultation through to detailed design. |

| ID | Description | Scoping Opinion Comments   | Response |
|----|-------------|--|----------|
|    |             | <p><i>should be EQS followed by DWS, then laboratory detection limits if no GAC value is available. Should groundwater and surface water be considered receptors, two separate risk assessments should be prepared. Controlled waters risk assessments should be prepared in accordance with Ciria C552 (Contaminated Land Risk Assessment. A Guide to Good Practice) and take into account requirements of LCRM and Guiding Principles for Land Contamination. It is noted that chapter 9 states that ground investigations were previously undertaken and no additional is proposed and that site clearance, remediation and removal of ground structures will be undertaken as necessary. Risks to groundwater from the proposed site usage should be considered as well as from historic/existing land uses and contamination on site. For example, the risk associated with the transportation and/or storage of potentially hazardous materials (fuels/hydrocarbons) below ground level. Any tanks and pipelines should be suitably designed, constructed and pollution prevention measures/mitigation installed where required.</i></p> <p><i>The Scoping Report<sup>1</sup> states that piling requirements have/will be considered and a proposal to install a geotextile to protect groundwater during compaction. The applicant should ensure that piling activities do not pose a risk to shallow or deep groundwater, mitigation should be put in place to mitigate pollution risks.”</i></p> |          |

| ID  | Description                | Scoping Opinion Comments   | Response   |
|---|----------------------------|--|--|
| EA Scoping<br>Response reference<br>NA/2023/116392/01-<br>L01 | EA consents and<br>permits | <p><i>“Flood Risk</i></p> <p><i>The River Tees is a designated ‘main river’ and under the Environmental Permitting Regulations certain works within 16m of a tidal main river, or within 16m of any flood defence structure on a tidal main river, require a Flood Risk Activity Permit from the EA. Assessments are required for both the temporary and permanent works. If a permit is required, it must be obtained prior to beginning the works.”</i></p>  | <p>Appropriate environmental permits will be obtained for any works proposed within 16m of a tidal main river, and/or within 16m of the existing flood defences on a tidal main river, if applicable. It is assumed that the permits will be secured via protective provisions with the EA for flood risk.</p>   |
| EA Scoping<br>Response reference<br>NA/2023/116392/01-<br>L01 | EA consents and<br>permits | <p><i>“Discharge of Trade Effluent</i></p> <p><i>Effluent discharged from any premises carrying on a trade or industry and effluent generated by a commercial enterprise where the effluent is different to that which would arise from domestic activities in a normal home is described as trade effluent. If you are not able to discharge effluent, it will be classed as waste, and you must then comply with your duty of care responsibilities.</i></p> <p><i>If Northumbrian Water accepts the flows at Bran Sands, then a permit will not be required. However, if Northumbrian Water do not accept the flows at Bran Sands, a permit would likely be required. The separation, treatment and re-use of effluents is essential and will likely be refined during the FEED process. On-site denitrification of final effluents prior to discharge to Bran Sands must be considered at an early stage to prevent the discharge of an additional nutrient load into the River Tees. Early discussions with</i></p> | <p>The Proposed Scheme is predicted to increase the nitrogen load discharged from Bran Sands WWTP into the River Tees and Cleveland Coast SPA, SSSI and Ramsar Site. The Proposed mitigation for this potential impact has not yet been developed. The preferred option will be agreed in consultation with Natural England and presented in the ES with a supporting Nutrient Neutrality technical note that will be submitted for DCO examination.</p> |

| ID  | Description             | Scoping Opinion Comments   | Response   |
|---|-------------------------|--|--|
|   |                         | <p><i>Northumbrian Water and Natural England are recommended.</i></p> <p><i>If proposing to discharge to non-mains: If you wish to discharge effluent, after appropriately treating it, to groundwater or surface water a permit under the Environmental Permit Regulations will be required. Full characterisation of the effluent will be required, and modelling may be required at the planning stage to determine the impact of the effluent on the receiving watercourse.</i></p> <p><i>If proposing to discharge to mains: A trade effluent consent or a trade effluent agreement with your water and sewerage company (in this case likely to be Northumbrian Water) must be obtained before you discharge trade effluent to a public foul sewer or a private sewer that connects to a public foul sewer.</i></p> <p><i>Further guidance is available at Pollution prevention for businesses.”</i></p> |  |
| EA Scoping Response reference NA/2023/116392/01-L01 | EA consents and permits | <p><i>“Discharge of Clean Water Clean surface water (i.e., clean, uncontaminated rainwater from hard standing areas such as roads and car parks) can be discharged to a watercourse without a permit if the discharge passes through a maintained oil interceptor or Sustainable Urban Drainage System.</i></p> <p><i>If a water attenuation system is proposed it would be beneficial to see the details, methods, and maintenance of the system to ensure longevity and effectiveness.”</i></p>  | Appropriate treatment and discharge will be considered in the Outline Drainage Strategy for the Proposed Scheme, to be submitted with the application for development consent. The Outline Drainage Strategy will be informed by consultation with the relevant authorities. |

| ID  | Description             | Scoping Opinion Comments  | Response  |
|---|-------------------------|---|---|
| EA Scoping<br>Response reference<br>NA/2023/116392/01-<br>L01 | EA consents and permits | <i>“Water Resources Water Resource (Impoundment and Abstraction) Licences are issued by the EA under the terms of the Water Resources Act 1991 and the provisions of the Water Resources (Abstraction and Impounding) Regulations 2006. No other EA administered regulatory regime provides consent to create or modify an impoundment and/or abstracted water at volumes greater than 20m<sup>3</sup>/day. You should seek to fully understand the permissions required for your proposal and not presume consent for abstraction and impoundment activity is provided by other regulatory documents.”</i> | The need for water impoundment and abstraction will be investigated and reported in the ES. Appropriate permits will be obtained, if applicable.  |
| EA Scoping<br>Response reference<br>NA/2023/116392/01-<br>L01 | EA consents and permits | <i>“Abstraction Licence If you intend to abstract more than 20 cubic metres of water per day from a surface water source e.g. a stream or from underground strata (via borehole or well) for any particular purpose then you will need an abstraction licence from the EA. There is no guarantee that a licence will be granted as this is dependent on available water resources and existing protected rights.”</i>   | The need for water abstraction will be investigated and reported in the ES. Appropriate permits will be obtained, if applicable, although at this stage no abstraction is expected.   |
| EA Scoping<br>Response reference<br>NA/2023/116392/01-<br>L01 | EA consents and permits | <i>“Dewatering / Abstraction for Construction Dewatering is the removal/abstraction of water in order to locally lower water levels near an excavation, or to remove water from a works area that has been temporarily created within a surface water course. This can allow operations to take place, such as mining, quarrying, building, engineering works or other operations. The</i>  | Any potential impacts associated with groundwater control activities such as dewatering to the Water Environment will be assessed in the ES as the design develops.<br>Appropriate water abstraction license(s) will be obtained by the appointed |

| ID   | Description                    | Scoping Opinion Comments  | Response  |
|--|--------------------------------|---|---|
|  |                                | <p><i>dewatering activities could have an impact upon local wells, water supplies and/or watercourses and environmental interests.</i></p> <p><i>This activity was previously exempt from requiring an abstraction licence. Since 01 January 2018, most cases of new planned dewatering operations, or abstractions from surface water courses in order to enable construction that last longer than six months or which may impact on designated sites or species, and which occur at over 20 cubic metres a day, will require a water abstraction licence from us prior to the commencement of activities at the site.”</i></p> | <p>contractor if applicable and form part of the OCoCP to be submitted with the application for development consent.</p>                |
| <p>EA Scoping Response reference NA/2023/116392/01-L01</p> | <p>EA consents and permits</p> | <p><i>Impoundment Licence</i></p> <p><i>If you intend to impound a watercourse then you are likely to need an impounding licence from the EA. An impoundment is any dam, weir or other structure that can raise the water level of a water body above its natural level. A licence may be required for new structures, as well as for modifying any existing structure or removing an existing structure.</i></p>   | <p>The need for water impoundment will be investigated and reported in the ES. Appropriate permits will be obtained, if applicable.</p> |

9.3.2. A summary of the consultations that have taken place up to the time of preparing this PEIR is summarised in **Table 9-2**:

**Table 9-2: Summary of consultations**

| Body/Organisation  | Consultation Date | Consultation Outcomes   |
|--|-------------------|---|
| Middlesbrough Council/STBC/EA/Lead Local Flood Authority/Environmental Health Department of STBC | May 2023          | A data request was submitted to provide information to support the baseline data review. This included surface water and groundwater water supplies and abstractions, groundwater quality, groundwater flood risk, groundwater level monitoring data, discharge consents, historic flood information and any other information which can be useful for the assessments. |
| Middlesbrough Council  | 16 June 2023      | Middlesbrough Council (MC) confirmed that they do not hold any information relevant to the data request submitted in May 2023 (as summarised above).  |
| STBC as the LLFA   | 23 May 2023       | The LLFA provided a link to the flood investigation report completed following the 2013 tidal surge event that affected part of the Proposed Site.<br><br>The LLFA confirmed that they do not hold other information relevant to the data request submitted in May 2023 (as summarised above).  |
| STBC Environmental Health Service  | 31 May 2023       | The Environmental Health Service responded to the data request submitted in May 2023 (as summarised above) with a list of the known license abstraction points within 3km of the Site Boundary.   |
| STBC Information Governance Team   | 13 June 2023      | The Council provided information regarding three known private water abstractions within the Borough.   |
| EA   | 30 May 2023       | The EA provided the following information: <ul style="list-style-type: none"> <li>■ Data on EA maintained flood defences in the Study Area;</li> <li>■ Product 5, 6 and 7 information, including the Port Clarence 2020</li> </ul>  |

| Body/Organisation             | Consultation Date | Consultation Outcomes  |
|-------------------------------|-------------------|--|
|                               |                   | FM-TUFLOW model and report;<br>and<br><ul style="list-style-type: none"> <li>■ Abstraction license data.</li> </ul>  |
|                               | 15 September 2023 | A follow-up request was submitted to request further information on flood defences in the area of the Proposed Scheme. The EA responded stating that all available data on the flood defences within the EA's remit had been already provided and that it would be advisable to contact landowners for further information.                                  |
|                               | 02 February 2024  | A follow-up request was sent to the EA requesting surface water and groundwater abstraction and discharge consents within a 1km buffer zone of the updated Site Boundary.  |
| EA<br>(Flood Management Team) | 03 October 2023   | A meeting was held between the EA flood management team and the Applicant, to discuss the Proposed Scheme, the approach to the assessment of existing and future flood risk, climate change uplifts, the lifetime of the Proposed Scheme and available baseline flood data. Formal meeting minutes are being agreed and will be available to support the ES. |
| EA<br>(Biodiversity Team)     | 06 November 2023  | A meeting was held between the EA biodiversity team and the Applicant to discuss the Proposed Scheme, the approach to the WFD assessment and assessment of impact to the water environment, and Biodiversity Net Gain (BNG). Formal meeting minutes are being agreed and will be available to support the ES.  |
| EA<br>(Flood Management Team) | 18 January 2024   | A meeting was held between the EA flood management team and the Applicant to provide a general update on the progress of the Proposed Scheme and assessment of flood risk. Formal meeting minutes are being  |

| Body/Organisation | Consultation Date | Consultation Outcomes   |
|-------------------|-------------------|---|
|                   |                   | agreed and will be available to support the ES.   |
| Natural England   | 08 June 2023      | <p>A Discretionary Advice Service (DAS) call was held with Natural England to confirm the approach to deliver the required nitrogen neutrality assessment and mitigation strategy (NNAMS).</p> <p>Natural England confirmed that the only offsite water discharge that should be considered in the NNAMS is the treated industrial process effluent discharged to Bran Sands WWTP for further treatment prior to being discharged to the River Tees.</p> <p>Natural England also confirmed that the nitrogen load calculation should be based on the current total nitrogen discharge concentration (27mg/l) in treated effluent discharged from Bran Sands WWTP. The WWTP must be upgraded to achieve a total nitrogen discharge consent limit of 10mg/l by 01 April 2030.</p> |

## 9.4. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

9.4.1. The assessment of the potential impacts of the Proposed Scheme on the water environment and flood risk has been undertaken in line with the legislation, policy and guidance described in **Section 9.2**.

### POTENTIALLY SIGNIFICANT EFFECTS

9.4.2. As set out in the EIA Scoping Report<sup>1</sup> and in light of the assessments undertaken since then, the following effects are considered to be potentially significant and have been considered further in this assessment:

#### Construction Phase

- Pollution risk to the River Tees from disturbance of bed materials and potentially contaminated sediment;
- Increased pollution risks from spillage of fuels or other harmful substances that may spill directly into or migrate to surface water receptors including licenced activities and private water supplies);
- Increased pollution risk from sedimentation caused by surface water runoff from areas of bare earth, construction materials such as aggregate, stockpiles of topsoil or discharge of groundwater dewatering;

- Direct impact to watercourses or other surface water features associated with temporary watercourse crossings, diversions or other physical modifications;
- Damage to existing culverted watercourses that could lead to water quality or flood risk impact;
- Increased flood risk associated with temporary works in areas identified to be at risk of flooding;
- Damage, obstruction or modification of existing flood defence infrastructure;
- Impact to groundwater quality and quantity (level and flow) of the Principal Sherwood Sandstone Group aquifer, Secondary B Mercia Mudstone Group aquifer, and Secondary (undifferentiated) superficial deposit aquifers;
- Potential temporary loss of water from storage and/or reduction in water level (locally) within Principal and Secondary aquifers and at groundwater abstractions due to construction activities and groundwater control measures;
- Potential impacts to groundwater flows or levels that could cause loss or changes to GWDTEs either within the footprint of the Proposed Scheme as a result of severance of habitat or as a result of changes to groundwater flows and levels associated with dewatering activities;
- Increased groundwater flood risk due to presence of groundwater flow barriers from intrusive earthworks that extend below the groundwater table forming groundwater flow barriers; and
- Impact to Water Framework Directive (WFD) Designated Waterbodies, including biological, hydromorphological, physico-chemical and chemical quality elements of the WFD designated waterbodies including the Tees transitional waterbody and Tees coastal waterbody, Tees Sherwood Sandstone and Tees Mercia Mudstone and Redcar groundwater waterbodies.

### **Operational Phase**

- Polluted surface water runoff and spillage risks containing silts, hydrocarbons or other harmful chemicals that may migrate or be discharged to surface water features via the proposed drainage system;
- The discharge of treated industrial process effluent to the River Tees (via Bran Sands WWTP), increasing the nitrogen load discharged to the Teesmouth and Cleveland Coast SPA and Ramsar site;
- Discharge of foul and effluent water that could cause deterioration of the receiving waterbody;
- Direct impact to watercourses or other surface water features associated with permanent watercourse crossings, diversions or other physical modifications;
- Increased rates and volumes of surface water runoff from an increase in impermeable area leading to a potential increase in flood risk;
- Flood risk to the Proposed Scheme from construction of the Proposed Scheme in areas identified to be at risk of flooding;
- Increased flood risk to people, property and infrastructure located in the Site and the surface water Study Area from changes to flood flow conveyance and storage;

- Potential for damage to existing culverted watercourses that could lead to flood risk impact;
- Damage, obstruction or modification of existing flood defence infrastructure;
- Increased groundwater flood risk due to presence of groundwater flow barriers from intrusive earthworks that extend below the groundwater table forming groundwater flow barriers;
- Impacts to groundwater flows and levels on the Principal Sherwood Sandstone Group aquifer, Secondary B Mercia Mudstone Group aquifer, and Secondary (undifferentiated) superficial deposit aquifers;
- Polluted surface water runoff and spillage risks containing hydrocarbons or other harmful chemicals that may migrate or be discharged to ground, potential affecting groundwater quality of the superficial (Tidal Flat Deposits) and bedrock (Mercia Mudstone Group and Sherwood Sandstone Group) aquifers; and
- Impact to WFD Designated Waterbodies, including biological, hydromorphological, physico-chemical and chemical quality elements of the WFD designated waterbodies including the Tees transitional waterbody and Tees coastal waterbody, and Tees Sherwood Sandstone and Tees Mercia Mudstone and Redcar groundwater waterbodies.

### **Decommissioning Phase**

9.4.3. Potentially significant effects that may arise during the decommissioning phase of the Proposed Scheme are not expected to be more significant than those that may arise during the construction phase of the Proposed Scheme. The decommissioning phase has therefore not been assessed independently in the PEIR and will be considered further in the ES. A summary of likely effects that will be considered in the ES is presented below.

- Increased pollution risks from spillage of fuels or other harmful substances that may spill directly into or migrate to surface water receptors including licenced activities and private water supplies);
- Increased pollution risk from sedimentation caused by surface water runoff from areas of bare earth or stockpiles of demolition materials;
- Damage to culverted watercourses that could lead to water quality or flood risk impact;
- Increased flood risk associated with temporary works in areas identified to be at risk of flooding;
- Damage, obstruction or modification of existing flood defence infrastructure;
- Impact to groundwater quality of the Principal Sherwood Sandstone Group aquifer, Secondary B Mercia Mudstone Group aquifer, and Secondary (undifferentiated) superficial deposit aquifers; and
- Impact to WFD Designated Waterbodies, including biological, hydromorphological, physico-chemical and chemical quality elements of the WFD designated waterbodies including the Tees transitional waterbody and Tees coastal

waterbody, Tees Sherwood Sandstone and Tees Mercia Mudstone and Redcar groundwater waterbodies.

### **SENSITIVE RECEPTORS**

9.4.4. The sensitive receptors identified for this assessment include:

- Surface water features (including main rivers, ordinary watercourses, ponds, designated sites and surface water abstractions);
- Groundwater receptors (including superficial and bedrock aquifers, GWDTs, and groundwater abstractions); and
- Flood risk (including risks to the Proposed Scheme and to people, property and infrastructure elsewhere).

### **BASELINE DATA COLLECTION**

9.4.5. A desk-based data collection exercise has been undertaken, including a review of available information to determine the baseline conditions in the relevant geographical areas of effect.

9.4.6. The key sources of information used to determine the baseline water environment and flood risk conditions are:

- EA Catchment Data Explorer<sup>40</sup>;
- Ordnance Survey Mapping<sup>41</sup>;
- Department for Environment, Food and Rural Affairs (DEFRA) MAGIC online Mapping<sup>42</sup>;
- British Geological Survey (BGS) Geology of Britain Viewer<sup>43</sup>;
- BGS Geological Map 1:50,000 map Sheet 33 Stockton Solid and Drift Geology<sup>44</sup>;
- BGS Geological Map 1:10,000 map Sheet NZ52SW Solid and Drift Geology<sup>45</sup>;
- Groundsure Report<sup>46</sup>;
- Groundworks Teesside (Former TV1 and TV2) Baseline Ground Investigation Factual Report<sup>47</sup>;
- STBC Level 1 Strategic Flood Risk Assessment<sup>48</sup>;
- STBC Level 2 Strategic Flood Risk Assessment<sup>49</sup>;
- EA LiDAR Digital Terrain Model (online)<sup>50</sup>;
- EA Flood Map for Planning (online)<sup>51</sup>;
- EA Risk of Flooding from Surface Water Map (online)<sup>52</sup>;
- EA Risk of Flooding from Reservoirs Map (online)<sup>53</sup>;
- EA Recorded Flood Outlines Map (online)<sup>54</sup>;
- Flood Estimation Handbook Web Service<sup>55</sup>; and
- Cranfield Soil and Agrifood Institute Soilscales online mapping<sup>56</sup>.

### **Site Visit**

- 9.4.7. A two-day site visit was undertaken on the 23 August 2023 and 24 August 2023. The purpose of the site visit was to confirm previously conducted desktop survey findings and to inform further assessments of the water environment.

### **ASSESSMENT METHODOLOGY**

- 9.4.8. The text in this Chapter presents the information gathered and the assessment approach used to date for this PEIR/ES, FRA, WFD and Nitrogen Neutrality. The approach to the assessment, for both the Construction, Operation and Decommissioning Phases of the Proposed Scheme will continue to be discussed, with a view to reaching agreement with the LLFA, STBC, Natural England and EA, as appropriate.
- 9.4.9. Further detailed assessments will be provided within the ES for surface water features, groundwater, WFD designated water bodies and flood risk.

### **SURFACE WATER AND GROUNDWATER RESOURCES**

- 9.4.10. The assessment of the effects during the Construction and Operation Phases will be undertaken following the principles set out within the Design Manual for Roads and Bridges (DMRB) LA 113 – Road Drainage and the Water Environment<sup>57</sup>. Although not directly applicable to the nature of the Proposed Scheme, the DMRB guidance provides a good basis for assessing effects of developments on the water environment.
- 9.4.11. A qualitative assessment of potential impacts that may arise during the Construction and Operational Phases has been carried out to inform this PEIR. The assessment will be developed during the preparation of the ES to take design development of the Proposed Scheme into account. No quantitative analysis, additional site survey or monitoring is proposed to inform the ES, although the ES will be updated to reflect ongoing consultation with the EA, the findings of the River Condition Assessment surveys undertaken to inform the Biodiversity Net Gain calculations, and other topographic survey data that may be collected to inform the engineering design to develop understanding of the baseline environment and impact assessment.
- 9.4.12. An assessment of the potential impacts from localised excavations for the Proposed Scheme (i.e. intrusive earthworks e.g. foundation piling) on groundwater resources and aquifers has not been assessed in this PEIR and will be addressed accordingly at ES stage. Reference will be made in the ES to the risks associated with such activities and measures that will be adopted to reduce/minimise the risk.
- 9.4.13. The Outline Drainage Strategy for the operational phase of the Proposed Scheme has not yet been developed and, as such, will not be considered in this PEIR. Consideration has however been given to the governing principles that will form the basis of the Outline Drainage Strategy. The Outline Drainage Strategy will be developed to inform the ES and the management of surface, foul and effluent drainage will be considered accordingly at ES stage.
- 9.4.14. The construction phase drainage strategy will be described in the ES and OCoCP, which will be submitted with the application for development consent. The appointed

contractor will describe more detailed measures within the full CoCP that will be based upon the measures described within the ES and OCoCP. Typical pollution control measures that are expected to be included in the ES and OCoCP are described in this PEIR and further detail will be provided within the ES.

