# Lighthouse Green Fuels Development Consent Order

Preliminary Environmental Information Report

## Appendix 12A: Flood Risk Assessment

Planning Inspectorate Reference: EN0110025

**2nd December 2025**

# Contents

## Tables

# 1. Introduction and scope

## 1.1 Report context

1.1.1 Ove Arup and Partners Ltd (hereafter referred to as 'Arup') has been commissioned by LGF Projects Ltd[i] (hereafter referred to as 'the Applicant'), to carry out a Level 2 Site-Specific Flood Risk Assessment (FRA). This report presents a Level 2 FRA, which can be defined as qualitative and semi-quantitative assessment to understand the flood risk as a result of the Proposed Development.

1.1.2 This FRA has been prepared to support the Development Consent Order (DCO) application for the construction, operation, maintenance, and decommissioning of the proposed Lighthouse Green Fuels Project (hereafter referred to as the 'Proposed Development').

1.1.3 The term the 'Proposed Development' includes the Main Site and land for the connection corridors and temporary land required during construction. The Main Site refers to the location of the main SAF production facility including associated quay.

1.1.4 This FRA identifies flood risk from all sources, including the River Tees (a Main River[ii]), considers the nature of the Proposed Development and the suitability of the Proposed Development against local and national planning policy relating to flood risk. This FRA will outline how the proposed development satisfies the Sequential and Exception tests. If necessary, the FRA will also identify required flood risk mitigation; for example, design elevations, if relevant.

## 1.2 Assumptions and limitations

1.2.1 The following assumptions and limitations apply:

- The FRA is based on the design at the time of writing (November 2025);
- It has been prepared using publicly available information to inform desk-based assessment. It is assumed that the information provided from public sources is correct and accurately reflects baseline conditions;
- The hydraulic modelling from the Environment Agency (EA) provides baseline flood risk within the River Tees. It is assumed that this modelling is an accurate and proportionate representation of potential flood risk to the Proposed Development;

[i] LGF Projects Ltd. (the Applicant) is wholly owned by Alfanar Global Development Company ('Alfanar'). Alfanar is a global project development, manufacturing, and engineering company headquartered in Saudi Arabia.

[ii] A Main River is typically a larger watercourse, as defined by the Environment Agency under section 193E of the Water Resources Act 1991.

- At this stage no site-specific hydraulic modelling has been undertaken. However, site-specific modelling will need to be undertaken for the DCO submission due to the site's location and the requirement to build within the River Tees, and the report updated to reflect the results;
- The construction activities, including management of temporary site drainage during construction, will be managed through a Construction Environmental Management Plan (CEMP). A Flood Risk Activity Permit will be secured, which will include a construction-specific FRA. As such, this FRA only considers permanent impacts associated with the operational phase of the Proposed Development; and
- The EA Flood Map for Planning adopts a precautionary approach and does not account for the presence or condition of flood defences; recognising that such structures may be overtopped, breached, or deteriorate over time.

## 1.3 Scoping opinion responses

1.3.1 The following responses have been provided by the regulators in Table 1-1.

**Table 1-1 Scoping Opinion Responses**

| Key stakeholders | Consultation response | Applicant Response to Feedback |
|---|---|---|
| Environment Agency | Summary of the PINS response:<br>The Flood Risk Assessment (FRA) should outline its methodology to avoid unnecessary work and confirm whether the site lies within Flood Zone 3a or 3b, as this determines vulnerability classification under the National Planning Policy Framework (NPPF).<br>It must define the proposal's classification and demonstrate compliance for essential infrastructure, ensuring it remains operational during flooding, does not reduce floodplain storage, and does not increase flood risk elsewhere. Highly vulnerable uses are generally unsuitable in Flood Zone 3 unless justified as essential infrastructure.<br>The FRA should include detailed site layouts overlaid on flood risk maps, differentiate Zones 3a and 3b, and apply a sequential approach to prioritize development in lower-risk areas, considering climate change impacts.<br>The assessment should reference key guidance documents such as the | A FRA has been produced which states the parts of the Proposed Development that are within Flood Zones. This FRA has followed the NPPF Annex 3 guidance.<br>This PEIR FRA outlines how the Proposed Development will interact with the flood risk receptors. Hydraulic modelling method statement will be prepared and agreed with the EA, prior to the work being undertaken at the ES stage. |