## **FLOOD RISK ASSESSMENT**

- 9.4.15. A standalone FRA is being produced in parallel to the ES and will be appended for final submission of the ES. The findings of the FRA will be cross-referenced in the ES where necessary. The assessment will be informed by but not limited to:
- Ongoing consultation with relevant authorities including the EA and STBC as the LLFA for the main project site;
  - Information on flood defences provided by the EA and private landowners (subject to further consultation);
  - Freely available online data sources;
  - The Port Clarence 2020 FM-TUFLOW model and report; and
  - Review of relevant literature.
- 9.4.16. The FRA is being undertaken in accordance with the guidance outlined in the NPPF and supporting PPG to assess the potential risk of flooding to the Proposed Scheme, as well as to assess the potential impacts of the Proposed Scheme on flood risk to people and property elsewhere.
- 9.4.17. At PEIR stage the assessment has remained qualitative and the potential for impact and mitigation options are discussed. As the FRA and ES progresses, the assessment of tidal flood risk (including breach) will be informed by hydraulic modelling that uses the existing Port Clarence 2020 FM-TUFLOW model. Consultation will be undertaken with the EA to agree the methodology and requirements of the assessment.
- 9.4.18. The assessment of other sources of flooding (including surface water, groundwater, reservoirs, drainage systems and site-generated surface water runoff) will continue to be assessed qualitatively at ES stage. Similarly, the assessment of tidal flood risk during the Construction Phase will be a qualitative assessment.
- 9.4.19. The Outline Drainage Strategy for the Proposed Scheme has not yet been developed and, as such, will not be considered in this PEIR. Consideration has however been given to the governing principles that will form the basis of the Outline Drainage Strategy. The management of surface, foul and effluent drainage will be considered accordingly at ES stage.

## **WATER FRAMEWORK DIRECTIVE**

- 9.4.20. A standalone WFD assessment is being produced in parallel to the ES. A staged approach has been adopted that follows Planning Inspectorate Guidance Note 18: Water Framework Directive (2017)<sup>58</sup> and Clearing the Waters for All (2016)<sup>59</sup>. Stage 1 (WFD Screening) and Stage 2 (WFD Scoping) can be found in **Appendix 9A: Water Framework Directive Screening and Scoping Assessment (Volume 3)**. Upon consultation with the ES, this will determine whether a full WFD assessment is required

for the Proposed Scheme. If a full WFD assessment is required, the outputs will be included in the EIA and cross-referenced in the ES where necessary. The potential impact to WFD waterbodies has not been presented in this PEIR.

- 9.4.21. **Appendix 9A: Water Framework Directive Screening and Scoping Assessment (Volume 3)** comprises a qualitative assessment informed by desk-based sources of information and site walkover. The findings of the assessment will be presented to the EA to inform agreement on the requirement for full WFD assessment.
- 9.4.22. The focus of **Appendix 9A: Water Framework Directive Screening and Scoping Assessment (Volume 3)** is on the potential impact to quality attributes and WFD classification of the Tees transitional waterbody, the Tees from Skerne to Tidal Limit waterbody; and Tees Sherwood Sandstone and Tees Mercia Mudstone and Redcar Mudstone groundwater bodies.

#### NITROGEN NEUTRALITY

- 9.4.23. A quantitative assessment of the additional nitrogen load discharged to the Teesmouth and Cleveland Coast SPA and Ramsar site will be submitted as part of the ES. The calculation will be prepared in accordance with Natural England's specified method as modified to suit the industrial nature of the Proposed Scheme.
- 9.4.24. A quantitative calculation of the required mitigation will be provided to demonstrate that the Proposed Scheme will achieve nitrogen neutrality.

#### SIGNIFICANCE CRITERIA

- 9.4.25. As discussed above, the assessment of the effects during Construction and Operation Phases will be undertaken following the principles set out within the Design Manual for Roads and Bridges (DMRB) LA 113 – Road Drainage and the Water Environment<sup>60</sup>. The DMRB LA 113 promotes the following approach:
- Estimation of the sensitivity of the receptor. The sensitivity of the feature or resource is based on the value and sensitivity of the feature or resource as shown in **Table 9-3**;
  - Estimation of the magnitude of the impact. The magnitude of an impact is estimated based on the potential size or scale of change compared to the baseline and is independent to the sensitivity of the receptor as shown in **Table 9-4** and
  - Assessment of the significance of the effect. The overall significance of the effect is determined by combining the sensitivity of the receptor (**Table 9-3**) and the magnitude of the impact (**Table 9-4**). The significance of effect matrix is shown in **Table 9-5**.

**Table 9-3: Criteria for Estimation of the Sensitivity of Water Environment Receptors**

| Receptor Sensitivity | Criteria  | Examples      |   |
|----------------------|---|---------------|---|
| <b>Very High</b>     | Nationally significant receptor of high sensitivity | Surface water | <ul style="list-style-type: none"> <li>WFD classification shown in a River Basin Management Plan (RBMP) and Q95<sup>i</sup> ≥ 1.0 m<sup>3</sup>/s.</li> <li>Site protected/designated under EC or UK legislation (Special Area of Conservation (SAC), SPA, Site of Special Scientific Interest (SSSI), Ramsar site, salmonid water)/Species protected by EC legislation.</li> </ul> |
|                      |   | Groundwater   | <ul style="list-style-type: none"> <li>Principal aquifer providing a regionally important resource and/or supporting a site protected under EC and UK Legislation.</li> <li>Groundwater locally supports GWDTE.</li> <li>Source Protection Zone (SPZ) 1.</li> </ul>   |
|                      |   | Flood risk    | <ul style="list-style-type: none"> <li>Essential infrastructure or highly vulnerable development.</li> </ul>  |
| <b>High</b>          | Locally significant receptor of high sensitivity    | Surface water | <ul style="list-style-type: none"> <li>Watercourse having a WFD classification shown in a RBMP and Q95 &lt;1.0 m<sup>3</sup> /s.</li> <li>Species protected under EC or UK legislation.</li> </ul>  |
|                      |   | Groundwater   | <ul style="list-style-type: none"> <li>Principal aquifer providing locally important resource or supporting a river ecosystem.</li> <li>Groundwater supports GWDTE</li> <li>SPZ 2</li> </ul>  |
|                      |   | Flood risk    | <ul style="list-style-type: none"> <li>More vulnerable development.</li> <li></li> </ul>  |
| <b>Medium</b>        | Of moderate quality and rarity                      | Surface water | <ul style="list-style-type: none"> <li>Watercourse not having a WFD classification shown in the RBMP and Q95 &gt;0.001 m<sup>3</sup> /s.</li> </ul>   |

<sup>i</sup> Typically defined as the percentage of time that the flow in a river is greater than the stated probability. For example, Q95 is the flow exceeded 95% of the time and is typical of a dry summer flow.

| Receptor Sensitivity | Criteria                      | Examples                             |  |
|----------------------|-------------------------------|--------------------------------------|--|
|                      |                               | Groundwater                          | <ul style="list-style-type: none"> <li>■ Aquifer providing water for agricultural or industrial use with limited connection to surface water</li> <li>■ SPZ 3</li> </ul> |
|                      |                               | Flood risk                           | <ul style="list-style-type: none"> <li>■ Less vulnerable development</li> </ul>  |
| Low                  | Lower Quality                 | Surface water                        | <ul style="list-style-type: none"> <li>■ Watercourse not having a WFD classification shown in the RBMP and Q95 <math>\leq 0.001</math> m<sup>3</sup> /s.</li> </ul>      |
|                      |                               | Groundwater                          | <ul style="list-style-type: none"> <li>■ Unproductive strata</li> </ul>  |
|                      |                               | Flood risk                           | <ul style="list-style-type: none"> <li>■ Water compatible development</li> </ul>   |
| Negligible           | Attribute of very low quality | Surface water/Groundwater/Flood risk | <ul style="list-style-type: none"> <li>■ Water features within the Proposed Scheme which form part of the drainage system with no other allocation.</li> </ul>           |

9.4.26. Embedded mitigation, as defined in **Chapter 3: Approach to EIA (Volume 1)**, will be taken into account in determining the magnitude of change.

**Table 9-4: Criteria for Assessing the Potential Magnitude of Impacts to Water Environment Receptors**

| Magnitude of Impact | Criteria   | Examples      |  |
|---------------------|--|---------------|--|
| High Adverse        | Results in loss of attribute and / or quality and integrity of the attribute | Surface water | Loss or extensive change to a fishery.<br>Loss of regionally important public water supply.<br>Loss or extensive change to a designated nature conservation site.<br>Reduction in water body WFD classification.   |
|                     |  | Groundwater   | Loss of, or extensive change to, an aquifer.<br>Loss of regionally important water supply.<br>Potential high risk of pollution to groundwater from routine runoff.<br>Loss of, or extensive change to GWDTE or baseflow contribution to protected surface water bodies.<br>Reduction in water body WFD classification. |

| Magnitude of Impact   | Criteria   | Examples      |  |
|-----------------------|--|---------------|--|
|                       |  |               | Loss or significant damage to major structures through subsidence or similar effects.  |
|                       |  | Flood risk    | Increase in peak flood level (> 100 mm)*.  |
| <b>Medium Adverse</b> | Results in effect on integrity of attribute, or loss of part of attribute                    | Surface water | Partial loss in productivity of a fishery.<br>Degradation of regionally important public water supply or loss of major commercial / industrial / agricultural supplies.<br>Contribution to reduction in water body WFD classification.   |
|                       |  | Groundwater   | Partial loss or change to an aquifer.<br>Degradation of regionally important public water supply or loss of significant commercial/ industrial/ agricultural supplies. Potential medium risk of pollution to groundwater from routine runoff.<br>Partial loss of the integrity of GWDTE.<br>Contribution to reduction in water body WFD classification.<br>Damage to major structures through subsidence or similar effects or loss of minor structures. |
|                       |  | Flood risk    | Increase in peak flood level > 50 mm*.   |
| <b>Low Adverse</b>    | Results in some measurable change in attributes, quality or vulnerability                    | Surface water | Minor effects on water supplies.   |
|                       |  | Groundwater   | Potential low risk of pollution to groundwater from routine runoff.<br><br>Minor effects on an aquifer, GWDTEs, abstractions and structures.   |
|                       |  | Flood risk    | Increase in peak flood level > 10 mm*.   |
| <b>Negligible</b>     | Results in effect on attribute, but of insufficient magnitude to affect the use or integrity | Surface water | No risk identified to water supplies.<br>Unlikely to affect the integrity of the water environment.  |
|                       |  | Groundwater   | No measurable impact upon an aquifer and/or groundwater.<br>Unlikely to affect the integrity of the water environment.   |
|                       |  | Flood risk    | Negligible change to peak flood level ( $\leq$ +/- 10mm).  |

| Magnitude of Impact      | Criteria   | Examples  |   |
|--------------------------|--|---|---|
| <b>No Change</b>         | Results in no change to the receptor   | No loss or alteration of characteristics, features or elements; no observable impact in either direction. |   |
| <b>Low Beneficial</b>    | Results in some beneficial effect on attribute or a reduced risk of adverse effect occurring | Surface water   | Potential for slight reduction in pollution to a surface water body, but insufficient to cause noticeable benefit in quality, fishery productivity or biodiversity.   |
|                          |  | Groundwater   | Potential for slight reduction in pollution to a groundwater body, but insufficient to cause noticeable benefit in quality, baseflow or GWDTE.<br>Reduction of groundwater hazard to existing structures.<br>Reductions in waterlogging and groundwater flooding.   |
|                          |  | Flood risk  | Creation of flood storage and decrease in peak flood level > 10 mm*.  |
| <b>Medium Beneficial</b> | Results in moderate improvement of attribute quality   | Surface water   | Moderate improvement to a fishery / designated nature conservation site.<br>Potential increase in the productivity of a fishery.<br>Reduced pollution of a receiving water body or reduced risk of spillage.<br>Contribution to improvement in water body WFD classification.                                     |
|                          |  | Groundwater   | Reduced pollution of a receiving water body or reduced risk of spillage.<br>Contribution to improvement in water body WFD classification.<br>Improvement in groundwater Catchment Abstraction Management Strategy (CAMS) (or equivalent) classification.<br>Support to significant improvements in damaged GWDTE. |
|                          |  | Flood risk  | Creation of flood storage and decrease in peak flood level > 50 mm*.  |
| <b>High Beneficial</b>   | Results in major   | Surface water   | Significant improvement to a fishery / designated nature conservation site.   |

| Magnitude of Impact | Criteria                         | Examples    |   |
|---------------------|----------------------------------|-------------|---|
|                     | improvement of attribute quality |             | Removal of existing polluting discharge or removing the likelihood of polluting discharges occurring.<br>Improvement in water body WFD classification.  |
|                     |                                  | Groundwater | Removal of existing polluting discharge to an aquifer or removing the likelihood of polluting discharges occurring.<br>Recharge of an aquifer.<br>Improvement in water body WFD classification. |
|                     |                                  | Flood risk  | Creation of flood storage and decrease in peak flood level > 100 mm*.   |

\* beyond model tolerance

9.4.27. The terminology related to the significance of effects set up in DMRB Volume 11, Section 3, Part 10 (LA113)<sup>61</sup> has been followed and used to define the significance of the effects identified:

- Major effect: where the Proposed Scheme could be expected to have a very significant effect (either beneficial or adverse) on receptors.
- Moderate effect: where the Proposed Scheme could be expected to have a noticeable effect (either beneficial or adverse) on receptors.
- Minor effect: where the Proposed Scheme could be expected to result in a small, barely noticeable effect (either beneficial or adverse) on receptors.
- Negligible: where no discernible effect is expected as a result of the Proposed Scheme on receptors.

9.4.28. The significance of potential impacts is classified by considering both the sensitivity of the receptor (**Table 9-3**) and the magnitude of impact (**Table 9-4**), using the matrix shown in **Table 9-5** adapted from Table 3.8.1 of DMRB LA104<sup>62</sup>. Noting that, where the significance of the effect is described as between two levels professional judgement is used to identify a level of significance. Only Moderate and Major effects are considered to be significant.

**Table 9-5: Criteria for Assessing the Significance of Effects**

|                      |            | Magnitude of Impact |                  |                   |                   |                   |
|----------------------|------------|---------------------|------------------|-------------------|-------------------|-------------------|
|                      |            | No change           | Negligible       | Low               | Medium            | High              |
| Receptor Sensitivity | Very High  | Neutral             | Minor            | Moderate or Major | Major             | Major             |
|                      | High       | Neutral             | Minor            | Minor or Moderate | Moderate or Major | Major             |
|                      | Medium     | Neutral             | Neutral or Minor | Minor             | Moderate          | Moderate or Major |
|                      | Low        | Neutral             | Neutral or Minor | Neutral or Minor  | Minor             | Minor or Moderate |
|                      | Negligible | Neutral             | Neutral          | Neutral or Minor  | Neutral or Minor  | Minor             |

## 9.5. STUDY AREA

### SURFACE WATER AND FLOOD RISK

- 9.5.1. The surface water Study Area is defined as the Site for the Proposed Scheme with a buffer of 1km from the Site for surface water features and flood risk receptors. The Study Area is shown on the Water Constraints maps in **Figure 9-1** and **Figure 9-10 (Volume 2)**. The Study Area also considers surface water features, flood risk receptors, and water dependent conservation sites (surface water) that may be directly connected hydrologically to the Study Area. This is in line with DMRB Guidance LA113 Road Drainage and Water Environment<sup>63</sup>. Although this guidance is applicable to road schemes, it is considered a robust framework for the assessment of risks to the water environment.
- 9.5.2. The Study Area is unlikely to change significantly as the Proposed Scheme develops. If the footprint of the Proposed Scheme changes, any newly identified and affected receptors will be included in the buffers specified for surface water and flood risk.

### WFD DESIGNATED WATER BODIES

- 9.5.3. The WFD Study Area consists of the following:
- Tees Water Body (surface water body ID GB510302509900);
  - Tees Estuary (South Bank) Water Body (surface water body ID GB103025072320);
  - Tees from Skerne to Tidal Limit Water Body (surface water body ID GB103025072595);
  - Marton West Beck Catchment (Trib of Tidal Tees) (surface water body ID GB103025072210)
  - Lustrum Beck Catchment (Trib of Tees) (surface water body ID GB103025072550)

- Tees Sherwood Sandstone (groundwater water body ID GB40301G702000);
- Tees Mercia Mudstone and Redscar Mudstone (groundwater water body ID GB40302G701300); and
- Skerne Magnesian Limestone (groundwater water body ID GB40301G704000).

9.5.4. The WFD Study Area also includes Holme Fleet and other watercourses, including the Dorman's Pool Outflow watercourse, that pass through the Site that discharge to either Home Fleet or the WFD surface water bodies listed above.

## **GROUNDWATER**

- 9.5.5. The Groundwater Study Area encompasses groundwater receptors including groundwater waterbodies or water dependent conservation sites (GWDTEs) located within 1km (and up to 5km if sensitive receptors are identified) of the Site for the Proposed Scheme. Receptors outside of the 5km Study Area will be considered if they are deemed to be hydrologically/hydrogeologically linked. This is in line with DMRB LA113<sup>64</sup>. The distance is considered appropriate for the assessment of direct and indirect effects on groundwater receptors potentially at risk from contamination and/or changes to groundwater quantity and quality from the Proposed Scheme.
- 9.5.6. The Groundwater Study Area is shown on the Water Constraints maps in **Figure 9-1** and **Figure 9-10 (Volume 2)**.
- 9.5.7. The Study Area is unlikely to change significantly as the Proposed Scheme develops. If the footprint of the Proposed Scheme changes, any newly identified and affected receptors will be included in the buffers specified for groundwater.

## **9.6. BASELINE CONDITIONS AND FUTURE BASELINE**

### **EXISTING BASELINE**

9.6.1. This section provides a description of the current baseline conditions with respect to the water environment and flood risk. The main features within the Study Area that may be affected by the Proposed Scheme are identified in **Figure 9-1 (Volume 2)** to **Figure 9-10 (Volume 2)**.

#### **Surface Water Features and Water Quality**

- 9.6.2. Surface water features identified within the Study Area are shown in **Figure 9-9 (Volume 2)**. The key features identified include:
- The River Tees;
  - Holme Fleet;
  - Dabholm Gut, Dabholm Beck, The Fleet and The Mill Race; and
  - Network of ditches and small watercourses.

#### **River Tees**

9.6.3. The River Tees (reference SW76 in **Figure 9-9 (Volume 2)**) flows along the southern boundary of the Site. The River Tees is a designated main river under the jurisdiction of the EA. At the location of the Site, the River Tees is tidally influenced. The River Tees

flows into the North Sea approximately 4km north and downstream of the Site. The River Tees forms part of the Teesmouth and Cleveland Coast SSSI, SPA and Ramsar as it flows through the Study Area, also encompassing tidal mudflats adjacent to the River Tees within and downstream of the Study Area.

- 9.6.4. The River Tees is a WFD monitored waterbody. The downstream extents of the River Tees as it flows through the Study Area is a Transitional and Coastal (TraC) waterbody referenced in the EA's Catchment Data Explorer as the Tees Water Body (GB 510302509900). This section of the River Tees is described as heavily modified.
- 9.6.5. The EA undertakes periodic monitoring of WFD waterbodies and publishes on Catchment Data Explorer. Cycle 3 (2022) monitoring awards the Tees Water Body ecological potential as Moderate. Cycle 3 (2019) monitoring awards the Tees Water Body chemical status as Fail. Cycle 3 is an update in classification for all water bodies following on from the Cycle 1 and Cycle 2 classification rounds. Ecological status was monitored in 2022 as part of the Cycle 3 interim assessment; chemical status did not require assessment in the 2022 interim assessment as these aspects are only assessed once per Cycle, hence the 2019 data remains valid.
- 9.6.6. Multiple reasons are listed for not achieving Good status:
- Poor nutrient management;
  - Contaminated water body bed sediments;
  - Sewage and trade/industry discharge;
  - Physical modification associated with ports and harbours, coastal squeeze and recreation; and
  - Elevated levels of Polybrominated diphenyl ethers (PBDE) and Mercury and its compounds.
- 9.6.7. A detailed summary of all WFD waterbodies within the Study Area is provided within **Appendix 9A: Water Framework Directive Screening and Scoping Assessment (Volume 3)**.
- 9.6.8. Within the Study Area the River Tees supports Teesport located along the south bank of the River Tees. Teesport is the fifth largest port in the UK serving imports and exports of cargo<sup>65</sup>. Multiple smaller ports, wharfs and jetties are located along the banks of the River Tees, within the Study Area and further upstream and downstream of the Study Area. These primarily serve the manufacturing and export/import industries located within the region.
- 9.6.9. The Site encompasses four existing marine facilities that operate in the River Tees: Port Clarence (that encompasses Wilton Engineering Wharf) in the west; Clarence Wharf located to the east of Wilton Engineering Wharf; and two existing jetties that serve the existing Navigator site (Navigator Wharfs). It is proposed that either Wilton Engineering Wharf (Option 1) or Clarence Wharf (Option 2) are used to support the import of construction materials (transportation of equipment and modular units); and the two existing jetties that serve the Navigator site are used during operation for the transportation of final products (SAF and Naphtha). Two additional existing jetties are

located within the Navigator site to support existing operations in the Site but do not form part of the Proposed Scheme. More detailed information on the Proposed Scheme is provided in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**.

### **Holme Fleet**

- 9.6.10. Holme Fleet (reference SW05 in **Figure 9-9 (Volume 2)**) is located to the west of the Site. It is a designated main river under the jurisdiction of the EA as it flows through the Saltholme Nature Reserve to its outfall to the River Tees. North of the RSPB Saltholme the watercourse is designated as an ordinary watercourse under the jurisdiction of STBC as the relevant LLFA.
- 9.6.11. Consultation with the EA in 2024 identified that the gradient of Holme Fleet is relatively flat, with the direction of flow changing in the approximate vicinity of the A1185. The southern extent of the watercourse flows south through to the RSPB Saltholme to the River Tees, and the northern extent flows north through Cowpen Marsh to Greatham Creek. Belasis Beck, an ordinary watercourse under the jurisdiction of STBC, discharges to Holme Fleet adjacent to the National Grid substation upstream of the Site.
- 9.6.12. The majority of the watercourse flows in open channel through wetland and saltmarsh habitats. As the watercourse flows south towards the River Tees it enters a culvert beneath the railway to the south of the Site. From here the watercourse is culverted and flows south before it discharges to the River Tees. The watercourse passes through the Site as it flows underneath the proposed haul road from Wilton Engineering Wharf to the Site, but otherwise remains outside of the Site boundary.
- 9.6.13. During consultation in October 2023, the EA stated that the depth of the culvert between the railway and River Tees is approximately 10m below ground level and in poor structural condition. The EA also stated that there are plans to improve and realign the culvert in the near future; a programme for the work has yet to be decided but are expected to be delivered within 2024-2025. This will be discussed further in ongoing consultation with the EA during the preparation of the ES. Although daylighting of the culvert was mooted as an option, the emerging plans for the watercourse do not include daylighting. The new alignment of the watercourse is also understood to remain largely outside of the Site, although may encroach to within land intended for Construction Laydown to the north of Clarence Wharf and will be crossed by the proposed haul road between Wilton Engineering Wharf and Clarence Wharf. Opportunities for daylighting parts of this watercourse will be discussed further with the EA during the preparation of the ES.