| Key stakeholders | Consultation response | Applicant Response to Feedback |
|---|---|---|
| | NPPF, Planning Practice Guidance, and Shoreline Management Plan, and address technical issues including reservoir risk, culverts, pipelines, quayside works, and watercourse crossings. Culverting should be avoided unless temporary and unavoidable, and pipeline crossings must prevent debris accumulation.<br>The Environmental Statement should show floodplain interactions, access routes, and drainage outfalls, while Development Consent Order (DCO) documents must include details of pipelines, crossings, and temporary laydown areas within the redline boundary. Overall, the FRA must demonstrate that the development will not increase flood risk elsewhere and complies with national policy. | |
| | Modelling and Unmapped Flood Risk<br>The applicant should provide a summary of data gaps and where there is the need for site-specific mapping to inform decision-making relating to flood risk or coastal erosion – indicating how this will be addressed. Additionally, the applicant should identify whether breach / overtopping modelling will be needed for defended sites. In areas where flood defences benefit the site (as referenced in paragraph 9.3.26), the ES should assess whether this is the case for the design event, and whether the flood defences have sufficient residual life commensurate with the development. | Hydraulic modelling method statement will be prepared and agreed with the EA, prior to the work being undertaken at the ES stage. |
| | Summary of the PINS response - Design life:<br>The temporal boundary is referenced, but the design life of the proposed development is unclear. While the applicant suggests a four-year construction phase, a minimum 30-year operation, and an 18-month decommissioning phase, the Planning Practice Guidance (PPG) advises assuming a design life of at least 75 years for non-residential developments. This assumption is critical because future flood extents | Whilst the expected design life of the Proposed Development will be a minimum of 25 years, the FRA will consider a 50 year and a 75 year operational life in accordance with EA climate change guidance. |

| Key stakeholders | Consultation response | Applicant Response to Feedback |
|---|---|---|
| | for the design flood must be assessed based on the development's design life. | |
| | The FRA should scope in flood risk for all phases inclusive of the decommissioning phase. Notably the decommissioning phase will experience the highest uplift in terms of climate change factors as they increase temporally. | The FRA will consider all phases of the Proposed Development. Currently the FRA has undertaken a desk-based review of the climate change impacts. This will be finalised at the ES stage. |
| | Summary of the PINS response - Climate Change: The FRA must clearly state the climate change allowances and epochs used for flood risk assessment. For essential infrastructure, peak river flow should use the higher central allowance with a sensitivity test for the upper end scenario, while sea level rise should assess both higher central and upper end allowances, including an H++ sensitivity test. In line with EN-1, the development must remain operational during the design flood and consider the credible maximum scenario to ensure resilience and a risk-averse approach for critical elements. | This has been considered in Section 8. |

# 2. Planning policy context

2.1.1 A review of relevant national, regional and local planning legislation, policy and guidance has been conducted to inform understanding of the potential impacts of the Proposed Development in terms of flood risk (see Table 2-1). The Proposed Development is located within the administrative boundaries of Stockton-on-Tees Borough Council (STBC) in North Tees and Redcar and Cleveland Borough Council (RCBC) in South Tees (see FRA Figure 1).

**Table 2-1 Summary of key legislation, policy and guidance**

| Legislation, Policy and Guidance | Summary |
|---|---|
| Legislation | |
| Environmental Protection Act 1990 (Ref 1); | This Act makes provision to control pollution arising from industrial and other processes for waste management.<br>This is relevant to the identification and control of pollution potentially arising from construction and operation of the Proposed Development. |
| The Water Environment (Water Framework Directive) (England and Wales) Regulations (2017) (Ref 2); | Aims to provide an integrated framework for the protection and restoration of the water environment through the delivery of actions set out in 11 River Basin Management Plans (RBMPs). This is pertinent to the protection of the River Tees. |
| Flood Risk Regulations 2009 (Ref 3); | The regulations designate Local Lead Flood Authorities (LLFA) and impose duties on the Environment Agency and LLFAs to prepare a number of documents including:<br>• Preliminary flood risk assessments<br>• Flood risk and flood hazard maps<br>• Flood risk management plans<br>The Proposed Development has the potential to impact flood risk and therefore takes account of these documents. |
| Flood and Water Management Act 2010 (Ref 4); | Gives the Environment Agency a strategic overview of the management of flood and coastal erosion risk in England. In accordance with the Government's Response to the Pitt Review, it also gives upper tier local authorities in England responsibility for preparing and putting in place strategies for managing flood risk from groundwater, surface water and ordinary watercourses in their areas. The principles outlined in the Act must inform the design of the Proposed Development and mitigation through consideration of changes to flood risk. |

| Legislation, Policy and Guidance | Summary |
|---|---|
| Reservoir Act 1975 (Ref 33) | It regulates large raised reservoirs to prevent catastrophic flooding. It requires registration, regular inspections by qualified engineers, and maintenance to ensure safety. The Act focuses on reservoirs where failure could endanger life, linking directly to flood risk by mandating preventive measures and emergency planning to minimise the impact of potential breaches. |
| Policy | |
| The Overarching National Policy Statement (NPS) for Energy (EN-1) (2024) (Ref 6); | The NPS EN-1, Section 4.12 (Pollution control and other environmental regulatory regimes) considers discharges and emissions including indirect and direct impacts to terrestrial and freshwater onshore environments. It notes that before consenting any potentially polluting developments, it should be confirmed that the relevant pollution control authority is satisfied that potential releases can be adequately regulated under the pollution control framework. It should also be confirmed that the effects of existing sources of pollution in and around the site are not such that the cumulative effects of pollution when the proposed development is added would make that development unacceptable, particularly in relation to statutory environmental quality limits.<br><br>The NPS EN-1, Section 5.8 (Flood Risk) addresses the assessment and management of flood risk for energy infrastructure projects. It mandates that a comprehensive Flood Risk Assessment (FRA) be conducted to evaluate potential impacts under both current and future conditions. The Sequential Test must be applied to prioritize locating projects in areas with the lowest flood risk. If this is not feasible, the Exception Test may be used. Developers are required to propose mitigation measures, such as flood defences and sustainable drainage systems, to manage and reduce flood risk. Additionally, assessments must consider climate change impacts, including increased rainfall and sea level rise, to ensure long-term sustainability and resilience. Consultation with relevant authorities, including the Environment Agency, is essential to confirm compliance with national and local flood risk policies.<br><br>The Proposed Development must be designed to mitigate the impact of flooding and must be completed in line with the requirements outlined in this policy. |
| National Planning Policy Framework (2024) (Ref 5) - Section 14 and | The NPPF states that when determining planning applications, local planning authorities should |

| Legislation, Policy and Guidance | Summary |
|---|---|
| Annex 3 in relation to flood risk and climate change, Section 15 in relation to protection of the water environment. | ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific FRA. Development should only be allowed in areas at risk of flooding where, in light of this assessment (and the Sequential and Exception tests, as applicable), it can be demonstrated that:<br>• within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;<br>• the development is appropriately flood resistant and resilient;<br>• it incorporates Sustainable Drainage Systems (SuDS), unless there is clear evidence that this would be inappropriate;<br>• any residual risk can be safely managed; and<br>• safe access and escape routes are included where appropriate, as part of an agreed emergency plan.<br><br>Major developments should incorporate SuDS unless there is clear evidence that this would be inappropriate. The systems used should:<br>• take account of advice from the Lead Local Flood Authority (LLFA);<br>• have appropriate proposed minimum operational standards;<br>• have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and<br>• where possible, provide multifunctional benefits.<br>The Proposed Development is located within areas of flood risk, as well as having the potential to impact water quality. This document is therefore relevant to the assessment. The FRA has followed the methodology outlined in the NPPF. |
| Stockton-on-Tees Borough Council (STBC) Local Plan (2019) (Ref 7Ref 7); | Requires development to avoid flood-prone areas and incorporate SuDS, reducing pressure on watercourses. Protects water resources through policies on green infrastructure and climate resilience. |
| Stockton-on-Tees Local Flood Risk Management Strategy (2016) (Ref 8); | Surface water drainage strategies are a key consideration for major development, where the proposals must not increase the risk of surface water run-off or the risk of flooding to neighbouring sites or downstream of the development. |
| Stockton-on-Tees Strategic Flood Risk Assessments: | A SFRA has been produced by Stockton-on-Tees Borough Council. The SFRA includes a Level 1 |

| Legislation, Policy and Guidance | Summary |
|---|---|
| Level 1 (2018) (Ref 9)<br>Level 2 (2018) (Ref 10) | SFRA, an SFRA review, a Level 2 Stage 1 SFRA and a Level 2 Stage 2 SFRA. They provide the evidence base to support a review of the Stockon-on-Tees Borough Council local plan and have an ongoing purpose in providing guidance to developers on flood risk management.<br>The Level 1 SFRA includes guidance to developers on flood risk identification, management and mitigation, flood risk regulatory compliance (including obtaining necessary permits), and community engagement.<br>The Level 2 Stage 1 SFRA includes further guidance to developers on site-specific flood risk identification and mitigation, Sequential and Exception Tests for flood risk assessment, and emergency planning. It also includes further guidance to developers on flood defence infrastructure, flood hazard mapping, residual risk management, and the alignment of development proposals with local and national flood risk policies. |
| Stockon-on-Tees Preliminary Flood Risk Assessment (n.d.) (Ref 11) | The PFRA is a high-level screening assessment that identifies areas where flood risk is significant (known as Flood Risk Areas). It considers the risk of flooding from local sources, namely Ordinary Watercourses, surface water and groundwater. No areas in Stockon-on-Tees were identified as meeting the national thresholds to be classed as a Flood Risk Area. |
| Redcar and Cleveland Local Plan (2018) (Ref 12) | The plan integrates flood risk management with coastal protection measures to safeguard communities and critical infrastructure from tidal and fluvial flooding. It places strong emphasis on preserving marine and estuarine environments, ensuring that development does not compromise ecological integrity or water quality. Policies encourage water-sensitive urban design, including SuDS and green infrastructure, to manage surface water, reduce runoff, and maintain healthy aquatic ecosystems. The strategy aligns with climate resilience objectives, promoting adaptive approaches to protect biodiversity and support sustainable growth along the coast. |
| Redcar and Cleveland Borough Council Preliminary Flood Risk Assessment (2011) (Ref 13) | The PFRA is a high-level screening assessment that identifies areas where flood risk is significant (known as Flood Risk Areas). It considers the risk of flooding from local sources, namely Ordinary Watercourses, surface water and groundwater. No areas in Redcar and Cleveland were identified as meeting the national thresholds to be classed as a Flood Risk Area. |