### **Dabholm Gut, Dabholm Beck, The Fleet and The Mill Race**

- 9.6.14. Dabholm Gut (reference SW78 in **Figure 9-9 (Volume 2)**) is located to the east of the Site adjacent to Brand Sands WWTP. It is an ordinary watercourse under the jurisdiction of Middlesbrough Council as the relevant LLFA and forms part of the Teesmouth and Cleveland Coast SSSI. The watercourse is tidally influenced and flows in open channel for approximately 1km from the outfall of the Bran Sands WWTP to its discharge to the River Tees. The watercourse is located immediately downstream of the Tees Estuary (S Bank) Water Body (GB103025072320) as discussed below.

- 9.6.15. Dabholm Beck, The Fleet and The Mill Race (reference SW113, SW81 and SW83 respectively in **Figure 9-9 (Volume 2)**) are ordinary watercourses located upstream of Dabholm Gut that converge and discharge to Dabholm Gut at its upstream extent adjacent to the Bran Sands WWTP. Review of OS mapping indicates that Dabholm Beck and The Mill Race drain relatively small predominantly urban catchments, flowing adjacent to rail and road infrastructure.
- 9.6.16. The Fleet flows through the Coatham Marsh LNR and SSSI located approximately 1km to the north-east (upstream) of Bran Sands WWTP. The Site supports several reedbeds and open water pools that attract waders and waterfowl. The Site also forms part of the Teesmouth and Cleveland Coast SSSI and SPA.
- 9.6.17. The Fleet is a WFD monitored river waterbody that is referenced in the EA's Catchment Data Explorer as the Tees Estuary (S Bank) Water Body (GB103025072320). The water body has a catchment area of 32km<sup>2</sup> and is described as heavily modified. Cycle 3 (2022) monitoring awards ecological status as Moderate and chemical status as Fail. Multiple reasons are listed for not achieving Good status including physical modification and exceedance of priority hazardous substances.

#### **Other Watercourses and Ditches**

- 9.6.18. A small watercourse flows from north to south through the west of the Site (reference SW28 in **Figure 9-9 (Volume 2)**), flowing in open channel to the east of the rail terminal and with an assumed discharge to Holme Fleet upstream of the culvert beneath the railway. The watercourse receives discharge from a smaller ditch that flows immediately south of Huntsman Drive and is assumed to receive discharge from Dorman's Pool and Saltholme East Pool. The watercourse may also be hydraulically connected to other ditches, small watercourses and ponds in the Study Area. The watercourse is classified as an ordinary watercourse under the jurisdiction of STBC as the relevant LLFA. The ecological value of this feature is likely to be low but will be determined to inform the ES.
- 9.6.19. An engineered channel (referred to as Dorman's Pool Outflow) flows through the approximate centre of the Site, flowing from west to east to the north of the existing TV1 and TV2 applications (adjacent to the North Tees Remediation Limited Reclamation Pond) and turning south to discharge to the River Tees. The watercourse flows partially in culvert and partially in open channel through the Site. The watercourse is assumed to receive flow from Dorman's Pool located to the west of the Site and is also considered likely to receive surface water and overland flow from the wider Site. The approved planning application (Application No. 01/2203/P) for the Reclamation Pond to the north of the existing TV1 and TV2 applications includes infilling of the Reclamation Pond and culverting of the open channel of the watercourse that passes through this area. The watercourse is assumed to be classified as an ordinary watercourse under the jurisdiction of STBC as the relevant LLFA. The ecological value of this feature is likely to be low but will be determined to inform the ES.
- 9.6.20. The site visit undertaken in August 2023 identified several ditches (reference SW20, SW38 to SW41 in **Figure 9-9 (Volume 2)**) that flow through the area of the Reclamation Pond. Connectivity with the wider water environment is currently uncertain although it is considered likely that these are fed by overland surface water flow and, potentially,

groundwater emergence given the low-lying nature of this land compared to surrounding topography (noting the Reclamation Pond is several meters lower than adjacent land). It is considered unlikely that these features receive flow from other surface water features located outside of this area, although they may discharge into the watercourse discussed above that flows to the north of the existing TV1 and TV2 applications. The features are assumed to be classified as drainage features and not ordinary watercourses. The ecological value of these features is currently uncertain and will be determined to inform the ES, however for the purpose of this assessment they are considered to form an integral part of the Reclamation Pond and will therefore not be assessed as standalone surface water receptors. The Reclamation Pond has been identified as a saltmarsh feature; the ecological value of this feature and the network of ditches that flows through this area is discussed further in **Chapter 8: Freshwater and Marine Ecology (Volume 1)**.

- 9.6.21. Several other watercourses and ditches are located in the wider Study Area. This type of network is typical of low-lying topography in tidal areas such as the Site and form an integral part of the Teesmouth and Cleveland Coast SSSI, Ramsar site and SPA that encompasses Dorman's Pool and other ponds to the west of the Site, and land within the Study Area to the east of the River Tees. The ponds located in these areas are discussed further in the Designated Sites section below.
- 9.6.22. Several smaller ponds that do not form part of these designated sites are located outside of the Site but within the Study Area. Impacts to these features will be assessed in **Chapter 8: Freshwater and Marine Ecology (Volume 1)** and will not be assessed in this Chapter.
- 9.6.23. There are also a number of water features (reference SW42 to SW45, SW58, SW59, SW64 to SW66, SW68 in **Figure 9-9 (Volume 2)**) within the existing industrial areas of the Site. The site walkover undertaken in August 2023 indicated that these are used for water treatment purposes or as water for fighting fires in case of emergency. Several further industrial surface water features have been identified within the Study Area following updates to the design of the Proposed Scheme in February 2024. They are located to the east of the Site (reference SW85 – SW90, SW94, SW95, SW99 and SW100 in **Figure 9-9 (Volume 2)**). These features have not been observed as site walkovers have not been conducted in the newly identified areas following updates to the design of the Proposed Scheme, but review of OS mapping indicates they are located within industrial or other urban sites. Likely functions could again include drainage attenuation, water treatment purposes or emergency water sources for fighting fires. The features are not hydraulically connected to watercourses that flow through the Study Area. Impacts to these features will be assessed in **Chapter 8: Freshwater and Marine Ecology (Volume 1)** and will not be assessed in this Chapter.

### Designated Sites

- 9.6.24. The River Tees forms part of the Teesmouth and Cleveland Coast SSSI, SPA and Ramsar as it flows through the Study Area, also encompassing tidal mudflats adjacent to the River Tees within and downstream of the Study Area. The Dabholm Gut and the surface water body to the north of this watercourse (SW82 and SW112 respectively in

**Figure 9-9 (Volume 2)**) also form part of the Teesmouth and Cleveland Coast SSSI and SPA.

9.6.25. There are a number of nature reserves within the Study Area to the west and north west of the Site that also form part of the Teesmouth and Cleveland Coast SSSI, SPA and Ramsar. These are under the protection of the Royal Society for the Protection of Birds (RSPB) and include:

- RSPB Saltholme, which includes:
  - Dorman’s Pool Nature Reserve
  - Saltholme East Pool Nature Reserve;
  - Saltholme West Pool Nature Reserve; and
  - Paddy’s Pool Nature Reserve.

9.6.26. The Coatham Marsh SSSI and Local Nature Reserve is managed by the Tees Valley Wildlife Trust and is located approximately 1km east of the Bran Sands WWTP.

9.6.27. In addition, the following designated sites were identified outside of the surface water Study Area but in hydrological connectivity with the Site:

- Teesmouth National Nature Reserve – located approximately 1km downstream of the northernmost extent of the Site on the banks of the River Tees, at the confluence of the River Tees with the North Sea; and
- Seaton Dunes and Common SSSI and Local Nature Reserve (LNR) – located approximately 3km downstream of the northernmost extent of the Site, at the confluence of the River Tees with the North Sea.

9.6.28. The designated sites related to the water environment and located in the Study Area are shown in **Figure 9-1 (Volume 2)**.

**Surface Water Abstractions and Discharge Consents**

9.6.29. The EA, STBC and Middlesbrough Council were consulted in relation to the active surface water abstractions and discharge consents within the Study Area. The location of these features is shown in **Figure 9-9 (Volume 2)** and summarised in **Table 9-6** and **Table 9-7**. Information from Middlesbrough Council has not been received at the time of preparing this PEIR but will be included in the ES. Similarly, the Study Area for the Proposed Scheme was amended during the preparation of this PEIR; the Applicant sent a data request for the amended Study Area to the EA and STBC but additional information has not been received at the time of preparing this PEIR.

**Table 9-6: Active Surface Water Abstractions within the Study Area**

| Reference on Water Constraints Map | Location  | Purpose  | National Grid Reference |        |
|------------------------------------|---|--|-------------------------|--------|
| WA_01_S                            | River Tees: Wilton Engineering Wharf, within the Site | Industrial, Commercial & Public Services - General cooling | 449700                  | 521500 |

| Reference on Water Constraints Map | Location   | Purpose  | National Grid Reference |        |
|------------------------------------|--|--|-------------------------|--------|
| WA_02_S                            | River Tees: Teesport, c.1km downstream of the Site | Industrial, Commercial and Public Services - Dust suppression. | 454660                  | 523558 |

**Table 9-7: Active Surface Water Discharge Consents within the Study Area**

| Reference on Water Constraints Map | Location   | Discharge Type                             | National Grid Reference |        |
|------------------------------------|--|--|-------------------------|--------|
| DC_02                              | Within Site: Unnamed watercourse. Road Rail Despatch Terminal, Saltholme, Port Clarence, Billingham, TS2 1TT         | Undefined or Other                         | 451100                  | 522400 |
| DC_03                              | Within Site: River Tees  | Sewage disposal works – other              | 453330                  | 522940 |
| DC_04                              | Within Site: River Tees  | Sewage disposal works – other              | 453700                  | 523410 |
| DC_06, DC_07, DC_09                | Unknown receptor: c. 680m north of the Site<br>Cats Terminal, Seal Sands, TS2 1UB                                    | Sewage disposal works – other              | 451920                  | 524760 |
| DC_08                              | Unknown receptor: c. 680m north of the Site<br>Innogy Cogen, Seal Sands, TS1 2FB                                     | Undefined or Other                         | 452670                  | 524785 |
| DC_10                              | River Tees: c.1km downstream of the Site<br>Seal Sands Terminal, Seal Sands Road, Seal Sands, Middlesbrough, TS2 1UB | Undefined or Other                         | 454450                  | 525080 |
| DC_12                              | Within Site: Holme Fleet   | Production and Distribution of Electricity | 449200                  | 523700 |
| DC_15                              | River Tees: c.400m east of the Site  | Sewage disposal works – other              | 454130                  | 524190 |
| DC_18                              | Within Site: River Tees  | Sewage disposal works – other              | 453180                  | 522780 |
| DC_19                              | Within Site: River Tees  | Sewage disposal works – other              | 453520                  | 523140 |

| Reference on Water Constraints Map | Location   | Discharge Type                        | National Grid Reference |        |
|------------------------------------|--|---------------------------------------|-------------------------|--------|
| DC_20                              | Within Site: River Tees  | Sewage disposal works – other         | 453050                  | 522630 |
| DC_21                              | River Tees: c.270m east of the Site<br>Seal Sands  | Basic Ind. Chemicals<br>Organic       | 453960                  | 524160 |
| DC_23                              | River Tees: c.920m west of the Site<br>Nutec Centre For Safety,<br>Billingham              | Recreational and Cultural             | 448800                  | 522400 |
| DC_24                              | River Tees: c.480m east of the Site<br>Port Clarence                                       | Sewage disposal works - other         | 451700                  | 521200 |
| DC_25                              | Within Site: River Tees<br>Port Clarence   | Sewage disposal works – other         | 451100                  | 521100 |
| DC_26                              | Unknown receptor: c. 790m north of the Site<br>Cats Terminal, Seal Sands                   | Sewage disposal works – other         | 451930                  | 524410 |
| DC_30                              | Unnamed ordinary watercourse: c. 260m west of the Site<br>Saltholme Brinefield, Billingham | Sewage disposal works – other         | 450800                  | 523300 |
| DC_31                              | Unnamed ordinary watercourse: c. 260m west of the Site<br>Saltholme Brinefield, Billingham | Salt Extraction                       | 450810                  | 523310 |
| DC_35                              | Within Site: River Tees<br>Pumping Station, Port Clarence, Haverton Hill                   | Sewage Disposal Works - water company | 450140                  | 521330 |
| DC_36                              | River Tees: Wilton Engineering Wharf, within the Site                                      | Sewage Disposal Works - water company | 449450                  | 521650 |
| DC_37                              | River Tees: c.550m west of the Site  | Sewage Disposal Works - water company | 449040                  | 522020 |

### Existing Drainage

- 9.6.30. Information on the existing drainage serving the area of the Proposed Scheme is currently limited. Existing drainage systems of relevance will be considered as part of the preparation of the Outline Drainage Strategy for the Proposed Scheme and summarised within the ES and supporting FRA.
- 9.6.31. A review of the Landis Soilscales mapping shows that the entire Site is underlain by loamy and clayey soils of coastal flats with naturally high groundwater. Land within the Site is also likely to contain contaminants. This information suggests that infiltration techniques are unlikely to be feasible in the area of the Site. Considering this information, it is therefore assumed that the existing surface water drainage system serving the Site eventually discharges to the nearby watercourses and the River Tees.

### Flood Risk

#### **Risk of Flooding from Fluvial and Tidal Sources**

- 9.6.32. A review of the EA's Flood Map for Planning shows that the majority of the Site is located in the low-risk Flood Zone 1. However, the following areas are identified to be located within Flood Zones 2 and 3 as can be seen in **Figure 9-4 (Volume 2)**:
- West and north west of the Site in the vicinity of the rail terminal, National Grid sub-station and the associated cabling routes, pipeline corridor and conveyor;
  - Wilton Engineering Wharf and heavy haul road in the south west of the Site.
  - Isolated low lying areas in the east of the Site within the existing bulk storage tank farm and pipeline corridor; and
  - Utilities corridor (including existing crossing below the River Tees) to Bran Sands WWTP (including construction access) in the east of the Site.
- 9.6.33. The majority of flooding outside of the Site but within the Study Area is limited to Dorman's Pool and the Saltholme Nature Reserve to the west and north west of the Site that are located in Flood Zone 3.
- 9.6.34. The A178 Seaton Carew Road, the A1185 and the A1046 (including adjacent properties and a primary school at High Clarence, and the Docks) are also located in Flood Zones 2 and 3.
- 9.6.35. The definition of the Flood Zones is as follows:
- Flood Zone 1 is described as land with less than a 1 in 1000 annual probability of flooding from fluvial or tidal sources;
  - Flood Zone 2 is described as land having between a 1 in 100 and 1 in 1000 annual probability of fluvial flooding, or between a 1 in 200 and 1 in 1000 annual probability of tidal flooding; and
  - Flood Zone 3 is described as land having a 1 in 100 or greater annual probability of fluvial flooding, or a 1 in 200 or greater annual probability of tidal flooding.
- 9.6.36. The EA's Flood Map for Planning Flood Zones are provided in **Figure 9-4 (Volume 2)**.

- 9.6.37. The EA has provided the Port Clarence 2020 FM-TUFLOW model and report. This, along with consultation with the EA in October 2023, confirms that the flood risk to the Site and majority of land at risk within the wider Study Area is at risk of tidally dominated flooding and not fluvially dominated flooding. When considering the extent of flooding as illustrated in the Flood Map for Planning, the source of this flood risk is the River Tees with flood waters potentially affecting the Site from the south as well as overland from the north. Consultation with the EA in October 2023 confirmed that this model will be suitable to inform the assessment of flood risk for the Proposed Scheme. The model includes the most up to date climate change predictions for sea level rise. No update to peak fluvial flows is deemed to be required. A detailed review of the model will be undertaken by the Applicant to inform the ES and supporting FRA to ensure its suitability for the assessment.
- 9.6.38. The Flood Map for Planning does not take the presence of flood defences into account. The Study Area is defended by flood defences as discussed further below. Review of the Port Clarence 2020 FM-TUFLOW model indicates that, in the present day scenario, all areas within the Study Area to the west of the Site (including land in the Site, Dorman's Pool, Saltholme Nature Reserve, A178 Seaton Carew Road, A1185, A1046, adjacent properties and a primary school at High Clarence, and the Docks) are defended up to and including the 1 in 200 annual probability flood event. There is no notable difference between the defended and undefended scenario in the east of the Site. It is understood that the flood defences within this area comprise raised ground and are therefore included within both the undefended and defended flood modelling.
- 9.6.39. Consultation with the EA in October 2023 identified that Holme Fleet to the west of the Site posed fluvial flood risk to adjacent land. Within the southern extent of the watercourse (around the railway) this is believed to be partially attributable to the capacity of the culvert that passes underneath the railway and conveys the watercourse to the River Tees. It is understood that the fluvial extent of flooding does not pose flood risk to the Site at this location, now or in the future. Fluvial flood risk was also noted as likely within the northern extent of the watercourse around an existing National Grid substation. It is understood that fluvial hydraulic model data is available from the EA and will be reviewed to inform the ES and supporting FRA.
- 9.6.40. During consultation with the EA in October 2023 it was advised that the Flood Map and Planning for this area is currently being updated and will be made publicly available in November 2023. This will likely lead to slight changes to the extent of Flood Zones currently shown on the Flood Map for Planning although significant differences are not expected. The updated flood mapping will be assessed in the ES and supporting FRA.

### **Flood Defences**

- 9.6.41. The EA provided flood defence information on their assets at Port Clarence and Greatham in the southern part of the Site. The extent of the existing flood defences, including the assets owned by the EA and privately owned assets, is shown in **Figure 9-4 (Volume 2)**. Consultation with landowners to obtain additional information on privately owned flood defence assets of relevance to the Site will be undertaken to inform the ES and supporting FRA.

9.6.42. **Table 9-8** provides an overview of the condition of reported EA assets. Descriptions of the asset condition is as follows:

- 1 Very Good – Cosmetic defects that will have no effect on performance;
- 2 Good – Minor defects that will not reduce the overall performance of the asset;
- 3 Fair – Defects that could reduce performance of the asset;
- 4 Poor – Defects that would significantly reduce the performance of the asset. Further investigation needed; and
- 5 Very Poor – Severe defects resulting in complete performance failures.

9.6.43. The Study Area for the Proposed Scheme was amended during the preparation of this PEIR. A request for data for the amended Study Area has been sent by the Applicant to the EA. Any additional flood defence data received from the EA will be presented in the ES and supporting FRA.

**Table 9-8: EA Flood Defence Information**

| Asset Ref | Description                                  | Details of Protection  |
|-----------|--|--|
| 29648     | Embankment at Port Clarence (NZ 50078 21419) | Condition: 3 (fair);<br>Standard of Protection: 1 in 200 years;<br>Upstream crest level: 4.59mAOD;<br>Downstream crest level: 4.59mAOD; and<br>Length: 301.60m.    |
| 416350    | Embankment at Port Clarence (NZ 50360 21331) | Condition: 1 (very good);<br>Standard of Protection: 1 in 200 years;<br>Upstream crest level: 4.60mAOD;<br>Downstream crest level: 4.59mAOD; and<br>Length: 6.90m. |
| 452698    | Embankment at Port Clarence (NZ 49379 21733) | Condition: 3 (fair);<br>Standard of Protection: 1 in 200 years;<br>Upstream crest level: 5.20mAOD;<br>Downstream crest level: 5.20mAOD; and<br>Length: 143.40m.    |
| 454231    | Embankment at Port Clarence (NZ 49554 21607) | Condition: 2 (good);<br>Standard of Protection: 1 in 200 years;<br>Upstream crest level: 5.10mAOD;<br>Downstream crest level: 5.10mAOD; and<br>Length: 65.80m.     |
| 454219    | Flood Wall at Port Clarence (NZ 49503 21661) | Condition: 2 (good);<br>Standard of Protection: 1 in 200 years;<br>Upstream crest level: 5.05mAOD;<br>Downstream crest level: 5.00mAOD; and<br>Length: 120.30m.    |
| 454133    | Flood Wall at Port Clarence (NZ 49875 21440) | Condition: 2 (good);<br>Standard of Protection: 1 in 200 years;<br>Upstream crest level: 4.95mAOD;<br>Downstream crest level: 4.91mAOD; and<br>Length: 228.70m.    |

| Asset Ref | Description                                  | Details of Protection   |
|-----------|--|---|
| 454290    | Flood Wall at Port Clarence (NZ 49614 21580) | Condition: 1 (very good);<br>Standard of Protection: 1 in 200 years;<br>Upstream crest level: 4.93mAOD;<br>Downstream crest level: 4.90mAOD; and<br>Length: 62.50m. |
| 454311    | Flood Wall at Port Clarence (NZ 50060 21427) | Condition: 1 (very good);<br>Standard of Protection: 1 in 200 years;<br>Upstream crest level: TBC;<br>Downstream crest level: TBC; and<br>Length: 9.10m.            |
| 515361    | Floodbank at Greatham South (NZ 50259 25412) | Condition: 2 (good);<br>Standard of Protection: TBC;<br>Upstream crest level: TBC;<br>Downstream crest level: TBC; and<br>Length: 1671.40m.                         |
| 515966    | Floodbank at Greatham South (NZ 50934 25418) | Condition: 3 (fair);<br>Standard of Protection: TBC;<br>Upstream crest level: TBC;<br>Downstream crest level: TBC; and<br>Length: 760.40m.                          |

9.6.44. The information presented above will be used to inform the assessment of flood risk to the Proposed Scheme (both now and in the future) that will be reported in the ES and supporting FRA, including the proposed defended hydraulic modelling analysis and defence breach assessment. This information will be further supplemented where possible with data obtained for defences in private ownership.

#### **Risk of Flooding from Surface Water**

- 9.6.45. A review of the EA's Flood Risk from Surface Water mapping shows small, isolated areas within the Site which are indicated to be at low to high susceptibility to flooding from surface water. These areas are likely to be associated with the locally low ground where water would pond after intense or prolonged rainfall events.
- 9.6.46. The areas susceptible to flooding from surface water are shown in **Figure 9-5 (Volume 2)**.