| Legislation, Policy and Guidance | Summary |
|---|---|
| Redcar and Cleveland Borough Council Strategic Flood Risk Assessments:<br>Updated Level 1 (2016) (Ref 14)<br>Level 2 (2010) (Ref 15) | A Level 1 SFRA and a Level 2 SFRA have been produced by Redcar and Cleveland Borough Council. They provide the evidence base to support a review of the Middlesbrough Borough Council local plan and have an ongoing purpose in providing guidance to developers on flood risk management.<br>The Level 1 SFRA includes guidance to developers on flood risk identification, management and mitigation, flood risk regulatory compliance (including obtaining necessary permits), and community engagement.<br>The Level 2 Stage 1 SFRA (Ref 15) includes further guidance to developers on site-specific flood risk identification and mitigation, Sequential and Exception Tests for flood risk assessment, and emergency planning. It also includes further guidance to developers on flood defence infrastructure, flood hazard mapping, residual risk management, and the alignment of development proposals with local and national flood risk policies. |
| Redcar and Cleveland Borough Council Local Flood Risk Management Strategy (2017) (Ref 16) | The Strategy notes a flood event (2013) was as a result of surface water run-off and sewer flooding rather than from river sources. Work has subsequently been undertaken with Northumbrian Water to improve the surface water drainage system within the borough. Sustainable drainage is critical to achieving effective surface water management, and the Authority is developing its policy in this area. All major planning applications now must include proposals on drainage and flood risk reduction. Surface water drainage strategies are a key consideration for major development, whereby the proposals must not increase the risk of surface water run-off or the risk of flooding to neighbouring sites or downstream of the development. |
| Guidance | |
| Environment Agency (EA)'s Climate Change Allowance Guidance (2022) (Ref 17); | Outlines when and how local authorities, developers, and their agents should use climate change allowances in flood risk assessments to ensure that developments are resilient to future climate change. It promotes an adaptive planning approach to managing flood risk, ensuring that all potential risks are identified and mitigated, thereby protecting communities and infrastructure.<br>The guidance will inform design and the identification of mitigation measures to manage the impact of climate change on flood risk. |

| Legislation, Policy and Guidance | Summary |
|---|---|
| Flood Risk Assessments: Climate Change Allowances (Environment Agency, 2022b) (Ref 17); | Outlines when and how risk management authorities should use climate change allowances for flood and coastal risk projects, schemes, and strategies. It promotes an adaptive approach to managing flood risk, enabling the development of projects that can adapt to a range of future climate change scenarios. By using climate change allowances to assess and plan for future flood risk, the guidance ensures that potential risks are identified and mitigated, and that projects are designed to be resilient to future climate change impacts. The guidance will inform design and the identification of mitigation measures to manage the impact of climate change on flood risk. |
| Planning Practice Guidance (Ref 31) | A proportionate approach should be taken to the sequential test. If a site-specific FRA shows that the proposed layout, design, and mitigation will keep occupiers safe from current and future surface water flood risk for the development's lifetime, this should be considered. For applications subject to the sequential test, the search area should reflect local circumstances, the development type, and the needs it addresses. The catchment area must be appropriate to the proposal's scale and the settlement it serves. |

# 3. Available information

## 3.1 Summary

3.1.1 Key sources of information that have been used in the production of this FRA include:

a. Environment Agency Flood map for Planning (Ref 18);
b. Environment Agency Long term flood risk for an area in England, for rivers and sea, surface water, reservoirs and groundwater (Ref 19);
c. Department for Environment Flood and Rural Affairs (Defra) National 1m LIDAR Programme DTM (Ref 20);
d. Department for Environment, Food and Rural Affairs (Defra) MAGiC online Mapping (Ref 21);
e. British Geology Survey (BGS) data (Ref 22);
f. The National Planning Policy Framework (NPPF): Annex 3 - Flood risk vulnerability classification (Ref 5);
g. National Planning Policy Guidance (NPPG): Flood Risk and Coastal Change Planning Practice (FRCC-PPG) (Ref 17);
h. Stockton-on-Tees Local Flood Risk Management Strategy (Ref 8);
i. Stockton-on-Tees Level 1 Strategic Flood Risk Assessment (Ref 9);
j. Stockton-on-Tees Level 2 Strategic Flood Risk Assessment (Ref 10);
k. Stockon-on-Tees Preliminary Flood Risk Assessment (Ref 11);
l. Redcar and Cleveland Borough Council Preliminary Flood Risk Assessment (Ref 13);
m. Redcar and Cleveland Borough Council Level 1 Strategic Flood Risk Assessment (Ref 14);
n. Redcar and Cleveland Borough Council Level 2 Strategic Flood Risk Assessment (Ref 15);
o. Redcar and Cleveland Borough Council Local Flood Risk Management Strategy (Ref 16); and
p. Tees Catchment Flood Management Plan (CFMP) (Ref 28)

# 4. Development site

## 4.1 Site description

4.1.1 The Proposed Development is located in Teesside, on land to the north and south of the River Tees. The Main Site is located in North Tees in the Seal Sands industrial area, approximately 5km east of Billingham town centre and 4km north-east of Middlesbrough town centre. The Main Site is on the north bank of the River Tees and roughly 4km south-west of Teesmouth. A number of connection corridors for industrial gases and wastewater cross the Tees into South Tees using existing infrastructure.

4.1.2 Further description of the Proposed Development is provided in Chapter 4: Proposed Development (PEIR Volume 1) and FRA Figure 1 (PEIR Volume 2) shows the Proposed Development Boundary and the Main Site.

## 4.2 Hydrology

4.2.1 The River Tees (a Main River) crosses the Proposed Development Boundary and is located to the south and east of the Main Site (FRA Figure 3). The Tees is crossed by the industrial gas and wastewater connections to South Tees. The River Tees is an estuary in this location, and is tidally influenced from Tees Mouth approximately 4km to the north of the Main Site to the Tees Barrage in Stockton on Tees, 12km to the south-west.

4.2.2 There are numerous other watercourses located in the vicinity of the Proposed Development. This includes:

a. Several unnamed land drains;

a. Dabholm Gut (an Ordinary Watercourse[iii]) is located to the east of the Proposed Development adjacent to Brand Sands Waste Water Treatment Works (WwTW);

a. Mill Race (an Ordinary Watercourse) intersects the Trunk Road at the eastern extent of the Proposed Development;

b. The Fleet (an Ordinary Watercourse) located approximately 200m north of the Proposed Development;

c. Holme Fleet (a Main River) located approximately 120m south-west of the Proposed Development (through the Saltholme Nature Reserve);

d. Knitting Wife Beck (an Ordinary Watercourse) located approximately 300m south-west of the eastern extent of the Proposed Development (Tees Dock roundabout); and

e. Greatham Creek (a Main River) located approximately 1.5km north of the Main Site

[iii] An Ordinary Watercourse is defined as any stream, river, ditch, drain, culvert, or other channel where water flows that is not designated as a Main River.

4.2.3 In addition, there are several other surface water features:

a. Dorman's Pool, plus water bodies within RSPB Saltholme Nature Reserve, including Saltholme East Pool, Saltholme West Pool and several unnamed ponds which are close to the pipeline connection corridor to Navigator North Tees Inland Terminal; and
b. Saltholme Brine Reservoirs located approximately 600m west of the Proposed Development.

## 4.3 Land use

4.3.1 Currently, the land use within the boundary of the Main Site is a closed and restored landfill site to the west and undeveloped land to the north. The Main Site was used for chemical manufacturing from the 1970s, with operations most recently undertaken by INEOS Nitriles. These industrial activities have since ceased operation; the facility has been decommissioned, demolished, and the site cleared leaving hardstanding as brownfield land. There are two existing redundant jetties located on the River Tees within the Proposed Development boundary.

4.3.2 Land use in the surrounding area is predominantly industrial including Navigator Terminals and Exolum amongst others all being located in proximity to the Main Site (see FRA Figure 2). The nearest residential properties are at Port Clarence and Cowpen Bewley, approximately 2.8km south-west and 3.5km north west, respectively. The wider area also includes various commercial buildings, such as the ASDA and Tesco distribution centres in South Teesside.

## 4.4 Geology and Groundwater

4.4.1 The Main Site and connection corridors are underlain by made ground (including dredged material in North Tees and ash and slag in South Tees), The underlying superficial depots are Tidal Flat Deposits (estuarine and marine alluvium) composed of sand, silt, and clay, which in turn overlie as Glaciolacustrine Deposits (clay and silt) and Glacial Till.

4.4.2 The superficial deposits are Secondary (undifferentiated) unproductive (Tidal Flat Deposits) and Secondary A aquifers (Glaciolacustrine Deposits).

4.4.3 According to the BGS Geology Viewer (Ref 22), the bedrock beneath the Main Site is the Mercia Mudstone Group which generally exhibits low permeability. The Mercia Mudstone (a Secondary B aquifer) is underlain by the Sherwood Sandstone Group (a Principal Aquifer) which also subcrops beneath superficial deposits to the west of the Main Site.

4.4.4 This indicates that the aquifers can provide local water supplies and may contribute significantly to river baseflow, with some horizontal groundwater

movement occurring through permeable layers. The Sherwood Sandstone is abstracted for drinking water supply approximately 9km to the north-east of the Main Site.