#### **Risk of Flooding from Reservoirs**

- 9.6.47. A review of the EA's Flood Risk from Reservoirs mapping shows that the north east and west of the Site is at risk of flooding from reservoirs should a failure such as breach of reservoir occur when there is also flooding from rivers. The mapping indicates that the flood extents would be similar to those predicted for fluvial and tidal sources as discussed above. The source of reservoir flooding is uncertain and will be investigated further to inform the ES and supporting FRA.
- 9.6.48. The areas indicated to be at risk of flooding from reservoirs is shown in **Figure 9-6 (Volume 2)**.

**Groundwater**

9.6.49. The main characteristics of the geology (superficial and bedrock) that underlies the Proposed Scheme are described in **Table 9-9** below. Further information about the layout of the Proposed Scheme and key design aspects is described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** and shown on **Figure 1-2 (Volume 2)**.

**Table 9-9: Summary of groundwater level data from 2018 GI<sup>47</sup>**

| <b>Strata</b>              | <b>Site Coverage</b>   | <b>Description</b>   |
|----------------------------|--|--|
| <b>Artificial Ground</b>   |  |  |
| Made Ground                | Majority of Site and surrounding area to north, south and east. Artificial ground is shown to be absent along the western and north western pipeline corridor, to the west of the rail terminal and the southern extent of the Wilton Engineering Wharf. | N/A  |
| <b>Superficial Geology</b> |  |  |
| Tidal Flat Deposits        | Entire Site  | Sand and silt  |
| Glaciolacustrine Deposits  | Westerly extent of the Site south of the A1185 within the Utility Pipeline Corridor extent.  | Clay and silt  |
| <b>Bedrock Geology</b>     |  |  |
| Mercia Mudstone Group      | Majority of the Site   | Brown and red-brown, calcareous clays and mudstones, with occasional beds of impersistent green siltstone and fine-grained sandstone |
| Sherwood Sandstone Group   | Access road along the western section of the Site and location of rail terminal, bulk liquid storage and Feedstock Storage & Pre-Processing Area   | Sandstone, red, yellow and brown part pebbly, conglomeratic in lower part  |

9.6.50. A review of BGS Mapping<sup>43</sup> shows that the Site is underlain by Tidal Flat Deposits and Glaciolacustrine Deposits (westerly extent only). The superficial deposits are underlain by the Mercia Mudstone Group and Sherwood Sandstone Group (bedrock geology) as summarised in **Table 9-9**.

9.6.51. Tidal Flat Deposits are low productivity aquifers of limited or local potential, where borehole yields are expected to be small. The EA designated the Tidal Flat Deposits as

Secondary (undifferentiated) aquifers assigned in cases where it is not possible to attribute either a category A or category B aquifer designation to the rock type<sup>42</sup>. Glaciolacustrine Deposits are designated Unproductive strata.

9.6.52. The Mercia Mudstone Group and Sherwood Sandstone Group are designated Secondary B and Principal aquifers respectively by the EA<sup>42</sup>. Principal aquifers are deemed capable of supporting water supplies at a regional scale meaning they usually provide a high level of water storage. They may also support water supply and/or river baseflow on a strategic scale. Secondary B aquifers are predominantly lower permeability layers which can store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons, and weathering. They are generally the water-bearing parts of the former non-aquifers.

### **Groundwater Level and Flow**

9.6.53. Locally, groundwater flow direction in the superficial deposits, while generally towards the River Tees, will be variable and influenced by local changes in topography as well as aquifer geometry i.e. presence of clay or fine-grained deposits, rainfall and local man-made features such as drains. The River Tees is likely to be hydraulically connected to shallow groundwater within the superficial deposits (Tidal Flat Deposits).

9.6.54. Regional groundwater flow is likely to occur in the deep bedrock aquifer (Sherwood Sandstone Group). Groundwater flow in the deep bedrock aquifer is not generally in continuity with shallow groundwater.

9.6.55. Fissure and fracture flow is an important element of groundwater flow in the Sherwood Sandstone Group. Fissures act as natural drains of intergranular storage and provide relatively rapid flow paths, potentially offering substantial yields.

9.6.56. Ground investigation (GI) works were completed in 2018<sup>47</sup>. The purpose of these works was to investigate ground conditions and assess the contamination status of the former Air Products TV1 and TV2 sites that lie within the SAF Plant Site of the Proposed Scheme. This data is considered appropriate to inform the baseline and complemented by freely available online data sources<sup>43</sup> where gaps in site-specific data exist.

9.6.57. Groundwater level monitoring was undertaken on three occasions between 19 June 2018 and 12 July 2018 within the superficial Tidal Flat Deposits (specifically sand lithology). The average depth to groundwater level is recorded at 4.49 mbgl (meters below ground level) at the location of the former Air Products TV1 and TV2 sites (**Table 9-10**).

9.6.58. No groundwater level data has been provided through consultation to date. The data that is obtained will be included in the ES.

**Table 9-10: Summary of groundwater level data from 2018 GI<sup>47</sup>**

| Borehole ID | Well Screen (mbgl) | Screened Strata    | Average Groundwater Level |      |
|-------------|--------------------|--------------------|---------------------------|------|
|             |                    |                    | mbgl                      | mOD  |
| BH01-18     | 3.0 – 5.5          | Made Ground        | 4.65                      | 1.29 |
| BH02-18     | 6.3 – 9.0          | Sand               | 4.77                      | 1.29 |
| BH05-18     | 2.1 - 5.1          | Made Ground        | 4.53                      | 1.46 |
| BH06-18     | 2.0 – 5.1          | Made Ground        | 4.52                      | 1.48 |
| BH07-18     | 3.5 – 6.5          | Made Ground        | 4.86                      | 1.13 |
| BH10-18     | 3.0 – 5.7          | Made Ground        | 4.54                      | 1.52 |
| BH12-18     | 3.0 – 6.0          | Made Ground        | 4.56                      | 1.42 |
| BH13-18     | 4.0 – 10.0         | Made Ground        | 4.43                      | 1.51 |
| BH17-18     | 1.0 – 5.0          | Made Ground        | 4.45                      | 1.58 |
| BH09-18     | 6.5 – 8.5          | Sand               | 4.66                      | 1.35 |
| BH23-18     | 3.0 – 5.5          | Made Ground        | 4.34                      | 1.36 |
| BH24-18     | 6.3 – 9.0          | Made Ground        | 4.27                      | 1.45 |
| BH25-18     | 2.1 – 5.1          | Made Ground        | 4.24                      | 1.53 |
| BH26-18     | 2.0 – 5.1          | Made Ground        | 4.13                      | 1.58 |
| BH21-18     | 5.5 – 8.5          | Sand               | 4.49                      | 1.33 |
| BH22-18     | 3.3 – 7.3          | Made Ground & Sand | 4.42                      | 1.35 |

Table notes –mOD denotes metres Ordnance Datum. No groundwater level monitoring has been undertaken within bedrock geology (Mercia Mudstone Group and Sherwood Sandstone Group).

- 9.6.59. Local BGS boreholes from the BGS GeoIndex Online Database<sup>43</sup> provide indicative records for ground conditions including depth to superficial/bedrock geology and water strikes (where available) for the Proposed Scheme. A summary is provided in **Table 9-11** and the location of the borehole to specific areas of the Proposed Scheme.
- 9.6.60. Local BGS boreholes identify that the Sherwood Sandstone Group is at depth (>50 mbgl) where overlain by the Mercia Mudstone Group, which is present across most of the Site. The Sherwood Sandstone Group is at a shallower depth (<50mbgl) in the north west of the Site where superficial deposit cover exists only and the Utility Pipeline Corridor Access will be located (NZ 51066 23306).
- 9.6.61. The data suggests that potentially shallow (<6mbgl) and deep (41mbgl) groundwater levels exist. Water strikes are recorded in local BGS boreholes and may not be representative spatially and temporally of groundwater level however, this data is considered appropriate to inform the baseline. The groundwater elevation for the outer perimeter of the Site is assumed to be at the level of the River Tees (2.4mOD).

**Table 9-11: Summary of water strike data from local BGS boreholes (GeolIndex, 2023)**

| BGS BH Ref     | BGS BH NGR     | Total Depth (m) | Depth to base of Strata* (m) |                     | Water Strike mbgl (mOD)*** | Location** (NGR)                                    |
|----------------|----------------|-----------------|------------------------------|---------------------|----------------------------|---|
|                |                |                 | Superficial Deposits         | Bedrock Geology     |                            |   |
| NZ52SW478      | NZ 53240 22990 | 105.5           | 31.5                         | 94 MMG<br>105.5 SSG | NR                         | Existing Jetty (NZ 53320 22948)                     |
| NZ52SW479      | NZ 51040 23340 | 122             | 33                           | 122 SSG             | 41 (-39.6mOD)              | Utility Pipeline Corridor Access (NZ 51066 23306)   |
| NZ52SW15055/19 | NZ 51474 23661 | 30.5            | 30.5                         | NA                  | NR                         | Utility Pipeline Corridor Access (NZ 51484 23601)   |
| NZ52SW784      | NZ 51170 22390 | 48.6            | 10                           | 48.6 SSG            | 5.35                       | Rail Terminal (NZ 51036 22259)                      |
| NZ52SW809      | NZ 51160 21890 | 14.25           | 4.0                          | 14.25 MMG           | 2.20                       | MOF / Provisional Heavy Haul Route (NZ 51101 21906) |
| NZ52SW690      | NZ 51100 21650 | 12.5            | 4.2                          | 12.5 MMG            | NR                         | MOF / Provisional Heavy Haul Route (NZ 51082 21624) |
| NZ52SW766      | NZ 51060 21460 | 12              | 12                           | NA                  | 3.9                        | MOF / Provisional Heavy Haul Route (NZ 51052 21433) |
| NZ52SW768      | NZ 50870 21210 | 12              | 11                           | NA                  | 3.7                        | MOF / Provisional Heavy Haul Route (NZ 50870 21210) |
| NZ52SW1085     | NZ 51175 21057 | 27              | 25.5                         | 27 MMG              | NR                         | MOF / Provisional Heavy Haul Route (NZ 51175 21057) |
| NZ52SW1084     | NZ 51111 21062 | 23.4            | 22.7                         | 23.4 MMG            | NR                         | MOF / Provisional Heavy Haul Route (NZ 51111 21062) |
| NZ42SW255/S    | NZ 49422 21732 | 30.48           | 30.48                        | NA                  | 3.6                        | MOF / Provisional Heavy Haul Route (NZ 49481 21708) |
| NZ52SW470      | NZ 50020 21480 | 33.83           | 29.0                         | 33.83 MMG           | NR                         | MOF / Provisional Heavy Haul Route (NZ 50020 21480) |

| BGS BH Ref | BGS BH NGR     | Total Depth (m) | Depth to base of Strata* (m) |                 | Water Strike mbgl (mOD)*** | Location** (NGR)  |
|------------|----------------|-----------------|------------------------------|-----------------|----------------------------|---|
|            |                |                 | Superficial Deposits         | Bedrock Geology |                            |   |
| NZ52SE51   | NZ 56991 24582 | 28.2            | 12.2                         | 28.2 MMG        | 2.1                        | Utility Pipeline Access Corridor (NZ 56991 24582) on eastern bank of River Tees |

Table notes – BH denotes borehole and NR specifies no record in log\* Recorded depth of strata in BGS BH log

\*\* Location of BGS borehole to key development areas for the Proposed Scheme

MMG denotes Mercia Mudstone Group

SSG denotes Sherwood Sandstone Group

\*\*\* mOD groundwater level provided when borehole elevation recorded on BGS BH log

### **Groundwater Abstractions**

- 9.6.62. The Groundwater Study Area does not fall within a Source Protection Zone (SPZ). The closest SPZ is approximately 9km north west of the Site at Dalton Piercy and based on the geology of the area, the abstraction is assumed to be targeting the Sherwood Sandstone Group and/or Ford Formation<sup>43</sup>.
- 9.6.63. The EA has provided information on groundwater abstractions identified within 5 km of the Proposed Scheme (**Table 9-12** and **Figure 9-9 (Volume 2)**). No details on yield (daily/annually) have been provided.
- 9.6.64. No data/information has been made available through consultation to date on small private (unlicenced) water supplies. Middlesbrough Council confirmed that they do not hold any information/data on private (unlicenced) water supplies within the Study Area. Further data and information regarding abstractions in the Study Area has been requested from STBC but is not yet available. The data that is obtained regarding this aspect will be included in the ES.
- 9.6.65. The Study Area for the Proposed Scheme was amended during the preparation of this PEIR; data request for the amended Study Area has been sent by the Applicant to the EA and STBC but additional information has not been received at the time of preparing this PEIR.

**Table 9-12: Summary of groundwater abstractions within Study Area**

| <b>Abstraction Licence No. / Name</b>           | <b>Easting</b> | <b>Northing</b> | <b>Purpose</b>                            | <b>Target Aquifer</b>    | <b>Location</b>   | <b>Water Constraints Reference (Figure 9-9 (Volume 2))</b> |
|---|----------------|-----------------|---|--------------------------|---|--|
| 1/25/04/164<br>North Tees Ltd                   | 452310         | 523190          | General Use                               | Mercia Mudstone Group    | Within Site   | WA_13_G  |
| 1/25/04/134<br>Huntsman Petrochemicals (UK) Ltd | 451030         | 523380          | General Use                               | Sherwood Sandstone Group | Within Groundwater Study Area close to location of pipeline corridor, north of Saltholme East Pool            | WA_04_G  |
| 1/25/04/134<br>Sabic UK Petrochemicals          | 451030         | 523380          | Environmental                             | Sherwood Sandstone Group | Within Groundwater Study Area close to location of pipeline corridor, north of Saltholme East Pool            | WA_09_G  |
| 1/25/04/133<br>Huntsman Petrochemicals (UK) Ltd | 450980         | 522850          | Industrial/Public and Commercial Services | Sherwood Sandstone Group | Within Groundwater Study Area close to location of pipeline corridor, within footprint of Saltholme East Pool | WA_02_G  |
| 1/25/04/133                                     | 450960         | 522740          | Industrial/Public and Commercial Services | Sherwood Sandstone Group | Within Groundwater Study Area close   | WA_03_G  |

| Abstraction Licence No. / Name               | Easting | Northing | Purpose       | Target Aquifer           | Location   | Water Constraints Reference (Figure 9-9 (Volume 2)) |
|--|---------|----------|---------------|--------------------------|--|---|
| Huntsman Petrochemicals (UK) Ltd             |         |          |               |                          | to location of pipeline corridor, south of Saltholme East Pool                                     |   |
| 1/25/04/134 Huntsman Petrochemicals (UK) Ltd | 450830  | 523400   | General Use   | Sherwood Sandstone Group | Within Groundwater Study Area close to location of pipeline corridor, north of Saltholme East Pool | WA_01_G   |
| 1/25/04/134 Sabic UK Petrochemicals          | 450830  | 523400   | Environmental | Sherwood Sandstone Group | Within Groundwater Study Area close to location of pipeline corridor, north of Saltholme East Pool | WA_08_G   |
| 1/25/04/134 Huntsman Petrochemicals (UK) Ltd | 450700  | 522950   | General Use   | Sherwood Sandstone Group | Within Groundwater Study Area, west of Saltholme East Pool and A178                                | WA_05_G   |
| 1/25/04/134 Sabic UK Petrochemicals          | 450700  | 522950   | Environmental | Sherwood Sandstone Group | Within Groundwater Study Area, west of Saltholme East Pool and A178                                | WA_07_G   |

| Abstraction Licence No. / Name                  | Easting | Northing | Purpose                                   | Target Aquifer           | Location   | Water Constraints Reference (Figure 9-9 (Volume 2)) |
|---|---------|----------|---|--------------------------|--|---|
| 1/25/04/134<br>Huntsman Petrochemicals (UK) Ltd | 451280  | 525000   | Industrial/Public and Commercial Services | Sherwood Sandstone Group | Within Groundwater Study Area, north of the Site             |   |
| 1/25/04/133<br>Huntsman Petrochemicals (UK) Ltd | 451230  | 524700   | Industrial/Public and Commercial Services | Sherwood Sandstone Group | Within Groundwater Study Area, north of the Site             | WA14_G  |
| 1/25/04/134<br>Sabic UK Petrochemicals          | 451200  | 524370   | Industrial/Public and Commercial Services | Sherwood Sandstone Group | Within Groundwater Study Area, north of the Site             | WA_11_G   |
| 1/25/04/134<br>Sabic UK Petrochemicals          | 451180  | 524100   | General Use                               | Sherwood Sandstone Group | Within Groundwater Study Area, north of the Site             | WA_10_G   |
| 1/25/04/183/R01<br>Middlesbrough Council        | 449513  | 520865   | Industrial/Public & Commercial Services   | Unknown                  | Within Groundwater Study Area, south of River Tees           | WA_06_G   |
| 1/25/04/142<br>United Biscuits (Foods) Ltd      | 447500  | 524100   | Industrial/Public & Commercial Services   | Sherwood Sandstone Group | Within Groundwater Study Area and 3.2km west of DCO the Site | -   |
| 1/25/04/162                                     | 442500  | 520950   | Laundry Use                               | Sherwood Sandstone Group | Outside Study Area   | -   |

| Abstraction Licence No. / Name                   | Easting | Northing | Purpose                                 | Target Aquifer           | Location                      | Water Constraints Reference (Figure 9-9 (Volume 2)) |
|--|---------|----------|---|--------------------------|-------------------------------|---|
| North Tees & Hartlepool NHS Trust                |         |          |   |                          |                               |   |
| NE/025/0001/014<br>Access Utilities (UK) Limited | 451587  | 520646   | Industrial/Public & Commercial Services | Sherwood Sandstone Group | Within Groundwater Study Area | WA_12_G   |

### **Groundwater Quality**

- 9.6.66. The groundwater vulnerability map<sup>42</sup> shows the vulnerability of groundwater to a pollutant discharged at ground level based on the hydrological, geological, hydrogeological and soil properties within a single square kilometre. The Tidal Flat Deposits are designated as Medium to High groundwater vulnerability which means that these units can transmit pollution to groundwater easily. The Glaciolacustrine Deposits are designated Unproductive strata with no groundwater vulnerability assigned.
- 9.6.67. Under the WFD (**Figure 9.7 (Volume 2)**), the EA has determined the Site lies within the Tees Sherwood Sandstone groundwater water body (WFD Groundwater Body ID GB40301G702000) and the Tees Mercia Mudstone & Redcar Mudstone Groundwater Waterbody (WFD Groundwater Body ID GB40302G701300) that are classified as holding Good status and Poor status (respectively) for both qualitative and chemical classification based on the 2019 dataset. Both groundwater bodies are protected under the Drinking Waters Directive<sup>40</sup>.
- 9.6.68. The Skerne Magnesian Limestone groundwater water body (WFD Groundwater Body ID GB40301G704000) is present within the wider Study Area<sup>40</sup> and is not considered to be directly and/or indirectly impacted by the Proposed Scheme.
- 9.6.69. No additional groundwater quality data through consultation has been provided for the Proposed Scheme to date. The data that is obtained will inform the EIA with the outcomes, as appropriate to Construction and Operation Phase risks to groundwater receptors and will be reported in the ES.

### **Groundwater Dependent Terrestrial Ecosystems (GWDTE)**

- 9.6.70. Based on the GWDTE Map of England<sup>42</sup>, GWDTE's are identified within the Site. The Tees and Cleveland Coast Ramsar Sites are located to the west of the Site and south east boundary along the River Tees. These areas are designated Ramsar sites based on the presence of nationally and internationally important number of species<sup>66</sup>. The Teesmouth and Cleveland Coast SSSI is designated to the River Tees (south of the Proposed Scheme) and is considered a SSSI for its nationally important Jurassic and Quaternary geology, saltmarsh, sand dunes, flora and fauna<sup>67</sup>. The SSSI and Ramsar designations include Dorman's Pool Nature Reserve and Salholme West Pool Nature Reserve to the west of the Site.
- 9.6.71. The Tees and Cleveland Coast Ramsar Sites and Teesmouth and Cleveland Coast SSSI will potentially be indirectly impacted by the Proposed Scheme. Precautionary assumptions and assessments will be made at ES stage, where additional detailed design information will be available, to these receptors that may be indirectly affected by the Proposed Scheme.

### **Groundwater Flooding**

- 9.6.72. Groundwater flooding usually occurs in low lying areas underlain by permeable rock and aquifers that allow groundwater to rise to the surface through the permeable subsoil following long periods of wet weather. Low lying areas may be more susceptible to

groundwater flooding because the water table is usually at a much shallower depth and often intersects the surface in valley bottoms providing baseflow for rivers and streams.

- 9.6.73. Most of the Site is classified as having a low risk to groundwater flooding attributed to the low permeability Mercia Mudstone Group<sup>46</sup>. The western and north western boundary of the Site (at the location of the rail terminal and pipeline corridor, respectively) is classified as having high risk to groundwater flooding attributed to the permeable Sherwood Sandstone Group<sup>46</sup>.
- 9.6.74. The LLFA do not hold any information on groundwater flooding and no additional groundwater flooding data has been provided through consultation and engagement on the Proposed Scheme to date. Any additional data that is obtained regarding this aspect will inform the EIA.
- 9.6.75. Groundwater flooding risks are often highly localised and dependent upon geological interfaces between permeable and impermeable subsoils/strata. It is important to understand site specific ground conditions. Considering the above information and preliminary design proposals, there is a potential risk of flooding from groundwater, and this will be assessed in the ES as more data becomes available.

## **FUTURE BASELINE**

### **Surface Water and WFD**

- 9.6.76. The main aim of the WFD is for designated waterbodies to achieve Good overall status. The surface water bodies identified within the Study Area are currently not achieving this objective. Review of the EA's Catchment Data Explorer indicates that this may not be achievable for the Tees Water Body due to disproportionate costs and unfavourable balance of costs and benefits, however improvement to achieve Good status for certain quality elements such as Fish, Invertebrates and Chemical status is proposed.
- 9.6.77. The approved planning application for the infilling of the Reclamation Pond by North Tees Remediation Limited includes a culvert extension of the ordinary watercourse that flows west to east through this site, over a length of approximately 400m. Further detail of the proposals are currently unknown. It is assumed however that hydraulic connectivity along the entire length of the watercourse would be maintained; that the capacity of the culverted watercourse would not be less than the capacity of the upstream culvert or the required capacity of the culvert to receive existing inflows; and the alignment and the hydraulic function of the watercourse would remain largely unchanged. This will be clarified as part of the ES and supporting FRA.
- 9.6.78. Investigations and further surveys are scheduled to determine hydrological and hydrogeological regime (including connectivity with other water sources outside the Site) and this will be clarified as part of the ES as more information and data becomes available to support the EIA.