4.4.5 At a local scale, the groundwater flow within the superficial deposits and made ground will generally be towards the River Tees. However, this flow direction can vary due to local changes in topography, aquifer structure (such as the presence of clay or fine-grained sediments), rainfall patterns, and artificial features (e.g. drainage systems). The River Tees is likely to be hydraulically connected to the shallow groundwater contained within the superficial (Tidal Flat) deposits.

## 4.5 Existing topography

4.5.1 The Proposed Development boundary is characterised by relatively flat topography (FRA Figure 3). LiDAR levels within the Main Site is approximately 5 metres Above Ordnance Datum (mAOD).

4.5.2 Ground levels along the existing pipeline corridor at the southern edge of the Main Site range between approximately 4 mAOD and 8 mAOD, while those in South Tees are around 4 mAOD.

## 4.6 Existing drainage

4.6.1 Information regarding the existing drainage serving the Proposed Development is currently limited. However, it is likely that existing drainage infrastructure on the Main Site has been abandoned.

4.6.2 The existing catchments within the Main Site that feed into the drainage system remain unknown, as does the design capacity of the system, and its performance under different storm events.

# 5. Proposed Development

## 5.1 Background

5.1.1 The Proposed Development is expected to be the UK's first commercial-scale, second generation Sustainable Aviation Fuel (SAF) production facility. The plant would be one of the largest of its kind in Europe, producing over 180 million litres of advanced SAF and approximately 30 million litres of renewable naphtha per annum from the processing of over 1.5 million tonnes of biomass feedstock (including agricultural residues). SAF produced by the plant will contribute to the UK's SAF Mandate targets.

## 5.2 Details of the Proposed Development

5.2.1 The Proposed Development boundary contains the proposed SAF Production Facility, connection corridors and access route. Table 5-1 details the components/activities of the Proposed Development, with FRA Figure 4 (PEIR Volume 2) showing indicative locations.

**Table 5-1 Summary of the components/activities**

| Components/activities | Details |
|---|---|
| SAF production infrastructure | • SAF production facility –producing advanced SAF and renewable naphtha.<br>• Feedstock Reception & Storage – Facilities for receiving and storing biomass and waste wood (stored separately).<br>• Feedstock Pre-treatment Facility – Prepares feedstock for conversion into SAF. |
| Energy Generation | • Biomass-fired Combined Heat and Power (CHP) Plant –up to 200 MWe capacity, providing low-carbon electricity and steam. |
| Product Handling and Export | • Bulk Liquid Storage – For SAF and naphtha.<br>• Pipeline and Cable Connections – For import/export of products and utilities.<br>• Utility Corridors – Infrastructure for gas, steam, and other services. |
| Transport and Logistics | • Above ground covered conveyors will be used onsite for transport of feedstock.<br>• Access roads |
| Quay | • A new quay will be constructed on the River Tees at the Site's eastern boundary. To be used for import of materials and modular plant during construction and feedstock import during operation. |

| Components/activities | Details |
|---|---|
| | • The quay will include a single berth with infrastructure for feedstock import.<br>• At this there are three potential design concepts for the quay at this stage:<br>– an open piled suspended deck quay;<br>– a combi-wall quay; and<br>– a diaphragm wall quay.<br>• A preferred option will be determined ahead of the ES stage.<br>• Capital dredging will be carried out in the estuary to support quay construction and operations. |

## 5.3 Flood defences

5.3.1 The EA asset management website (Ref 23) identifies several flood defences in Seal Sands near the Main Site (FRA Figure 5). These are not 'formal' flood defences, i.e. they are not defined as assets and features that are formally maintained by risk management authorities (namely the EA).

5.3.2 Asset ID 395472 (5149.5m in length) extends along the left (north) bank of the River Tees through the Proposed Development, where the proposed quay will be built, and extending 200m to the south, and 319m to the north. These features are providing partial protection against tidal flooding to Seal Sands.

5.3.3 Assets ID 183041 (2214.74m in length) and 29649 (2615.15m in length) extend along the right hand (south) bank of the River Tees. These features are providing partial protection against tidal flooding of in South Tees from the River Tees (see a)

5.3.4 Flood defences within the area surrounding the Site are understood to be maintained by private third parties (i.e. not the EA). Accordingly, the EA asset dataset (Ref 28) contains no recorded information on its ownership, operator, condition, design characteristics, or standard of protection (Annual Exceedance Probability (AEP) %) (see B.4). It is also noted that these assets are not included within the EA Flood Map for Planning. The presence of such flood defences is not, therefore, reflected in the published flood zone extents (see b).

5.3.5 The closest 'formal' (i.e. EA owned and/or maintained) flood defences to the Proposed Development are located >4km upstream along the River Tees (near Port Clarence) and approximately 2km downstream along the banks of the Greatham Creek.

## 5.4 Historical flooding

5.4.1 STBC holds no records of historical flooding within the vicinity of the Proposed Development Site.

5.4.2 Historical flooding has been recorded within the RCBC SFRA (Ref 15), as well as the EA maintained database (see b), which records the flood outlines historical events caused by rivers, the sea, groundwater and surface water.

5.4.3 Within the boundary of RCBC, historical flooding has predominantly arisen from sources such as surface water sewers, combined sewer systems, and smaller ordinary watercourses and drains. All major urban areas within RCBC have experienced localised flooding. Across Redcar and Cleveland, nearly 800 flooding incidents have been documented by multiple data holders, affecting approximately ten key locations. The RCBC SFRA identifies Eston, Guisborough, and Redcar as the principal local flood risk areas, designating them as Critical Drainage Areas (CDAs).

5.4.4 Historical flood records sourced from the BHS Chronology of British Hydrological Event (Ref 29) and the RCBC SFRA and EA are summarised in Table 5-2.

**Table 5-2 Records of historical flooding**

| Date | Flooding source | Summary |
|---|---|---|
| 1953 | Tidal | A deep low-pressure system combined with north-westerly winds and a high spring tide generated a major tidal surge, flooding Port Clarence to 1.2 m depth. Peak water level reached 4.01 mAOD on the River Tees. Two breaches occurred on Greatham Creek embankments near the A178, with additional impacts at Billingham Reach Industrial Estate, Tees Marshalling Yard, and other low-lying areas along the tidal Tees. |
| 1978 | Tidal | A breach occurred on both the north and south embankments of Greatham Creek, downstream of the A178. |
| 1983 | Tidal | A breach of the Greatham Creek Southern flood defence embankment both upstream and downstream of the A178, with a peak tide level of 3.65 m AOD. |
| 1999 | Fluvial | Heavy rainfall and restricted peak flows caused substantial flooding when the Holme Fleet culvert north of Port Clarence became blocked by debris within its access chambers. |
| 2000 | Fluvial | An intense storm hit the area of Port Clarence. Approximately 16 properties suffered from internal |

| Date | Flooding source | Summary |
|---|---|---|
| | | flooding with flood water reaching ground floor level. It was reported that the flooding occurred due to Holme Fleet Beck overtopping due to heavy rainfall. |
| Unknown | Groundwater | Flooding to the south of Marske, directly below Errington Wood. |
| 2012 | Fluvial and surface water | 24-hours of persistent heavy rain followed the wettest summer on record, resulting in fluvial and surface water flooding of several communities. The most severely affected were those along Lustrum Beck, and those in Norton near Billingham Beck. Traffic disruption also occurred following flooding of the A19/A66 trunk road. The report estimates that 150 properties and businesses were flooded internally |
| 2013 | Tidal | A high spring tide combined with a low-pressure system caused a tidal surge reaching 4.09 mAOD, exceeding previous records. Flooding affected 32 homes and 20 businesses in Port Clarence, Billingham Reach Industrial Estate, and Seal Sands. Significant infrastructure damage included closure of the A19 Portrack interchange and partial closure of the A66. Breaches at Greatham Creek inundated large areas of land. |
| 2017 | Fluvial/Surface water/Drainage Infrastructure | Cross Beck (Eston) and Spencer Beck (Teesville) catchments were affected after one week's rainfall fell in an hour, confirmed by the Met Office. Northumbrian Water reported this as a 1-in-197-year storm. Dry antecedent conditions accelerated runoff, and the rainfall intensity overwhelmed all drainage systems. |

# 6. Baseline Flood Risk Assessment

## 6.1 Overview

6.1.1 This section provides a baseline assessment of flood risk at the Proposed Development, from all sources including fluvial, tidal (coastal), surface water, groundwater, and artificial sources such as infrastructure failure. Following this, potential changes to flood risk due to climate change are discussed. Finally, flood risk management measures to protect the Proposed Development over its design life are set out.

## 6.2 Fluvial and tidal/coastal flooding

6.2.1 The EA classifies flood risk into three main Flood Zones, defined as follows:

- Flood Zone 1 (Low Probability): Land assessed as having less than a 0.1% annual probability of fluvial flooding (i.e. less than a 1 in 1,000 chance in any given year);
- Flood Zone 2 (Medium Probability): Land assessed as having between a 0.1% and 1% annual probability of fluvial flooding (i.e. between a 1 in 1,000 and 1 in 100 chance in any given year); and
- Flood Zone 3 (High Probability): Land assessed as having a 1% or greater annual probability of fluvial flooding (i.e. a 1 in 100 or greater chance in any given year).

6.2.2 The majority of the Main Site falls within Flood Zone 1 and is at low fluvial and tidal flood risk (Flood Zone 1), under baseline conditions. However, it should be noted that without any changes to flood defences, the EA predict all of the land within this area may become Flood Zone 2 and/or 3 by 2070, when accounting for climate change (FRA Figure 7). The EA Flood Map for Planning plus Climate Change (Ref 32) does not account for the benefits of any existing flood defences.