### **Flood Risk**

- 9.6.79. Climate change is expected to change baseline flood risk over the design life of the Proposed Scheme, with sea levels predicted to rise and periods of rainfall likely to become more prolonged and intense.
- 9.6.80. The Port Clarence 2020 FM-TUFLOW model included climate change analysis for the 1 in 200 annual probability tidal flood event for the defended scenario. Initial review of this data indicates no increase in flood risk to the west of the Site during the 2070 epoch, with all land in the Site and Study Area to the west of the Site still shown to be defended. Modelling of the 2100 epoch indicates overtopping of the defences in this area, with flood waters during the 1 in 200 annual probability tidal flood event posing flood risk to Wilton Engineering Wharf and the proposed haul road, and encroaching to within the southern extent of the rail terminal bulk storage area. Land within the Study Area to the west of the Site is also shown to be at risk of flooding during this event.
- 9.6.81. Initial review of this data indicates an increase in tidal flood risk in the east of the Site during the 2070 epoch, with flood waters encroaching further into the bulk storage area, pipeline corridors and Construction Laydown/parking areas. The extent of flooding increases further during the 2100 epoch, with flood waters also spilling into the saltmarsh/Reclamation Pond area.
- 9.6.82. The main works area for the SAF Plant Site remains outside the flood extent of the modelled climate change scenarios for both epochs.
- 9.6.83. The impacts of climate change on the risk of tidal flooding will be assessed in greater detail as part of the ES and supporting FRA.
- 9.6.84. Climate change could also increase the risk of flooding from surface water flooding, groundwater flooding and drainage systems; this will be assessed in greater detail as part of the ES and supporting FRA.

### **Groundwater**

- 9.6.85. The effects of climate change may impact on groundwater levels (locally) within the Study Area, due to hydraulic connectivity to surface water, changes to precipitation patterns and groundwater recharge. The combined climate change effects may lead to greater interaction between surface waters and groundwater in the future. Therefore, allowances will be included in the design to account for these future changes to the water environment to improve the sustainability and future-proof the Proposed Scheme.
- 9.6.86. The overall effect on the natural groundwater regime (quantity and quality) from climate change is unpredictable due to various climate change factors directly influencing associated resources in opposing ways; high temperatures reducing groundwater recharge, changes to rainfall patterns altering the seasonality and long term groundwater recharge and enhanced extremes increasing regime variability. The groundwater regime may be further impacted indirectly by climate change due to associated changes in anthropogenic behaviour affecting land use and water resource development/management.

9.6.87. Climate change impacts on groundwater receptors will be considered further in the ES as further information on detailed design becomes available.

9.6.88. The approved planning application for the infilling of the Reclamation Pond by North Tees Remediation Limited is summarised in **Section 9.6.67** above. Further detail of the proposals is currently unknown and at this stage, it is unclear if groundwater connectivity to the Reclamation Pond exists. Investigations and further surveys are scheduled to determine hydrological and hydrogeological regime (including connectivity with other water sources outside the Site) and this will be clarified as part of the ES as more information and data becomes available to support the EIA.

**SUMMARY OF IDENTIFIED RECEPTORS**

9.6.89. The sensitive receptors (surface water, groundwater and flood risk) identified for this assessment are presented in **Table 9-13** below. The list of the sensitive receptors will be redefined in the ES if needed to include findings from ongoing Site surveys.

**Table 9-13: Water Environment and Flood Risk Sensitive Receptors**

| Receptor  | Sensitivity | Justification  |
|---|-------------|--|
| <b>Surface Water Receptors, including WFD Receptors</b>                             |             |  |
| River Tees (reference SW76 in <b>Figure 9-9 (Volume 2)</b> )                        | Very High   | Designated main river. WFD monitored water body. Designated SSSI, Ramsar and SPA (marine components). Flows adjacent to the Site and in hydraulic connectivity with the Site.<br><br>The Teesmouth and Cleveland Coast SPA and Ramsar site triggers the requirement for nutrient neutrality. |
| North Sea/Tees Coastal Water Body (reference SW78 in <b>Figure 9-9 (Volume 2)</b> ) | High        | WFD monitored water body. North Sea and Tees Coastal Water Body is adjacent to the Site and in hydraulic connectivity with the Site.   |
| Holme Fleet (reference SW05 in <b>Figure 9-9 (Volume 2)</b> )                       | Very High   | Designated main river and ordinary watercourse. Flows through adjacent Nature Reserves and areas designated as SSSI and Ramsar. Open channel section is located within the surface water Study Area. The river is culverted through the Site. Not monitored against WFD objectives.          |
| Dabholm Gut (reference SW78 in <b>Figure 9-9 (Volume 2)</b> )                       | Very High   | Ordinary watercourse that forms part of a WFD monitored water body (Tees Estuary (S Bank) Water Body). Designated SSSI. Flows adjacent to the Site and in hydraulic connectivity with the Site.  |

| Receptor  | Sensitivity         | Justification   |
|---|---------------------|---|
| The Fleet (reference SW81 in <b>Figure 9-9 (Volume 2)</b> )   | Very High           | Ordinary watercourse and WFD monitored water body (Tees Estuary (S Bank) Water Body). Designated SSSI and SPA (marine components). Flows through Coatham Marsh LNR upstream of the Site.  |
| Ponds located in designated areas including Dorman's Pool, Saltholme East Pool, Saltholme West Pool and Paddy's Pool <b>Figure 9-9 (Volume 2)</b> | Very High           | Located in areas designated as SSSI and Ramsar. Ponds are not located in the Site but are located within the surface water Study Area.  |
| Ordinary watercourses and drains <b>Figure 9-9 (Volume 2)</b>   | Low to High         | Ordinary watercourses located within the Site and in the surface water Study Area. Ecological value currently uncertain. Flow through adjacent Nature Reserves and areas designated as SSSI and Ramsar.   |
| Teesmouth National Nature Reserve (reference SW01 in <b>Figure 9-9 (Volume 2)</b> )   | Very High           | Designated as SSSI and Ramsar. Located approximately 1km downstream and hydraulically connected to the Site.  |
| Licensed and Private (unlicensed/licenced) surface water abstractions <b>Figure 9-9 (Volume 2)</b>  | Medium              | Surface water abstractions provide water supply for non-domestic industrial applications. Limited use of surface water abstraction within Study Area.   |
| <b>Flood Risk Receptors</b>   |                     |   |
| People, property and infrastructure in the surrounding area   | Medium to Very High | Flood risk receptors within the Study Area include industrial premises, marine docks infrastructure, electrical sub-stations, Bran Sands WWTP, residential development, school facilities and roads likely to be required for mass evacuation.  |
| Proposed Scheme   |                     | The Proposed Scheme comprises several land use activities. In accordance with Annex 3 of the NPPF, non-hazardous waste management facilities and car parking would be classified as Less Vulnerable; areas containing hazardous substances would be classified as Highly Vulnerable or Essential Infrastructure; electricity generation facilities would be classified as Essential |

| Receptor   | Sensitivity | Justification   |
|--|-------------|---|
|  |             | Infrastructure; and docks and wharfs would be classified as Water Compatible. Vulnerability classification is subject to ongoing consultation with the EA and Local Authorities.  |
| <b>Groundwater Receptors</b>   |             |   |
| Superficial Deposit aquifers – Secondary (undifferentiated) aquifers | Medium      | Form perched minor aquifers discontinuous to underlying bedrock system.<br>Changes to groundwater flow path(s) due to below ground structures extending below the groundwater table forming groundwater barriers that may increase susceptibility of groundwater flood risk.<br>Shallow groundwater levels are expected and hydraulic connectivity to River Tees.   |
| Sherwood Sandstone Group - Principal aquifer                         | Very High   | Forms part of the regional aquifer system designated under the WFD as ‘Good’ status. Supports major public water supply abstraction licences in the area.<br><br>Changes to groundwater flow path(s) due to below ground structures extending below the groundwater table forming groundwater barriers that may increase susceptibility of groundwater flood risk.  |
| Mercia Mudstone Group - Secondary B Aquifer                          | Medium      | Forms part of the regional aquifer system designated under the WFD as ‘poor’ status. May support public water supply abstraction licences in the area. Where permeable sandy strata exist (skerries), limited quantities of groundwater suitable for domestic or small-scale agricultural use may be obtainable.<br><br>Changes to groundwater flow path(s) due to below ground structures extending below the groundwater table forming groundwater barriers that may increase susceptibility of groundwater flood risk. |

| Receptor   | Sensitivity | Justification  |
|--|-------------|--|
| Groundwater Dependent Terrestrial Ecosystem (GWDTE)    | High/Medium | Teesmouth and Cleveland Coast SSSI/Ramsar designations (including Dorman’s Pool and Saltholme Nature Reserves) located within the Study Area that may be hydraulically connected to groundwater and potentially impacted by the Proposed Scheme.<br>Investigations and further surveys are scheduled to determine hydrological and hydrogeological regime (including connectivity with other water sources outside the Site) of the Reclamation Pond and this will be clarified as part of the ES as more information and data becomes available to support the EIA. |
| Private (unlicensed/licenced) groundwater abstractions | High        | Licensed groundwater abstractions are located within the Study Area targeting the bedrock aquifers (Mercia Mudstone Group and Sherwood Sandstone Group). It is unclear if these abstractions are still in use (active) from the available information. For the purposes of the EIA, these abstractions are considered active.  |

## 9.7. EMBEDDED DESIGN, MITIGATION AND ENHANCEMENT MEASURES

9.7.1. This section sets out the embedded design, mitigation and enhancement measures relevant to the Water Environment and Flood Risk. The measures outlined here will be necessary to address the significant impacts outlined in **Section 9.11**. Many of the mitigation measures proposed for the construction phase will, if appropriate, also apply to the decommissioning phase.

### CONSTRUCTION MITIGATION MEASURES

#### Drainage Strategy

9.7.2. An OCoCP will be prepared for the works and submitted for the DCO. The OCoCP will summarise the key principles to manage risks to the water environment and flood risk receptors. It will form the basis of the full CoCP which will be provided by appointed contractor prior to works commencing.

9.7.3. The OCoCP will outline how construction activities will be undertaken and include method statements for the proposed works, a Construction Phase drainage strategy, and details of materials to be used. The instructions and construction method statements contained within the OCoCP will inform onsite staff of how the carry out works in a way that reduces the risk of contaminating the surrounding environment. This

includes working in adverse weather conditions and managing complaints and environmental incidents.

- 9.7.4. The OCoCP will reference industry-standard best practice and guidance including, but not limited to, the following:
- CIRIA C532: Control of Water Pollution from Construction Sites<sup>37</sup>
  - CIRIA C741: Environmental Good Practice on Site Guide<sup>68</sup>;
  - Guidance for Pollution Prevention (GPP)<sup>26</sup>. This will replace the Pollution Prevention Guidelines (PPG)<sup>69</sup> when published by the EA. While they have not yet been replaced, the PPG should be followed for best practice. Of particular relevance are:
    - GPP1: Understanding Your Environmental Responsibilities – Good Environmental Practices;
    - GPP 5: Works and Maintenance in or Near Water;
    - PPG 6: Working at Construction Demolition Sites;
    - GPP 21: Pollution Incident Response Planning; and
    - GPP 22: Dealing with Spills.
- 9.7.5. Examples of mitigation measures which will be implemented include, but are not limited to, the following:
- Appropriate pollution prevention measures will be applied during all construction activities;
  - Construction time will be minimised as far as practical; and
  - Appropriate construction techniques will be used to minimise potential impact on the surface water and groundwater resources.
- 9.7.6. The mitigation measures listed below are also likely to be required to minimise impacts of the Proposed Scheme to the water environment through the Construction Phase:
- Exposed surface to be minimised by removing vegetation only when necessary, and keeping gradients as shallow as possible to ensure materials don't flow as far and fast during periods of prolonged heavy rainfall;
  - Use of heavy machinery near waterbodies should be minimised as far as reasonably practicable and stockpiles should not be located within 10m of surface water features;
  - All entry and exit points should have wheel wash facilities in place with machinery cleaned in accordance with best practice, relevant guidance and approved FRAP if applicable;
  - Surface water runoff would be captured and settled out in accordance with best practice and guidance, with contaminants being removed prior to disposal;
  - Runoff should be treated at source to ensure hydrocarbon removal is carried out in accordance with guidelines and permits;

- The use of drip trays under machinery at risk of causing leaks or spillages should be incorporated wherever necessary to reduce the risk of contaminated runoff polluting sensitive surface water features;
- Areas that pose greater risks of contamination by spillage should be located appropriately, as far away from surface water features as practicable;
- A fully mapped network of the drainage including all surface water collection points such as gullies and drains, should be considered through the construction process with measures being put in place to prevent the system becoming contaminated;
- Refuelling of machinery and HGVs should be carried out in bunded areas with a 10m buffer zone between the areas and surface water features and drainage assets;
- Hazardous substances should be contained within fully bunded (and lined) impermeable areas within adequate storage capacity plus an appropriate safety margin;
- Fit-for-purpose means of containing spillages should be located at suitable locations across the Site, such as absorption materials;
- Concrete washout would take place in designated washout areas, and construction materials such as cement would be mixed a suitable distance from surface water features; and
- Appropriate and effective management of polluting substances and sediments throughout construction processes.

9.7.7. The OCoCP will describe measures that effectively manage surface water runoff during the construction phase to prevent pollution risk to the water environment. This will need to be an adaptive strategy that responds to the evolving nature of the construction site, with focus on the interception, treatment and safe management of surface water runoff that could otherwise migrate directly or indirectly to receiving waterbodies.

9.7.8. The OCoCP will be supported by method statements prepared by the appointed contractor for works in close proximity to sensitive receptors. It is recommended that these are developed in consultation with the relevant authorities and include but not limited to the following:

- River Tees;
- Holme Fleet;
- Dorman's Pool; and
- Saltholme East Pool.

9.7.9. The potential for airborne contaminants to pollute surface water features would be mitigated in accordance with measures outlined in the **Chapter 5: Air Quality (Volume 1)**.

### **Flood Risk**

9.7.10. Qualifying works that are carried out within the mapped Flood Zones or in close proximity to EA flood defences would require a Flood Risk Activities Permit (FRAP). This would be secured prior to works in these areas commencing and secured as part of the

Requirements of the DCO. This would be of particular relevance to the works proposed within the existing floodplain and works proposed within 16m of the existing flood defences and/or main river (namely River Tees and Holme Fleet). The need for a FRAP in these areas has been discussed with the EA and further details will be subject to ongoing consultation as the works progress through to ES stage. This will also include consideration of impacts to maintenance access to flood defence infrastructure.

- 9.7.11. Consideration will also be given to the condition of infrastructure that may be affected by construction activities, including but not limited to the structural condition of existing culverts (including Holme Fleet), drainage lines and flood defence assets. Survey of existing infrastructure will be undertaken as required to determine the alignment and condition of existing assets within the Site prior to works commencing. In regard to Holme Fleet, the condition of the culvert is reported to be in poor condition with proposed reconstruction/realignment of this culvert by the EA. The programme of these proposed works is currently unknown. However, the Applicant will maintain communication with the EA to coordinate respective works and undertake pre- and post-construction condition assessment as required.
- 9.7.12. If Option 2 (Clarence Wharf) is progressed to support the import of construction materials and works within the River Tees are subsequently deemed to be required, a Marine License may be required from the Marine Management Organisation (MMO). Consultation with the MMO will be undertaken during the preparation of the ES and evolving design of the Proposed Scheme to determine the requirement for a Marine License. If required, this would be secured prior to works in the River Tees commencing and secured as part of the Requirements to the DCO.
- 9.7.13. Consideration will be given to potential effects that may arise through localised excavations or intrusive earthworks (e.g., piled foundations) on groundwater resources and aquifers and groundwater flooding risk. As design evolution is ongoing this will be considered accordingly within the ES. Reference will be made in the ES to the risks associated with such activities and measures that will be adopted to reduce/minimise the risk.
- 9.7.14. This section will be revised during the preparation of the ES once further details of the Proposed Scheme and construction methods/sequencing are available.

## **OPERATION MITIGATION MEASURES**

### **Embedded Design**

- 9.7.15. Measures to mitigate potential effects during operation of the Proposed Scheme are likely to be embedded within the scheme design. These include flood defence measures, drainage proposals, pollution prevention controls and water supply proposals.

### **Flood Risk**

- 9.7.16. The design of the Proposed Scheme will take flood risks into account and incorporate appropriate flood defence and mitigation measures. At this stage it is likely that these may include land raising, improved flood defence structures and/or localised flood

defence measures such as bunding of individual tanks. It is not possible to provide further clarity on the likely measures that will be embedded in the design at this stage although further information regarding the approach to informing these measures is provided below.

- 9.7.17. The design of flood defence measures will provide appropriate protection to the Proposed Scheme and assess risks for the design event, taken to be the 1 in 200 annual probability tidal event with an appropriate climate change allowance applied using the Upper End<sup>5</sup> climate change scenario and inclusion of appropriate freeboard. The design of flood defence measures and application of climate change allowances will also take the design life of the Proposed Scheme into account. This design development is ongoing and subject of consultation with the EA.
- 9.7.18. The residual flood risk to the Proposed Scheme in the event of a breach in the existing flood defences and for the undefended scenario will be assessed. Mitigation measures to manage this residual risk will be incorporated into the design and operation of the Proposed Scheme as required and reported in the ES.
- 9.7.19. The layout of the Proposed Scheme will take a sequential approach to the location of new infrastructure, locating development away from areas at greatest flood risk where possible. It may however be considered essential to locate certain infrastructure in areas of flood risk as their location is governed by the need to be in close proximity to existing port or rail facilities. It is also proposed to reuse existing bulk storage tanks in the east of the Site which may be at future risk of flooding, however appropriate management and defence measures will be implemented to manage this risk over the design life of the development.
- 9.7.20. The assessment will consider potential increased risk to people and property elsewhere caused by the construction of the Proposed Scheme in areas at tidal and (potentially) fluvial flood risk and caused by the construction of flood risk mitigation measures. This will be informed by comparison of baseline and future baseline scenarios for the present day and with climate change allowance and mitigation incorporated into the Proposed Scheme as required. The need for floodplain compensation for any loss of fluvial floodplain will be assessed and agreed in consultation with the EA. The need for works in areas at fluvial flood risk and therefore the need for fluvial floodplain compensation is considered unlikely but will be confirmed during the preparation of the FRA and ES.
- 9.7.21. The FRA and ES will also give consideration to measures to provide environmental protection should a flood event occur, for example if infrastructure that contains hazardous substances is located within areas that may experience flooding. This includes proposed pipelines that are required to follow existing pipeline routes and utilise existing port infrastructure.
- 9.7.22. Hydraulic modelling using the Port Clarence 2020 FM-TUFLOW model will be undertaken to inform the design of appropriate mitigation and ensure no unacceptable flood risk to the Proposed Scheme or elsewhere as a result of the Proposed Scheme.
- 9.7.23. The approach and proposed management of flood risk will be discussed with the EA and LLFA throughout the course of the assessment.

### **Drainage Strategy**

- 9.7.24. The Proposed Scheme will be served by an onsite drainage system for the management of surface, foul and effluent drainage, which will be described within the Outline Drainage Strategy that will be submitted with the application for development consent. It is expected that surface water will be discharged either directly or indirectly to the River Tees via existing outfalls, with suitable treatment, pollution prevention measures and (if required) attenuation embedded into the design to appropriately mitigate risk to the receiving water features. The design of the surface water drainage system will be designed in consultation with the EA and LLFA.
- 9.7.25. The drainage strategy will be designed to appropriately manage flood risks to the Proposed Scheme and elsewhere, and prevent unacceptable risk of pollution to identified surface water and groundwater receptors.
- 9.7.26. Review of predicted changes to traffic flow on the supporting road network indicates a maximum increase in traffic flow during operation of the Proposed Scheme of 5% on the A1185 to the north of the Site. Traffic flow elsewhere is predicted to increase less than 5%. Further information is provided in **Chapter 16 Traffic and Transport (Volume 1)**. Changes to the existing highway drainage systems are not proposed as part of the Proposed Scheme.
- 9.7.27. The Proposed Scheme intends to discharge all wastewater streams produced by the facility to the Bran Sands WWTP, via the onsite wastewater treatment plant. Consultation is currently ongoing with Northumbrian Water. If discharge to Bran Sands is not viable, it is intended that this water would most likely be tankered to an alternative WWTP. Discharge from the treatment facility(s) is assumed to meet permit requirements. Discharge to the water environment is not being considered as an option.

### **Other measures**

- 9.7.28. The Proposed Scheme requires the import, processing, distribution, storage and export of potential polluting and harmful substances. The safe operation of the Proposed Scheme will be paramount to the protection of the water environment and subject to rigorous controls that will form part of the required permit applications. The management of surface water runoff from these areas will also be considered as part of the surface water drainage strategy and monitoring/treatment processes incorporated as required.
- 9.7.29. The Proposed Scheme intends to secure water supply from Northumbrian Water, including for industrial processes such as cooling. No groundwater or surface water abstractions are proposed. The intention will be to recycle water wherever possible.
- 9.7.30. The treated industrial effluent discharged to Bran Sands WWTP from the Proposed Scheme will increase the nitrogen load discharged to the Teesmouth and Cleveland Coast SPA and Ramsar site. This will be mitigated using one or more mitigation methods to achieve nitrogen neutrality.
- 9.7.31. Measures embedded into the operation of the Proposed Scheme to manage risks to the environment will be developed and enforced as part of the permitting requirements.

9.7.32. As design development progresses, any required additional measures would be incorporated into the Proposed Scheme to mitigate any unacceptable risk identified to any nearby (active) groundwater abstractions and groundwater flooding where potential/plausible risks from the Proposed Scheme have been identified. More information regarding the design, mitigations and enhancement measures are detailed in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**.

#### **Biodiversity Net Gain**

9.7.33. Opportunities for Biodiversity Net Gain (BNG) are being considered for the Proposed Scheme, including the potential to enhance surface water features. Opportunities for incorporation are being considered in areas both on and adjacent to the Site and will be considered on an ongoing basis as further design details are confirmed.

## **9.8. PRELIMINARY ASSESSMENT OF LIKELY IMPACTS AND EFFECTS**

9.8.1. This section details the preliminary assessment of likely impacts and effects of the Proposed Scheme during both the Construction and Operation Phases.

9.8.2. Impacts to Ecology, including sensitive and/or important aquatic species and habitats are discussed in **Chapter 7: Terrestrial Ecology (Volume 1)** and **Chapter 8: Freshwater and Marine Ecology (Volume 1)**.

9.8.3. Potentially significant effects that may arise during the Decommissioning Phase of the Proposed Scheme are not expected to be more significant than those that may arise during the Construction Phase of the Proposed Scheme and have therefore not been assessed independently.

#### **CONSTRUCTION PHASE**

9.8.4. A preliminary assessment of the potentially significant effects to the water environment and flood risk through the Construction Phase is summarised in **Table 9-14**.

9.8.5. The construction assessment presented in this Chapter is appropriate for the construction programme options, as set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, although this will be assessed and confirmed in the ES.

**Table 9-14: Construction Phase Preliminary Assessment of Likely Significant Impacts**

| Receptor  | Sensitivity of Receptor | Effect  | Preliminary Magnitude of Impact  | Preliminary Significance of Effect  |
|---|-------------------------|---|--|---|
| <b>Surface Water</b>  |                         |   |  |   |
| River Tees<br>(reference SW76 in <b>Figure 9-9 (Volume 2)</b> ) | Very High               | Pollution risk from disturbance of bed materials and potentially contaminated sediment. | Two options for the marine transport infrastructure are considered at this stage.<br><u>Option 1</u> relates to the existing Wilton Engineering Wharf and includes removal of ancillary buildings. Preliminary magnitude of impact is assessed to be Negligible – No works in the marine environment is anticipated to be required, hence the potential risk of direct pollution is limited.<br><u>Option 2</u> relates to the existing Clarence Wharf and may require reinforcement works to the existing wharf, including additional piling or top slab reinforcement. Preliminary magnitude of impact is assessed to be Low Adverse – the potential piling works proposed for Option 2 may cause localised disturbance of bed material, although given the tidal nature of the River Tees and extensive use for port facilities the potential impacts are unlikely to be significant. | Option 1: Minor Adverse (Not Significant)<br><br>Option 2:<br><b>Moderate Adverse (Significant)</b> |
| River Tees<br>(reference SW76 in                                | Very High               | Increased pollution risks from spillage of fuels or other                               | Negligible to Low Adverse – The proposed construction works could accidentally release pollutants to the   | Minor Adverse (Not Significant) or <b>Major Adverse (Significant)</b>                               |

| Receptor   | Sensitivity of Receptor | Effect  | Preliminary Magnitude of Impact  | Preliminary Significance of Effect |
|--|-------------------------|---|--|------------------------------------|
| Figure 9-9 (Volume 2))   |                         | harmful substances.   | River Tees directly or indirectly that could result in some measurable change. Given the tidal nature of the River Tees and extensive use for marine wharfs the potential impacts are unlikely to result in the loss or degradation of the integrity of the River. The impact may be greater (low adverse) if Option 2 for the marine transport infrastructure is pursued (use of Clarence Wharf) given the need for works directly within the River Tees. |                                    |
| River Tees (reference SW76 in Figure 9-9 (Volume 2))                         | Very High               | Increased pollution risk from sedimentation.  | Negligible – Given the size and tidal nature of the River Tees, potential risks associated with increased sedimentation are unlikely to result in a measurable change in attributes, quality or vulnerability.   | Minor Adverse (Not Significant)    |
| North Sea / Tees Coastal Waterbody (reference SW78 in Figure 9-9 (Volume 2)) | High                    | <ul style="list-style-type: none"> <li>■ Increased pollution risks from spillage of fuels or other harmful substances; and</li> <li>■ Increased pollution risk from sedimentation.</li> </ul> | Negligible – Given the distance of this waterbody from the Site and dilution provided by the River Tees, the potential risks to the North Sea or Tees Coastal Waterbody are not considered to be significant.  | Minor Adverse (Not Significant)    |

| Receptor   | Sensitivity of Receptor | Effect   | Preliminary Magnitude of Impact   | Preliminary Significance of Effect    |
|--|-------------------------|--|---|---------------------------------------|
| Holme Fleet<br>(reference SW05 in <b>Figure 9-9 (Volume 2)</b> ) | Very High               | <ul style="list-style-type: none"> <li>Increased pollution risks from spillage of fuels or other harmful substances; and</li> <li>Increased risk of pollution from sedimentation.</li> </ul> | Low Adverse – The watercourse is largely located upstream of the Proposed Scheme and outside of the Site. Construction works are proposed in the vicinity of Holme Fleet in the north-west of the Site; direct runoff could occur although significant impact unlikely. Pollutants and sediments could be indirectly discharged to Holme Fleet via the ordinary watercourse that passes through the Site and is assumed to discharge to Holme Fleet immediately upstream of the railway crossing and culvert. | <b>Moderate Adverse (Significant)</b> |
| Holme Fleet<br>(reference SW05 in <b>Figure 9-9 (Volume 2)</b> ) | Very High               | Potential for damage to existing culverted watercourses that could lead to water quality impact.   | Negligible – Holme Fleet passes beneath the proposed haul road from Wilton Engineering Wharf to the main Site. The watercourse is culverted at this section. The condition of the culvert is reported to be in poor condition with proposed reconstruction/realignment of this culvert by the EA. The Applicant will implement appropriate inspection and mitigation to prevent collapse or further damage of the culvert.  | Minor Adverse (Not Significant)       |
| Dabholm Gut<br>(reference SW78 in <b>Figure 9-9 (Volume 2)</b> ) | Very High               | <ul style="list-style-type: none"> <li>Increased pollution risks from spillage of fuels or other harmful</li> </ul>  | Low Adverse – No works are proposed directly in the watercourse although works will be undertaken adjacent to the bank top. Pollutants and sediment could   | <b>Moderate Adverse (Significant)</b> |

| Receptor   | Sensitivity of Receptor | Effect   | Preliminary Magnitude of Impact   | Preliminary Significance of Effect             |
|--|-------------------------|--|---|--|
|  |                         | <p>substances;<br/>and</p> <ul style="list-style-type: none"> <li>Increased risk of pollution from sedimentation.</li> </ul>   | potentially discharge to the watercourse with localised and temporary effect.   |  |
| The Fleet (reference SW81 in <b>Figure 9-9 (Volume 2)</b> )  | Very High               | <ul style="list-style-type: none"> <li>Increased pollution risks from spillage of fuels or other harmful substances;<br/>and</li> <li>Increased risk of pollution from sedimentation.</li> </ul> | Negligible – Watercourse largely upstream of the Site and unlikely to be affected by the Proposed Scheme.   | Minor Adverse (Not Significant)                |
| Ordinary watercourses and ditches located within the DCO Application Boundary <b>Figure 9-9 (Volume 2)</b> | Low to High             | <ul style="list-style-type: none"> <li>Increased pollution risks from spillage of fuels or other harmful substances;<br/>and</li> <li>Increased risk of pollution from sedimentation.</li> </ul> | Medium Adverse – Due to the proximity of the works to watercourses and ditches in the Site, fuels or other harmful substances may spill directly into or migrate to these surface water receptors. Works within watercourse channels are also expected to increase sediment loading at the local scale. | <b>Minor to Moderate Adverse (Significant)</b> |

| Receptor   | Sensitivity of Receptor | Effect   | Preliminary Magnitude of Impact  | Preliminary Significance of Effect             |
|--|-------------------------|--|--|--|
| Ordinary watercourses and ditches located within the DCO Application Boundary <b>Figure 9-9 (Volume 2)</b>         | Low to High             | Impact to watercourse quality attributes from temporary diversion, culverting or other physical modifications.   | Medium Adverse – Works within watercourse channels are expected to increase sediment loading at the local scale and cause localised adverse effect to quality attributes.  | <b>Minor to Moderate Adverse (Significant)</b> |
| Ordinary watercourses and ditches located within the DCO Application Boundary <b>Figure 9-9 (Volume 2)</b>         | Low to High             | Potential for damage to existing culverted watercourses that could lead to water quality impact.   | Negligible – The ordinary watercourses and ditches that pass through the site cross beneath existing railway line, access roads and hard standing areas that may be used for construction traffic and haulage. The Applicant will implement appropriate inspection and mitigation to prevent collapse or damage to these culverts. | Neutral to Minor Adverse (Not Significant)     |
| Ordinary watercourses and ditches located outside of the DCO Application Boundary ( <b>Figure 9-9 (Volume 2)</b> ) | Low to High             | <ul style="list-style-type: none"> <li>■ Increased pollution risks from spillage of fuels or other harmful substances; and</li> <li>■ Increased risk of pollution from sedimentation.</li> </ul> | Negligible– Other watercourses and ditches located outside of the Site are predominantly located upstream of the Site and therefore not considered to be at significant risk of pollution.   | Neutral to Minor Adverse (Not Significant)     |

| Receptor  | Sensitivity of Receptor | Effect   | Preliminary Magnitude of Impact  | Preliminary Significance of Effect             |
|---|-------------------------|--|--|--|
| Dorman's Pool (Figure 9-9 (Volume 2))   | Very High               | <ul style="list-style-type: none"> <li>Increased pollution risks from spillage of fuels or other harmful substances; and</li> <li>Increased risk of pollution from sedimentation.</li> </ul> | Medium Adverse – The proximity of Dorman's Pool to areas of the Proposed Scheme that require major construction works makes it more susceptible to accidental release of fuels or other harmful substances, and increased sediment loading from surface water runoff.  | <b>Major Adverse (Significant)</b>             |
| Other ponds located in designated areas including Saltholme East Pool, Saltholme West Pool and Paddy's Pool (Figure 9-9 (Volume 2)) | Very High               | Increased pollution risks from spillage of fuels or other harmful substances.  | Medium to Low Adverse – The waterbodies at RSPB Saltholme are located outside of the Site but in close proximity to works proposed in the west of the Site. There is therefore risk that a large accidental release of fuels or other harmful substances could migrate directly or indirectly to these features. | <b>Moderate to Major Adverse (Significant)</b> |
| Other ponds located in designated areas including Saltholme East Pool, Saltholme West Pool and Paddy's Pool (Figure 9-9 (Volume 2)) | Very High               | Increased risk of pollution from sedimentation.  | Negligible – It is considered likely that sediment contained in surface water runoff would settle in upstream watercourses and ditches and not pose significant risk to these features given their location outside of the Site.   | Minor Adverse (Not Significant)                |
| Teesmouth National Nature Reserve   | Very High               | <ul style="list-style-type: none"> <li>Increased pollution risks</li> </ul>  | Negligible – Given the distance of this feature from the Site and dilution   | Minor Adverse (Not Significant)                |

| Receptor   | Sensitivity of Receptor | Effect  | Preliminary Magnitude of Impact  | Preliminary Significance of Effect |
|--|-------------------------|---|--|------------------------------------|
| (reference SW01 in <b>Figure 9-9 (Volume 2)</b> )  |                         | <p>from spillage of fuels or other harmful substances; and</p> <ul style="list-style-type: none"> <li>Increased pollution risk from sedimentation.</li> </ul> | provided by the River Tees, the potential risks to the Teesmouth National Nature Reserve are not considered to be significant.   |                                    |
| Licensed and Private (unlicensed/licenced) surface water abstractions                          | Medium                  | Increased pollution risks from spillage of fuels or other harmful substances.   | Negligible – The identified surface water abstractions at Wilton Engineering Wharf and Teesport approximately 1km downstream of the Site are considered unlikely to be at increased risk from potential pollution incidents that may occur during construction of the Proposed Scheme.   | Minor Adverse (Not Significant)    |
| <b>Flood Risk</b>  |                         |   |  |                                    |
| Flood risk receptors: People, property and the infrastructure in the Site and surrounding area | Medium to Very High     | Increased flood risk from temporary construction works within/adjacent to the floodplain.   | Negligible – The majority of the Proposed Scheme is located in areas at low flood risk when the presence of flood defences are taken into account. Care will be taken when working close to existing flood defences. Increased flood risk during the Construction Phase is considered negligible. Potential effects associated with the permanent works over the design life of the Proposed Scheme are assessed as operational effects. | Minor Adverse (Not Significant)    |

| Receptor   | Sensitivity of Receptor | Effect  | Preliminary Magnitude of Impact   | Preliminary Significance of Effect    |
|--|-------------------------|---|---|---------------------------------------|
| Flood risk receptors: People, property and the infrastructure in the Site and surrounding area                     | High                    | Potential for damage to existing culverted watercourses that could lead to flood risk impact. | Negligible – Existing culverts that pass through the Site (including Holme Fleet and other ordinary watercourses) will be subject to appropriate inspection and mitigation to ensure no risk to the collapse or damage of these culverts.   | Minor Adverse (Not Significant)       |
| Flood risk receptors: Proposed Scheme and people, property and the infrastructure in the Site and surrounding area | Medium to Very High     | Potential damage, obstruction or modification of existing flood defence infrastructure.       | Negligible – Existing flood defence infrastructure will be retained during construction of the Proposed Scheme will no expected change to form or function. Works within 16m of flood defences will be subject to a FRAP. Consideration will also be given to maintenance access requirements during construction.  | Minor Adverse (Not Significant)       |
| <b>Groundwater</b>   |                         |   |   |                                       |
| Superficial deposit aquifers designated Secondary Undifferentiated Aquifers (Tidal Flat Deposits)                  | Medium                  | Impacts to groundwater quantity (level and flow) and quality.                                 | Medium Adverse – potential temporary loss of water from storage and reduction in water levels (locally) within superficial deposit aquifers from Construction Phase activities (i.e., intrusive earthworks that extend below the groundwater table) and groundwater control measures i.e., dewatering. Potential increased pollution risk from spillage of fuel and other harmful substances. | <b>Moderate Adverse (Significant)</b> |
| Secondary B Aquifer – Mercia Mudstone Group  | Medium                  | Impacts to groundwater quantity (level and flow) and quality.                                 | Medium Adverse – potential temporary loss of water from storage and reduction in water levels (locally) within Secondary B aquifer (Mercia Mudstone Group) from   | <b>Moderate Adverse (Significant)</b> |

| Receptor   | Sensitivity of Receptor | Effect  | Preliminary Magnitude of Impact   | Preliminary Significance of Effect    |
|--|-------------------------|---|---|---------------------------------------|
|  |                         |   | Construction Phase activities (i.e., intrusive earthworks that extend below the groundwater table) and groundwater control measures i.e., dewatering. Potential increased pollution risk from spillage of fuel and other harmful substances.  |                                       |
| Principal Aquifer - Sherwood Sandstone Group           | Very High               | Impacts to groundwater quantity (level and flow) and quality.   | Low Adverse – potential temporary loss of water from storage and reduction in water levels (locally) within Principal aquifer (Sherwood Sandstone Group) from Construction Phase activities (i.e., intrusive earthworks that extend below the groundwater table) and groundwater control measures i.e., dewatering specifically in the north west area of the development where the principal aquifer is at shallower depth. Potential increased pollution risk from spillage of fuel and other harmful substances where the principal aquifer is at shallower depth. | <b>Moderate Adverse (Significant)</b> |
| Private (unlicenced/licenced) Groundwater Abstractions | High                    | Potential reduction in water level (locally) within Principal and Secondary aquifers due to groundwater control measures. | Medium Adverse – active groundwater abstractions identified within and close to (approximately 100m) of DCO Application Boundary that may be at risk from Construction Phase activities (i.e., intrusive earthworks that extend below the groundwater table) associated to the Pipeline Corridor and Rail Terminal.   | <b>Moderate Adverse (Significant)</b> |

| Receptor  | Sensitivity of Receptor | Effect   | Preliminary Magnitude of Impact  | Preliminary Significance of Effect    |
|---|-------------------------|--|--|---------------------------------------|
| Proposed Development - Groundwater Flood Risk   | Medium                  | Potential for increased flood risk due to presence of groundwater flow barriers from intrusive earthworks (e.g. foundation piling) that extend below the groundwater table forming groundwater flow barriers.  | Medium Adverse – Parts of the Proposed Scheme will be in areas identified to be at risk of groundwater flooding, either in the present day or future scenarios. The Applicant is committed to development of appropriate mitigation to appropriately protect the Proposed Scheme, but further detailed analysis is required before a more robust assessment can be made.   | <b>Moderate Adverse (Significant)</b> |
| GWDTE – The Tees and Cleveland Coast Ramsar/SSSI sites including Dorman’s Pool and Saltholme Nature Reserves. | High to Medium          | <ul style="list-style-type: none"> <li>■ Potential indirect impact to groundwater quantity (level and flow) and quality; and</li> <li>■ Potential reduction in water level (locally) within Principal and Secondary aquifers due to groundwater control measures if sites are</li> </ul> | Medium Adverse – The Tees and Cleveland Coast Ramsar Sites including Dorman’s Pool and Saltholme Nature Reserves are located to the west of the DCO Application Boundary and the southeast boundary along the River Tees. The Teesmouth and Cleveland Coast SSSI is designated to the River Tees. Considering the proximity of these designated sites to the Construction Phase activities proposed within the DCO Application Boundary there is a potential indirect risk to groundwater quantity and quality if these sites are hydrogeological connected (see <b>Section 9.6</b> ). | <b>Moderate Adverse (Significant)</b> |

| Receptor | Sensitivity of Receptor | Effect   | Preliminary Magnitude of Impact | Preliminary Significance of Effect |
|----------|-------------------------|--|---------------------------------|------------------------------------|
|          |                         | hydrogeological connected (see <b>Section 9.6</b> ). |                                 |                                    |

## OPERATION PHASE

- 9.8.6. A preliminary assessment of the potentially significant effects to the water environment and flood risk through the Operational Phase is summarised in **Table 9-15**. A conservative approach of the assessment of likely potential significant effects has been adopted based on design information available at the time of writing and uncertainties regarding proposed mitigation.

**Table 9-15: Operational Phase Preliminary Assessment of Likely Significant Impacts**

| Receptor  | Sensitivity of Receptor | Effect  | Preliminary Magnitude of Impact   | Preliminary Significance of Effect |
|---|-------------------------|---|---|------------------------------------|
| <b>Surface Water</b>  |                         |   |   |                                    |
| River Tees (reference SW76 in <b>Figure 9-9 (Volume 2)</b> )                        | Very High               | Polluted surface water runoff and spillage risks containing silts, hydrocarbons or other harmful chemicals. | Negligible – An appropriate surface water drainage system will be implemented that will incorporate appropriate pollution control and maintenance measures to mitigate the risk of pollution during operation. The operation of the Proposed Scheme will also include appropriate monitoring and control of environmental risks. Changes in traffic flow on the public road network are predicted to be less than 5%.   | Minor Adverse (Not Significant)    |
| River Tees (reference SW76 in <b>Figure 9-9 (Volume 2)</b> )                        | Very High               | Discharge of foul and effluent water that could cause deterioration of the receiving waterbody.             | Negligible – all wastewater streams produced by the facility will be discharged to the Bran Sands WWTP that will manage discharge in accordance with existing environmental permits, with no direct discharge to the River Tees or other water bodies proposed.   | Minor Adverse (Not Significant)    |
| North Sea/Tees Coastal Water Body (reference SW78 in <b>Figure 9-9 (Volume 2)</b> ) | High                    | Polluted surface water runoff and spillage risks containing silts, hydrocarbons or other harmful chemicals. | No Change – An appropriate surface water drainage system will be implemented that will incorporate appropriate pollution control and maintenance measures to mitigate the risk of pollution during operation. The operation of the Proposed Scheme will also include appropriate monitoring and control of environmental risks. Given the distance of the North Sea/Tees Coastal Water Body from the Site, the existing use of this waterbody for marine operations and dilution provided by the River Tees, no change is predicted to the North Sea/Tees Coastal Water | Neutral (Not Significant)          |

| Receptor   | Sensitivity of Receptor | Effect  | Preliminary Magnitude of Impact  | Preliminary Significance of Effect |
|--|-------------------------|---|--|------------------------------------|
|  |                         |   | Body. Changes in traffic flow on the public road network are predicted to be less than 5%.   |                                    |
| North Sea/Tees Coastal Water Body (reference SW78 in <b>Figure 9-9 (Volume 2)</b> )      | High                    | Discharge of foul and effluent water that could cause deterioration of the receiving waterbody.   | No Change – all wastewater streams produced by the facility will be discharged to the Bran Sands WWTP that will manage discharge in accordance with existing environmental permits, with no direct discharge to the River Tees or other water bodies proposed.<br>Given the dilution offered by the North Sea/Tees Coastal Water Body, no change is predicted to the North Sea/Tees Coastal Water Body.                  | Neutral (Not Significant)          |
| Teesmouth and Cleveland Coast SPA, SSSI and Ramsar site ( <b>Figure 9-1 (Volume 2)</b> ) | Very High               | Discharge of treated industrial process effluent to the River Tees (via Bran Sands WWTP), increasing the nitrogen load discharged to the Teesmouth and Cleveland Coast SPA, SSSI and Ramsar site. | Medium Adverse –the increased nitrogen load discharged to the Teesmouth and Cleveland Coast SPA will breach the requirement for nitrogen neutrality and will need to be mitigated.   | <b>Major Adverse (Significant)</b> |
| Holme Fleet (reference SW05 in <b>Figure 9-9 (Volume 2)</b> )                            | Very High               | Polluted surface water runoff and spillage risks containing silts, hydrocarbons or other harmful chemicals.   | Negligible – An appropriate surface water drainage system will be implemented that will incorporate appropriate pollution control and maintenance measures to mitigate the risk of pollution during operation. The operation of the Proposed Scheme will also include appropriate monitoring and control of environmental risks.<br>Changes in traffic flow on the public road network are predicted to be less than 5%. | Minor Adverse (Not Significant)    |

| Receptor   | Sensitivity of Receptor | Effect  | Preliminary Magnitude of Impact  | Preliminary Significance of Effect          |
|--|-------------------------|---|--|---|
| Dabholm Gut (reference SW78 in <b>Figure 9-9 (Volume 2)</b> )  | Very High               | Polluted surface water runoff and spillage risks containing silts, hydrocarbons or other harmful chemicals. | No Change – The Bran Sands WWTP is served by an appropriate drainage strategy and no change is proposed. No potentially polluted surface water runoff is expected from the sewerage pipes adjacent to the watercourse.   | Neutral (Not Significant)                   |
| Dabholm Gut (reference SW78 in <b>Figure 9-9 (Volume 2)</b> )  | Very High               | Discharge of foul and effluent water that could cause deterioration of the receiving waterbody.             | Negligible – all wastewater streams produced by the facility will be discharged to the Bran Sands WWTP that will manage discharge in accordance with existing environmental permits.   | Minor Adverse (Not Significant)             |
| The Fleet (reference SW81 in <b>Figure 9-9 (Volume 2)</b> )  | Very High               | Polluted surface water runoff and spillage risks containing silts, hydrocarbons or other harmful chemicals. | No Change – Watercourse is located upstream of the Proposed Scheme. No works proposed that would change existing runoff quality or characteristics to this watercourse.  | Neutral (Not Significant)                   |
| Ordinary watercourses and ditches located within the DCO Application Boundary ( <b>Figure 9-9 (Volume 2)</b> ) | Low to High             | Polluted surface water runoff and spillage risks containing silts, hydrocarbons or other harmful chemicals. | Negligible – An appropriate surface water drainage system will be implemented that will incorporate appropriate pollution control and maintenance measures to mitigate the risk of pollution during operation. The operation of the Proposed Scheme will also include appropriate monitoring and control of environmental risks. | Neutral to Minor Adverse (Not Significant)  |
| Ordinary watercourses and ditches located within the DCO Application Boundary ( <b>Figure 9-9 (Volume 2)</b> ) | Low to High             | Impact associated with watercourse crossings, diversions or other physical modifications.                   | Medium to High Adverse - The watercourse that flows adjacent to the rail terminal and to the north of the existing TV1 and TV2 sites will require diversion and/or culverting as part of the Proposed Scheme, resulting in the partial permanent or temporary loss of this feature.  | <b>Minor to Major Adverse (Significant)</b> |

| Receptor  | Sensitivity of Receptor | Effect  | Preliminary Magnitude of Impact   | Preliminary Significance of Effect         |
|---|-------------------------|---|---|--|
| Ordinary watercourses and ditches located outside of the DCO Application Boundary ( <b>Figure 9-9 (Volume 2)</b> )                                    | Low to High             | Polluted surface water runoff and spillage risks containing silts, hydrocarbons or other harmful chemicals. | Negligible – An appropriate surface water drainage system will be implemented that will incorporate appropriate pollution control and maintenance measures to mitigate the risk of pollution during operation. The operation of the Proposed Scheme will also include appropriate monitoring and control of environmental risks. Majority of features are also located upstream of the Site. Changes in traffic flow on the public road network are predicted to be less than 5%.                               | Neutral to Minor Adverse (Not Significant) |
| Ponds located in designated areas including Dorman’s Pool, Saltholme East Pool, Saltholme West Pool and Paddy’s Pool ( <b>Figure 9-9 (Volume 2)</b> ) | Very High               | Polluted surface water runoff and spillage risks containing silts, hydrocarbons or other harmful chemicals. | Negligible – An appropriate surface water drainage system will be implemented that will incorporate appropriate pollution control and maintenance measures to mitigate the risk of pollution during operation. The operation of the Proposed Scheme will also include appropriate monitoring and control of environmental risks. Changes in traffic flow on the public road network are predicted to be less than 5%.   | Minor Adverse (Not Significant)            |
| Teesmouth National Nature Reserve (reference SW01 in <b>Figure 9-9 (Volume 2)</b> )   | Very High               | Polluted surface water runoff and spillage risks containing silts, hydrocarbons or other harmful chemicals. | No Change – An appropriate surface water drainage system will be implemented that will incorporate appropriate pollution control and maintenance measures to mitigate the risk of pollution during operation. The operation of the Proposed Scheme will also include appropriate monitoring and control of environmental risks. Given the distance of Teesmouth National Nature Reserve from the Site and dilution provided by the River Tees, no change is predicted to the Teesmouth National Nature Reserve. | Neutral (Not Significant)                  |

| Receptor   | Sensitivity of Receptor | Effect  | Preliminary Magnitude of Impact  | Preliminary Significance of Effect             |
|--|-------------------------|---|--|--|
| Licensed and Private (unlicensed/licenced) surface water abstractions                      | Medium                  | Polluted surface water runoff and spillage risks containing silts, hydrocarbons or other harmful chemicals.         | Negligible – An appropriate surface water drainage system will be implemented that will incorporate appropriate pollution control and maintenance measures to mitigate the risk of pollution during operation. The operation of the Proposed Scheme will also include appropriate monitoring and control of environmental risks.                                     | Minor Adverse (Not Significant)                |
| <b>Flood Risk</b>  |                         |   |  |  |
| Flood risk receptors: People, property and infrastructure in the Site and surrounding area | Medium to Very High     | Increased flood risk from changes to flood flow conveyance and storage.   | Low Adverse – Construction of the Proposed Scheme may result in changes to flood flow conveyance and storage that could increase flood risk elsewhere. The Applicant is committed to development of appropriate mitigation, but further detailed analysis is required before a more robust assessment can be made.   | <b>Moderate to Major Adverse (Significant)</b> |
| Flood risk receptors: People, property and infrastructure in the Site and surrounding area | Medium to Very High     | Increased flood risk from increased rates and volumes of surface water runoff from an increase in impermeable area. | Negligible – An appropriate surface water drainage system will be implemented to mitigate the risk of flooding associated with surface water runoff during Operational Phase.  | Minor Adverse (Not Significant)                |
| Flood risk receptors: Proposed Scheme  | Medium to Very High     | Flood risk from construction of the Proposed Scheme in areas identified to be at risk of flooding.                  | Medium Adverse – Parts of the Proposed Scheme will be located in areas identified to be at risk of flooding, either in the present day or future scenarios. The Applicant is committed to development of appropriate mitigation to appropriately protect the Proposed Scheme, but further detailed analysis is required before a more robust assessment can be made. | <b>Moderate to Major Adverse (Significant)</b> |

| Receptor   | Sensitivity of Receptor | Effect   | Preliminary Magnitude of Impact  | Preliminary Significance of Effect    |
|--|-------------------------|--|--|---------------------------------------|
| Flood risk receptors: Proposed Scheme and people, property and the infrastructure in the Site and surrounding area | Medium to Very High     | Potential for damage to existing culverted watercourses that could lead to flood risk impact.  | Negligible – Existing culverts that pass through the Site (including Holme Fleet and other ordinary watercourses) will be subject to appropriate inspection and mitigation to ensure no risk to the collapse or damage of these culverts.  | Minor Adverse (Not Significant)       |
| Flood risk receptors: Proposed Scheme and people, property and the infrastructure in the Site and surrounding area | Medium to Very High     | Potential damage, obstruction or modification of existing flood defence infrastructure   | Negligible – Existing flood defence infrastructure will be retained as part of the Proposed Scheme with no expected change to form or function. Consideration will also be given to maintenance access requirements.   | Minor Adverse (Not Significant)       |
| <b>Groundwater</b>   |                         |  |  |                                       |
| Proposed Development - Groundwater Flood Risk  | Medium                  | Potential for increased flood risk due to presence of groundwater flow barriers from intrusive earthworks that extend below the groundwater table forming groundwater flow barriers. | Medium Adverse – Parts of the Proposed Scheme will be in areas identified to be at risk of groundwater flooding, either in the present day or future scenarios. The Applicant is committed to development of appropriate mitigation to appropriately protect the Proposed Scheme, but further detailed analysis is required before a more robust assessment can be made. | <b>Moderate Adverse (Significant)</b> |
| Superficial deposit aquifers designated Secondary Undifferentiated Aquifers (Tidal Flat Deposits)                  | Medium                  | Groundwater quality of the superficial aquifers.   | Low Adverse – an appropriate surface water drainage system will be implemented that will incorporate appropriate pollution control and maintenance measures to mitigate the risk of pollution during operation. No infiltration to ground is expected as part of the Outline Drainage  | Minor Adverse (Not Significant)       |

| Receptor                                      | Sensitivity of Receptor | Effect  | Preliminary Magnitude of Impact   | Preliminary Significance of Effect    |
|---|-------------------------|---|---|---------------------------------------|
|   |                         |   | Strategy. The operation of the Proposed Scheme will also include appropriate monitoring and control of environmental risks.   |                                       |
| Principal Aquifer - Sherwood Sandstone Group  | Very High               | Groundwater quality of the principal bedrock aquifer.   | Low Adverse – an appropriate surface water drainage system will be implemented that will incorporate appropriate pollution control and maintenance measures to mitigate the risk of pollution during operation. No infiltration to ground is expected as part of the Outline Drainage Strategy. The operation of the Proposed Scheme will also include appropriate monitoring and control of environmental risks. | <b>Moderate Adverse (Significant)</b> |
| Secondary B Aquifer – Mercia Mudstone Group   | Medium                  | Groundwater quality of the bedrock aquifer.   | Low Adverse – an appropriate surface water drainage system will be implemented that will incorporate appropriate pollution control and maintenance measures to mitigate the risk of pollution during operation. No infiltration to ground is expected as part of the Outline Drainage Strategy. The operation of the Proposed Scheme will also include appropriate monitoring and control of environmental risks. | Minor Adverse (Not Significant)       |
| Proposed Development - Groundwater Flood Risk | Medium                  | Potential for increased flood risk due to presence of groundwater flow barriers from intrusive earthworks that extend below the groundwater table forming | Moderate Adverse – Parts of the Proposed Scheme will be in areas identified to be at risk of groundwater flooding, either in the present day or future scenarios. The Applicant is committed to development of appropriate mitigation to appropriately protect the Proposed Scheme, but further detailed analysis is required before a more robust assessment can be made.  | <b>Moderate Adverse (Significant)</b> |

| Receptor   | Sensitivity of Receptor | Effect  | Preliminary Magnitude of Impact  | Preliminary Significance of Effect    |
|--|-------------------------|---|--|---------------------------------------|
|  |                         | groundwater flow barriers.  |  |                                       |
| Private (unlicenced/licenced) Groundwater Abstractions | High                    | Potential impact to groundwater quality (locally) within Principal and Secondary aquifers as a result of operational phase activities | Medium Adverse – active groundwater abstractions identified within and close to (approximately 100m) of DCO Application Boundary that may be at risk from operational phase activities (i.e., accidental spillages) associated to the Proposed Development | <b>Moderate Adverse (Significant)</b> |

## 9.9. ADDITIONAL DESIGN, MITIGATION AND ENHANCEMENT MEASURES

- 9.9.1. This section sets out the preliminary additional design, mitigation, and enhancement measures relevant to the water environment and flood risk assessment.
- 9.9.2. The details of the required mitigation beyond the current design commitments are yet to be determined. However, it is expected that further mitigation identified as necessary will be incorporated into the design of the Proposed Scheme.

### CONSTRUCTION PHASE

- 9.9.3. As discussed in **Section 9.7**, the appointed contractor will prepare a full CoCP, which will contain measures to protect both surface and groundwater quality, and other water resource aspects. The need for additional mitigation measures during construction will be determined through ongoing consultation with the EA and reported in the ES.
- 9.9.4. Examples of potentially appropriate additional mitigation measures are as follows:
- Water quality monitoring before and during construction activities that have the potential to effect water quality in receiving water bodies.
  - Installation of barriers adjacent to sensitive water features to intercept polluted surface water runoff.
  - A piling method which does not allow the ‘dragging down’ of contaminants and does not create preferential pathways from the near-surface soils to the aquifers where required depending onsite conditions. It is anticipated that the appropriate piling method will be determined as detailed design progresses following additional assessment of the ground conditions i.e., completion of intrusive ground investigation to obtain site-specific geotechnical and geo-environmental data to inform detailed design and through consultation with relevant stakeholders (**Appendix 3C Geology and Soils Technical Note (Volume 3)**).

### OPERATION PHASE

- 9.9.5. The Proposed Scheme is predicted to increase the nitrogen load discharged from Bran Sands WWTP into the River Tees and Cleveland Coast SPA, SSSI and Ramsar site. The proposed mitigation for this potential impact has not yet been developed. The preferred option will be agreed in consultation with Natural England and presented in the ES with a supporting Nutrient Neutrality technical note that will be submitted for DCO examination.
- 9.9.6. No further additional design, mitigation or enhancement measures are proposed for the water environment and flood risk assessment at this stage but will be considered and confirmed as part of the ES as the design develops, in acknowledgement that there are likely significant adverse effects that have been identified at this preliminary stage.

## 9.10. MONITORING

- 9.10.1. No need for water monitoring has been identified at this stage but will be considered and confirmed as part of the ES as the design develops. The need for monitoring will be derived through ongoing consultation with the EA and reported in the ES.

9.10.2. Key obligations to be upheld by the Applicant with regards to monitoring are detailed in **Section 5 of Appendix 3C: Geology and Soils Technical Note (Volume 3)**.

## **9.11. RESIDUAL EFFECTS**

9.11.1. **Table 9-16** below summarises the residual effects associated with the Construction and Operational Phases of the Proposed Scheme. The table below assumes that the detail of what is proposed further to the principles and mitigation set out in **Section 9.7** to **Section 9.9** will be specifically effective to reduce the effects.

**Table 9-16: Water Environment and Flood Risk Summary of Residual Effects**

| Description of the Effect   | Sensitive Receptor   | Significance of Effect with Embedded Mitigation  | Additional Design Mitigation, Enhancement Measure   | Residual Effect  |
|---|--|--|---|--|
| <b>Construction Phase</b>   |  |  |   |  |
| Pollution risk from disturbance of bed materials and potentially contaminated sediment. | River Tees (reference SW76 in <b>Figure 9-9 (Volume 2)</b> )                       | Option 1: Minor Adverse (Not Significant)<br><br>Option 2: <b>Moderate Adverse (Significant)</b> | Further measures will be identified for inclusion in the OCoCP and recommended construction methodology as the design develops. | <b>Moderate Adverse (Significant)</b> to Minor Adverse (Not Significant) |
| Increased pollution risks from spillage of fuels or other harmful substances.           | River Tees (reference SW76 in <b>Figure 9-9 (Volume 2)</b> )                       | <b>Minor or Major Adverse (Significant)</b>  | Further measures will be identified for inclusion in the OCoCP as the design develops.  | Minor Adverse (Not Significant) or <b>Major Adverse (Significant)</b>    |
| Increased pollution risks from spillage of fuels or other harmful substances.           | North Sea/Tees Coastal Waterbody (reference SW78 in <b>Figure 9-9 (Volume 2)</b> ) | Minor Adverse (Not Significant)  | Further measures will be identified for inclusion in the OCoCP as the design develops.  | Minor Adverse (Not Significant)  |
| Increased pollution risks from spillage of fuels or other harmful substances.           | Holme Fleet (reference SW05 in <b>Figure 9-9 (Volume 2)</b> )                      | <b>Moderate Adverse (Significant)</b>  | Further measures will be identified for inclusion in the OCoCP as the design develops.  | <b>Moderate Adverse (Significant)</b>                                    |
| Increased pollution risks from spillage of fuels or other harmful substances.           | Dabholm Gut (reference SW78 in <b>Figure 9-9 (Volume 2)</b> )                      | <b>Moderate Adverse (Significant)</b>  | Further measures will be identified for inclusion in the OCoCP as the design develops.  | <b>Moderate Adverse (Significant)</b>                                    |
| Increased pollution risks from spillage of fuels or other harmful substances.           | The Fleet (reference SW81 in <b>Figure 9-9 (Volume 2)</b> )                        | Minor Adverse (Not Significant)  | Further measures will be identified for inclusion in the OCoCP as the design develops.  | Minor Adverse (Not Significant)  |

| Description of the Effect   | Sensitive Receptor  | Significance of Effect with Embedded Mitigation                          | Additional Design Mitigation, Enhancement Measure                                      | Residual Effect  |
|---|---|--|--|--|
| Increased pollution risks from spillage of fuels or other harmful substances. | Ordinary watercourses and ditches located within the DCO Application Boundary <b>Figure 9-9 (Volume 2))</b>                               | Minor Adverse (Not Significant) to <b>Moderate Adverse (Significant)</b> | Further measures will be identified for inclusion in the OCoCP as the design develops. | Minor Adverse (Not Significant) to <b>Moderate Adverse (Significant)</b> |
| Increased pollution risks from spillage of fuels or other harmful substances. | Ordinary watercourses and ditches located outside of the DCO Application Boundary <b>Figure 9-9 (Volume 2))</b>                           | Neutral to Minor Adverse (Not Significant)                               | Further measures will be identified for inclusion in the OCoCP as the design develops. | Neutral to Minor Adverse (Not Significant)                               |
| Increased pollution risks from spillage of fuels or other harmful substances. | Dorman's Pool <b>Figure 9-9 (Volume 2))</b>   | <b>Major Adverse (Significant)</b>                                       | Further measures will be identified for inclusion in the OCoCP as the design develops. | Minor Adverse (Not Significant)  |
| Increased pollution risks from spillage of fuels or other harmful substances. | Other ponds located in designated areas including Saltholme East Pool, Saltholme West Pool and Paddy's Pool <b>Figure 9-9 (Volume 2))</b> | <b>Moderate to Major Adverse (Significant)</b>                           | Further measures will be identified for inclusion in the OCoCP as the design develops. | Minor Adverse (Not Significant)  |
| Increased pollution risks from spillage of fuels or other harmful substances. | Teesmouth National Nature Reserve (reference SW01 in <b>Figure 9-9 (Volume 2))</b>  | Minor Adverse (Not Significant)  | Further measures will be identified for inclusion in the OCoCP as the design develops. | Minor Adverse (Not Significant)  |

| Description of the Effect   | Sensitive Receptor   | Significance of Effect with Embedded Mitigation                          | Additional Design Mitigation, Enhancement Measure                                      | Residual Effect  |
|---|--|--|--|--|
| Increased pollution risks from spillage of fuels or other harmful substances. | Licensed and Private (unlicensed/licenced) surface water abstractions              | Minor Adverse (Not Significant)  | Further measures will be identified for inclusion in the OCoCP as the design develops. | Minor Adverse (Not Significant)  |
| Increased risk of pollution from sedimentation.                               | River Tees (reference SW76 in <b>Figure 9-9 (Volume 2)</b> )                       | Minor Adverse (Significant)  | Further measures will be identified for inclusion in the OCoCP as the design develops. | Minor Adverse (Not Significant)  |
| Increased risk of pollution from sedimentation.                               | North Sea/Tees Coastal Waterbody (reference SW78 in <b>Figure 9-9 (Volume 2)</b> ) | Minor Adverse (Significant)  | Further measures will be identified for inclusion in the OCoCP as the design develops. | Minor Adverse (Not Significant)  |
| Increased risk of pollution from sedimentation.                               | Holme Fleet (reference SW05 in <b>Figure 9-9 (Volume 2)</b> )                      | <b>Moderate Adverse (Significant)</b>                                    | Further measures will be identified for inclusion in the OCoCP as the design develops. | <b>Moderate Adverse (Significant)</b>                                    |
| Increased risk of pollution from sedimentation.                               | Dabholm Gut (reference SW78 in <b>Figure 9-9 (Volume 2)</b> )                      | <b>Moderate Adverse (Significant)</b>                                    | Further measures will be identified for inclusion in the OCoCP as the design develops. | <b>Moderate Adverse (Significant)</b>                                    |
| Increased risk of pollution from sedimentation.                               | The Fleet (reference SW81 in <b>Figure 9-9 (Volume 2)</b> )                        | Minor Adverse (Not Significant)  | Further measures will be identified for inclusion in the OCoCP as the design develops. | Minor Adverse (Not Significant)  |
| Increased risk of pollution from sedimentation.                               | Ordinary watercourses and ditches located within the DCO Application Boundary      | Minor Adverse (Not Significant) to <b>Moderate Adverse (Significant)</b> | Further measures will be identified for inclusion in the OCoCP as the design develops. | Minor Adverse (Not Significant) to <b>Moderate Adverse (Significant)</b> |

| Description of the Effect  | Sensitive Receptor  | Significance of Effect with Embedded Mitigation | Additional Design Mitigation, Enhancement Measure                                      | Residual Effect                            |
|--|---|---|--|--|
|  | <b>Figure 9-9 (Volume 2))</b>   |   |  |  |
| Increased risk of pollution from sedimentation.  | Ordinary watercourses and ditches located outside of the DCO Application Boundary ( <b>Figure 9-9 (Volume 2))</b> )                           | Neutral to Minor Adverse (Not Significant)      | Further measures will be identified for inclusion in the OCoCP as the design develops. | Neutral to Minor Adverse (Not Significant) |
| Increased risk of pollution from sedimentation.  | Dorman's Pool ( <b>Figure 9-9 (Volume 2))</b> )   | <b>Major Adverse (Significant)</b>              | Further measures will be identified for inclusion in the OCoCP as the design develops. | Minor Adverse (Not Significant)            |
| Increased risk of pollution from sedimentation.  | Other ponds located in designated areas including Saltholme East Pool, Saltholme West Pool and Paddy's Pool ( <b>Figure 9-9 (Volume 2))</b> ) | Minor Adverse (Not Significant)                 | Further measures will be identified for inclusion in the OCoCP as the design develops. | Minor Adverse (Not Significant)            |
| Increased risk of pollution from sedimentation.  | Teesmouth National Nature Reserve (reference SW01 in <b>Figure 9-9 (Volume 2))</b> )  | Minor Adverse (Not Significant)                 | Further measures will be identified for inclusion in the OCoCP as the design develops. | Minor Adverse (Not Significant)            |
| Impact to watercourse quality attributes from temporary diversion, culverting or other physical modifications. | Ordinary watercourses and ditches located within the DCO Application Boundary   | Minor to Moderate Adverse (Not Significant)     | Further measures will be identified for inclusion in the OCoCP as the design develops. | Minor Adverse (Not Significant)            |

| Description of the Effect  | Sensitive Receptor  | Significance of Effect with Embedded Mitigation | Additional Design Mitigation, Enhancement Measure   | Residual Effect                            |
|--|---|---|---|--|
|  | <b>Figure 9-9 (Volume 2))</b>   |   |   |  |
| Potential for damage to existing culverted watercourses that could lead to water quality impact. | Holme Fleet (reference SW05 in <b>Figure 9-9 (Volume 2))</b>  | Minor Adverse (Not Significant)                 | Further measures will be identified for inclusion in the OCoCP as the design develops. Remedial or protective works will be undertaken as required. | Minor Adverse (Not Significant)            |
| Potential for damage to existing culverted watercourses that could lead to water quality impact. | Ordinary watercourses and ditches located within the DCO Application Boundary ( <b>Figure 9-9 (Volume 2))</b> | Neutral to Minor Adverse (Not Significant)      | Further measures will be identified for inclusion in the OCoCP as the design develops. Remedial or protective works will be undertaken as required. | Neutral to Minor Adverse (Not Significant) |
| Potential for damage to existing culverted watercourses that could lead to flood risk impact.    | Flood risk receptors: People, property and the infrastructure in the Site and surrounding area                | Minor Adverse (Not Significant)                 | Further measures will be identified for inclusion in the OCoCP as the design develops. Remedial or protective works will be undertaken as required. | Minor Adverse (Not Significant)            |
| Increased flood risk from temporary construction works within/adjacent to the floodplain.        | Flood risk receptors: People, property and the infrastructure in the Site and surrounding area                | Minor Adverse (Not Significant)                 | Further measures will be identified for inclusion in the OCoCP as the design develops.  | Minor Adverse (Not Significant)            |
| Potential damage, obstruction or modification of existing flood defence infrastructure.          | Flood risk receptors: Proposed Scheme and people, property and the infrastructure in the                      | Minor Adverse (Not Significant)                 | Further measures will be identified for inclusion in the OCoCP as the design develops.  | Minor Adverse (Not Significant)            |

| Description of the Effect   | Sensitive Receptor  | Significance of Effect with Embedded Mitigation | Additional Design Mitigation, Enhancement Measure  | Residual Effect                 |
|---|---|---|--|---------------------------------|
|   | Site and surrounding area   |   | A FRAP will be required for works within 16m of EA flood defence.  |                                 |
| Impacts to groundwater quantity (level and flow) and quality from Proposed Scheme. Potential temporary loss of water from storage and reduction in water levels (locally) within superficial deposit aquifers from construction phase activities. Increased pollution risk from spillage of fuels and other harmful substances that may migrate to local groundwater receptors. | Superficial deposit aquifers designated Secondary Undifferentiated Aquifers (Tidal Flat Deposits) | <b>Moderate Adverse (Significant)</b>           | Further measures will be identified for inclusion in the OCoCP as the design develops. Appropriate piling method to be determined. | Minor Adverse (Not Significant) |
| Impacts to groundwater quantity (level and flow) and quality from Proposed Scheme. Potential temporary loss of water from storage and reduction in water levels (locally) within Principal Aquifers and at groundwater abstractions due to groundwater control measures.  | Principal Aquifer - Sherwood Sandstone Group  | <b>Moderate Adverse (Significant)</b>           | Further measures will be identified for inclusion in the OCoCP as the design develops. Appropriate piling method to be determined. | Minor Adverse (Not Significant) |

| Description of the Effect   | Sensitive Receptor                                       | Significance of Effect with Embedded Mitigation | Additional Design Mitigation, Enhancement Measure  | Residual Effect                 |
|---|--|---|--|---------------------------------|
| Increased pollution risk from spillage of fuels and other harmful substances that may migrate to local groundwater receptors.   |  |   |  |                                 |
| Impacts to groundwater quantity (level and flow) and quality from Proposed Scheme due to groundwater control measures. Potential temporary loss of water from storage and reduction in water levels (locally) within the permeable layers of the Mercia Mudstone Group. | Secondary B Aquifer – Mercia Mudstone Group              | <b>Moderate Adverse (Significant)</b>           | Further measures will be identified for inclusion in the OCoCP as the design develops.   | Minor Adverse (Not Significant) |
| Potential reduction in water level (locally) within Principal and Secondary aquifers due to groundwater control measures.   | Private (unlicensed/licenced) Groundwater Abstractions   | <b>Moderate Adverse (Significant)</b>           | Further measures will be identified for inclusion in the OCoCP as the design develops.   | Minor Adverse (Not Significant) |
| Potential indirect impact to groundwater quantity (level and flow) and quality from Proposed Scheme. Potential reduction in water level (locally) within Principal and Secondary aquifers due to  | GWDTE – The Tees and Cleveland Coast Ramsar / SSSI Sites | <b>Moderate Adverse (Significant)</b>           | Further measures will be identified for inclusion in the OCoCP as the design develops. Appropriate piling method to be determined. | Minor Adverse (Not Significant) |

| Description of the Effect   | Sensitive Receptor  | Significance of Effect with Embedded Mitigation | Additional Design Mitigation, Enhancement Measure   | Residual Effect                 |
|---|---|---|---|---------------------------------|
| groundwater control measures.   |   |   |   |                                 |
| <b>Operational Phase</b>  |   |   |   |                                 |
| Polluted surface water runoff and spillage risks containing silts, hydrocarbons or other harmful chemicals. | River Tees (reference SW76 in <b>Figure 9-9 (Volume 2)</b> )                          | Minor Adverse (Not Significant)                 | No residual mitigation proposed but ongoing development of proposed Outline Drainage Strategy and other design/operational procedures to be agreed with EA and LLFA will be considered further in the ES. | Minor Adverse (Not Significant) |
| Polluted surface water runoff and spillage risks containing silts, hydrocarbons or other harmful chemicals. | North Sea / Tees Coastal Water Body (reference SW78 in <b>Figure 9-9 (Volume 2)</b> ) | Neutral (Not Significant)                       | No residual mitigation proposed   | Neutral (Not Significant)       |
| Polluted surface water runoff and spillage risks containing silts, hydrocarbons or other harmful chemicals. | Holme Fleet (reference SW05 in <b>Figure 9-9 (Volume 2)</b> )                         | Minor Adverse (Not Significant)                 | No residual mitigation proposed but ongoing development of proposed Outline Drainage Strategy and other design/operational procedures to be agreed with EA and LLFA will be considered further in the ES. | Minor Adverse (Not Significant) |

| Description of the Effect   | Sensitive Receptor   | Significance of Effect with Embedded Mitigation | Additional Design Mitigation, Enhancement Measure   | Residual Effect                            |
|---|--|---|---|--|
| Polluted surface water runoff and spillage risks containing silts, hydrocarbons or other harmful chemicals. | Dabholm Gut (reference SW78 in <b>Figure 9-9 (Volume 2)</b> )  | Neutral (Not Significant)                       | No residual mitigation proposed   | Neutral (Not Significant)                  |
| Polluted surface water runoff and spillage risks containing silts, hydrocarbons or other harmful chemicals. | The Fleet (reference SW81 in <b>Figure 9-9 (Volume 2)</b> )  | Neutral (Not Significant)                       | No residual mitigation proposed   | Neutral (Not Significant)                  |
| Polluted surface water runoff and spillage risks containing silts, hydrocarbons or other harmful chemicals. | Ordinary watercourses and ditches located within the DCO Application Boundary ( <b>Figure 9-9 (Volume 2)</b> )     | Neutral to Minor Adverse (Not Significant)      | No residual mitigation proposed but ongoing development of proposed Outline Drainage Strategy and other design/operational procedures to be agreed with EA and LLFA will be considered further in the ES. | Neutral to Minor Adverse (Not Significant) |
| Polluted surface water runoff and spillage risks containing silts, hydrocarbons or other harmful chemicals. | Ordinary watercourses and ditches located outside of the DCO Application Boundary ( <b>Figure 9-9 (Volume 2)</b> ) | Neutral to Minor Adverse (Not Significant)      | No residual mitigation proposed but ongoing development of proposed Outline Drainage Strategy and other design/operational procedures to be agreed with EA and LLFA will be considered further in the ES. | Neutral to Minor Adverse (Not Significant) |

| Description of the Effect   | Sensitive Receptor  | Significance of Effect with Embedded Mitigation | Additional Design Mitigation, Enhancement Measure   | Residual Effect                 |
|---|---|---|---|---------------------------------|
| Polluted surface water runoff and spillage risks containing silts, hydrocarbons or other harmful chemicals. | Ponds located in designated areas including Dorman's Pool, Saltholme East Pool, Saltholme West Pool and Paddy's Pool ( <b>Figure 9-9 (Volume 2)</b> ) | Minor Adverse (Not Significant)                 | No residual mitigation proposed but ongoing development of proposed Outline Drainage Strategy and other design/operational procedures to be agreed with EA and LLFA will be considered further in the ES. | Minor Adverse (Not Significant) |
| Polluted surface water runoff and spillage risks containing silts, hydrocarbons or other harmful chemicals. | Teesmouth National Nature Reserve (reference SW01 in <b>Figure 9-9 (Volume 2)</b> )   | Neutral (Not Significant)                       | No residual mitigation proposed   | Neutral (Not Significant)       |
| Polluted surface water runoff and spillage risks containing silts, hydrocarbons or other harmful chemicals. | Licensed and Private (unlicensed/licenced) surface water abstractions   | Minor Adverse (Not Significant)                 | No residual mitigation proposed but ongoing development of proposed Outline Drainage Strategy and other design/operational procedures to be agreed with EA and LLFA will be considered further in the ES. | Minor Adverse (Not Significant) |
| Discharge of foul and effluent water that could cause deterioration of the receiving waterbody.             | River Tees (reference SW76 in <b>Figure 9-9 (Volume 2)</b> )  | Minor Adverse (Not Significant)                 | No residual mitigation proposed   | Minor Adverse (Not Significant) |

| Description of the Effect   | Sensitive Receptor   | Significance of Effect with Embedded Mitigation                       | Additional Design Mitigation, Enhancement Measure   | Residual Effect   |
|---|--|---|---|---|
| Discharge of foul and effluent water that could cause deterioration of the receiving waterbody.   | North Sea/Tees Coastal Water Body (reference SW78 in <b>Figure 9-9 (Volume 2)</b> )                            | Neutral (Not Significant)   | No residual mitigation proposed   | Neutral (Not Significant)   |
| Discharge of foul and effluent water that could cause deterioration of the receiving waterbody.   | Dabholm Gut (reference SW78 in <b>Figure 9-9 (Volume 2)</b> )  | Minor Adverse (Not Significant)                                       | No residual mitigation proposed   | Minor Adverse (Not Significant)                                       |
| Discharge of treated industrial process effluent to the River Tees (via Bran Sands WWTP), increasing the nitrogen load discharged to the Teesmouth and Cleveland Coast SPA and Ramsar site. | Teesmouth and Cleveland Coast SPA and Ramsar site ( <b>Figure 9-1 (Volume 2)</b> )                             | <b>Major Adverse (Significant)</b>                                    | Offsite mitigation including the purchase of nitrogen mitigation credits, construction of a treatment wetland or the conversion of agricultural land to a low nutrient land use.                                  | Neutral (Not Significant)   |
| Impact associated with watercourse crossings, diversions or other physical modifications.   | Ordinary watercourses and ditches located within the DCO Application Boundary ( <b>Figure 9-9 (Volume 2)</b> ) | Minor Adverse (Not Significant) to <b>Major Adverse (Significant)</b> | Channels designed to maintain hydraulic form and function. Design not yet developed and therefore cannot be considered in assessment of residual effects. This will be reviewed and considered further in the ES. | Minor Adverse (Not Significant) to <b>Major Adverse (Significant)</b> |
| Increased flood risk from changes to flood flow conveyance and storage.   | Flood risk receptors: People, property and infrastructure in the   | <b>Moderate to Major Adverse (Significant)</b>                        | Ongoing assessment and development of appropriate flood defence and mitigation works. Measures not yet  | <b>Moderate to Major Adverse (Significant)</b>                        |

| Description of the Effect   | Sensitive Receptor   | Significance of Effect with Embedded Mitigation | Additional Design Mitigation, Enhancement Measure  | Residual Effect                                |
|---|--|---|--|--|
|   | Site and surrounding area  |   | developed and therefore cannot be considered in assessment of residual effects. This will be reviewed and considered further in the ES.  |  |
| Increased flood risk from increased rates and volumes of surface water runoff from an increase in impermeable area. | Flood risk receptors: People, property and infrastructure in the Site and surrounding area                         | Minor Adverse (Not Significant)                 | No residual mitigation proposed but ongoing development of proposed Outline Drainage Strategy that will be considered further in the ES.   | Minor Adverse (Not Significant)                |
| Flood risk from construction of the Proposed Scheme in areas identified to be at risk of flooding.                  | Flood risk receptors: Proposed Scheme  | <b>Moderate to Major Adverse (Significant)</b>  | Ongoing assessment and development of appropriate flood defence and mitigation works. Measures not yet developed and therefore cannot be considered in assessment of residual effects. This will be reviewed and considered further in the ES. | <b>Moderate to Major Adverse (Significant)</b> |
| Potential for damage to existing culverted watercourses that could lead to flood risk impact.                       | Flood risk receptors: Proposed Scheme and people, property and the infrastructure in the Site and surrounding area | Minor Adverse (Not Significant)                 | Remedial or protective works will be undertaken as required. Measures not yet developed and therefore cannot be considered in assessment of residual effects. This will be reviewed and considered further in the ES.                          | Minor Adverse (Not Significant)                |

| Description of the Effect  | Sensitive Receptor   | Significance of Effect with Embedded Mitigation | Additional Design Mitigation, Enhancement Measure   | Residual Effect                 |
|--|--|---|---|---------------------------------|
| Potential damage, obstruction or modification of existing flood defence infrastructure.  | Flood risk receptors: Proposed Scheme and people, property and the infrastructure in the Site and surrounding area | Minor Adverse (Not Significant)                 | Ongoing consideration of flood defence assets throughout design and operations. Measures not yet developed and therefore cannot be considered in assessment of residual effects. This will be reviewed and considered further in the ES.                                | Minor Adverse (Not Significant) |
| Potential for increased flood risk due to presence of groundwater flow barriers from intrusive earthworks that extend below the groundwater table forming groundwater flow barriers. | Flood risk receptors: Proposed Scheme and people, property and the infrastructure in the Site and surrounding area | <b>Moderate Adverse (Significant)</b>           | Additional mitigation measures will be identified as the design progresses. Measures not yet developed and therefore cannot be considered in assessment of residual effects. This will be reviewed and considered further in the ES.                                    | Minor Adverse (Not Significant) |
| Groundwater quality of the superficial aquifers.   | Superficial deposit aquifers designated Secondary Undifferentiated Aquifers (Tidal Flat Deposits)                  | <b>Moderate Adverse (Significant)</b>           | Additional mitigation measures will be identified as the design progresses in relation to groundwater quality. Measures not yet developed and therefore cannot be considered in assessment of residual effects. This will be reviewed and considered further in the ES. | Minor Adverse (Not Significant) |
| Groundwater quality of the principal bedrock aquifer.  | Principal Aquifer - Sherwood Sandstone Group   | <b>Moderate Adverse (Significant)</b>           | Additional mitigation measures will be identified as the design progresses in relation to   | Minor Adverse (Not Significant) |

| Description of the Effect                   | Sensitive Receptor                          | Significance of Effect with Embedded Mitigation | Additional Design Mitigation, Enhancement Measure   | Residual Effect                 |
|---|---|---|---|---------------------------------|
|   |   |   | groundwater quality. Measures not yet developed and therefore cannot be considered in assessment of residual effects. This will be reviewed and considered further in the ES.   |                                 |
| Groundwater quality of the bedrock aquifer. | Secondary B Aquifer – Mercia Mudstone Group | Minor Adverse (Not Significant)                 | Additional mitigation measures will be identified as the design progresses in relation to groundwater quality. Measures not yet developed and therefore cannot be considered in assessment of residual effects. This will be reviewed and considered further in the ES. | Minor Adverse (Not Significant) |

## 9.12. NEXT STEPS

9.12.1. Further work to be completed and included in the ES comprises:

- Continued consultation with stakeholders to discuss the Proposed Scheme and proposed mitigation;
- The Water Environment and Flood Risk assessment will be further developed and refined based on any relevant responses to the statutory consultation;
- The gaps in the assessment identified within this Chapter (e.g. FRA WFD assessment and Nutrient Neutrality assessment) will be completed and outcomes confirmed within the ES;
- The detailed assessment within the ES will involve a review of the water environment and flood risk assessment presented in this Chapter, based on further information as part of ongoing design development;
- Identify appropriate piling method as detailed design progresses following additional assessment of the ground condition i.e., completion of intrusive ground investigation to obtain site-specific geotechnical and geo-environmental data to inform detailed design and through consultation with the relevant stakeholders. A piling risk assessment (to inform the detailed design) will be undertaken (**Appendix 3C: Geology and Soils Technical Note (Volume 3)**);
- Development of a site-specific FRA;
- Detailed flood modelling to inform design considerations; and
- Additional intrusive ground investigation works will be required in order to provide information associated with detailed design but the intrusive works will not be carried out in advance of submission of the ES Chapter.

## 9.13. LIMITATIONS AND ASSUMPTIONS

9.13.1. The following limitations and assumptions have been identified and considered in this PEIR:

- This assessment has relied upon the accuracy and level of detail of the documented data sources reviewed as part of the desktop assessment. No significant changes or limitations in these datasets (in space or time) have been identified that would affect the robustness of the assessment at the time of writing this Chapter;
- All baseline data has been collated from freely available sources for a desk-based study;
- The Proposed Scheme is located in an area with tidal influence. It is therefore assumed that no flood compensation will be required for loss of existing floodplain storage caused by the Proposed Scheme, if applicable;
- The final layout of the Proposed Scheme has not been determined at the time of writing this PEIR. The final layout will take into account the ongoing consultation with the EA in relation to flood risk and climate change. The assessment will be revised once the final layout is determined for the ES stage;

- It is not proposed to undertake water quality sampling (surface and groundwater) to inform the assessment of the impacts of the Proposed Scheme on the quality of the water features nearby. Any water quality monitoring deemed to be required for construction works can be agreed as part of the EA and LLFA consenting procedures;
- Water quality sampling of the Reclamation Pond is proposed to understand the baseline condition of this water feature and any connectivity to nearby existing designated sites outside of the Site;
- There is limited design information on the location and depth to localised excavations for the Proposed Scheme i.e., intrusive earthworks e.g. foundation piling). The impacts from localised excavations on groundwater resources and aquifers has not been assessed in this PEIR and will be addressed accordingly at ES Stage as design information becomes readily available;
- The assessment of significance of effects (surface and groundwater receptors) is based on design information available at the time of writing. As design development is ongoing this could be subject to change. Any updates will be assessed in the EIA and reported in the ES. Data requests and data received to date align with the previous DCO Application Boundary that at the time of writing did not include the grid connection/WWTP connection;
- Limited additional information has been made available following a restricted visit to the Site of the Proposed Scheme though this is subject to change as a result of ongoing consultations with relevant stakeholders and will be assessed dynamically up to ES stage;
- In preparing this Chapter, a key assumption has been that ground investigation works will be a requirement for and undertaken to inform detailed design of the proposed facility. Where concern critical design features exist geotechnically and hydrogeologically, precautionary assumptions and assessment have been made to groundwater receptors that may be directly and/or indirectly affected by the Proposed Scheme. As this data becomes available (post submission of EIA) WSP will re-engage with key stakeholders and applicant to discuss risks to receptors (surface water and groundwater) and mitigations;
- It has been assumed that all construction works and the operation of the proposed facility will be completed in accordance with standard environmental practices and under the planning regime;
- Drainage information is not currently available and therefore potential impacts and likely mitigation are assumed based on best standard design practices. It is assumed that detailed design information for the drainage of the Proposed Scheme will be made available for the completion of the ES.

## 9.14. REFERENCES

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- <sup>2</sup> Department for Energy Security and Net Zero. (2023). Overarching National Policy Statement for Energy (EN-1). Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1147380/NPS\\_EN-1.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147380/NPS_EN-1.pdf)
- <sup>3</sup> Department for Energy Security and Net Zero. (2023). National Policy Statement for Natural Gas Electricity Generating Infrastructure (EN-2).. Available at: [https://assets.publishing.service.gov.uk/media/64252f4b3d885d000cdade9c/NPS\\_EN-2.pdf](https://assets.publishing.service.gov.uk/media/64252f4b3d885d000cdade9c/NPS_EN-2.pdf)
- <sup>4</sup> Department for Energy Security and Net Zero. (2023). National Policy Statement for Electricity Networks Infrastructure (EN-5). Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1147384/NPS\\_EN-5.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147384/NPS_EN-5.pdf)
- <sup>5</sup> Ministry of Housing, Communities and Local Government. (2023). National Planning Policy Framework. Available at: [https://webarchive.nationalarchives.gov.uk/ukgwa/20230826160735mp\\_/https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1005759/NPPF\\_July\\_2021.pdf](https://webarchive.nationalarchives.gov.uk/ukgwa/20230826160735mp_/https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf)
- <sup>6</sup> Stockton-on-Tees Borough Council. (2016). Stock-on-Tees Local Flood Risk Management Strategy. Available at: [https://www.stockton.gov.uk/media/2981/Local-flood-risk-management-strategy/pdf/Local\\_flood\\_risk\\_management\\_strategy.pdf?m=637813986536300000](https://www.stockton.gov.uk/media/2981/Local-flood-risk-management-strategy/pdf/Local_flood_risk_management_strategy.pdf?m=637813986536300000)
- <sup>7</sup> Stockton-on-Tees Borough Council. (2019). Stockton-on-Tees Borough Council Local Plan. Available at: [https://www.stockton.gov.uk/media/2518/Local-Plan-2019/pdf/Local\\_Plan\\_2019.pdf?m=637810468860870000#:~:text=It%20covers%20a%20range%20of,of%20town%20centres%20and%20community](https://www.stockton.gov.uk/media/2518/Local-Plan-2019/pdf/Local_Plan_2019.pdf?m=637810468860870000#:~:text=It%20covers%20a%20range%20of,of%20town%20centres%20and%20community)
- <sup>8</sup> Middlesbrough Flood Risk Management Partnership. (2016). Middlesbrough Local Flood Risk Management Strategy. Available at: <https://www.middlesbrough.gov.uk/media/bt0nzuoj/middlesbrough-lfrms-sept-16.pdf>
- <sup>9</sup> Middlesbrough Council. (2008). Middlesbrough Local Development Framework Core Strategy. Available at: <https://www.middlesbrough.gov.uk/media/2nvloyfb/planning-policy-core-strategy-2008.pdf>
- <sup>10</sup> Middlesbrough Council. (2024). Middlesbrough Draft Local Plan. Available at: <https://www.middlesbrough.gov.uk/media/ysyjki25/draft-local-plan-2024.pdf>
- <sup>11</sup> Redcar & Cleveland Borough Council (2018). Redcar & Cleveland Borough Council Local Plan, adopted May 2018. Available at: <https://www.redcar-cleveland.gov.uk/sites/default/files/2022-04/Local%20Plan%20Adopted%20May%202018.pdf>
- <sup>12</sup> HM Government. (2010). 'Flood and Water Management Act'. Available at: <http://www.legislation.gov.uk/ukxi/2017/407/contents/made>
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The logo for Lighthouse Green Fuels, featuring the company name in a bold, sans-serif font. The text is white and is contained within a white rectangular box. The background of the top half of the page is a solid green color, with a blue diagonal stripe running from the bottom left towards the top right, partially overlapping the green area.

**Lighthouse  
Green Fuels**

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