6.2.3 Furthermore, several sections of the Proposed Development boundary are situated within higher-risk areas classified (Flood Zones 2 and 3) under baseline conditions. These include: the initial 800m of Seal Sands Road east of Seal Sands Roundabout; the route proposed for the SAF export pipeline leading to the Navigator North Tees Inland Terminal; the intertidal area along the River Tees; and areas along the north bank of Dabholm Gut in South Tees.

## 6.3 Existing Environment Agency Model

6.3.1 The EA has developed an updated tidal hydraulic model (Greatham and Port Clarence model update (2020)) for the Tees Estuary to support the

strategic flood risk assessment. The model enables a detailed simulation of tidal propagation, floodplain interactions, and the performance of formal flood defences across the wider Tees Estuary.

6.3.2 The underlying model geometry is based on LiDAR data collected in 2017 together with “as-built” survey information obtained between 2015 and 2019. Boundary conditions for extreme sea levels and projected future sea-level rise have been derived in accordance with UKCP18 climate change guidance. All known formal and informal flood defences, including recent structures at Greatham and Port Clarence, are represented within the defended model.

6.3.3 Model outputs are available for:

- Present-day conditions, and
- Future climate change scenarios (2030, 2070 and 2100).

6.3.4 The modelling also considered two defence condition scenarios, across a range of return period events:

- Defended scenario - all formal flood defences maintained by the EA and third parties are included to assess their performance during extreme tidal events. Model outputs are available for the 2, 5, 10, 20, 25, 30, 50, 75, 100, 200 (with climate change) and 1,000 year return period events; and
- Undefended scenario - all formal defences are removed to represent natural flood behaviour and to support residual-risk assessment. Model outputs are available for the 200 year and 1,000 year return periods only. No climate change model outputs are provided under this scenario.

6.3.5 Under NPPF Annex 3, essential infrastructure located in high flood risk areas must be designed to remain operational and safe during at least the 1-in-200-year flood event. This section has considered the 1-in-200 and 1-in-1000 flood events. At the next stage analysis will be undertaken of the other return periods.

## Defended flooding scenario (present day)

6.3.6 The defended flood scenario indicate that tidal inundation potentially occurs within three identified areas during the 5, 20, 75, 200 and 1,000-year return period events. These four return periods were chosen to represent flood likelihood from relatively frequent to rare events, to provide a balanced and comprehensive risk assessment.

6.3.7 Under the defended scenario for baseline conditions (i.e. without climate change), three areas are potentially affected by tidal flooding. The details for these three flooded areas for the 200-year and 1,000-year return periods are provided below:

- **Southern section of the Main Site, in the existing Sembcorp pipeline corridor, where existing above ground pipelines are located, and where the SAF export pipeline will likely be routed.** The maximum predicted flood levels range from 0–2mAOD, which is lower than the current ground levels (FRA Figure 8), with maximum flow velocities predominantly between 0–1 m/s (FRA Figure 9).
- **Connection Pipeline Corridors and access routes, South Teesside:** The maximum predicted flood depths range from 2–5 mAOD, again lower than the current ground levels (FRA Figure 8). Maximum flow velocities are predominantly between 0–0.5 m/s (FRA Figure 9).
- **Marine Assessment Area (including the proposed new quay).** It is predicted that the flood water at the location of the quay will be at around 5mAOD (FRA Figure 8). A new quay will be built out into the Tees. As such it is, by definition, located in a permanently wet area. Based on the modelling information available at the time of writing this report (November 2025), it is anticipated the quay elevation will need to be set to 5.65mAOD to minimise flood risk during operation. There is potential for the new quay to impact on baseline flood levels. This will be explored at the next stage via site specific hydraulic modelling. Maximum flow velocities are predicted to be predominantly between 0–0.5 m/s (FRA Figure 9).

## Undefended flooding (present day)

6.3.8 In the undefended scenario, tidal inundation extends beyond the areas identified above. The 200-year and 1,000-year return period events are predicted to affect an additional area of flooding including the access routes (Seal Sands Road) to the Main Site.

6.3.9 Further detail on predicted flooding under the 200-year and 1,000-year return periods for the defended scenario is provided below:

- **Southern section of the Main Site (Sembcorp Corridor)**: The modelling shows that the western areas of the Site (outside the Main Site) including pipelines and access road (Seal Sands) could be affected during flood events in an undefended scenario. In the absence of these defences, these areas would be inundated, which is likely due to the removal or non-inclusion of flood defences along Greatham Creek, Holme Fleet, and the River Tees within the defended model scenario; and
- **Marine Assessment Area (including the proposed new quay):** It is predicted that the depth at the location of the quay will be between 5-10 mAOD (FRA Figure 10). Maximum flow velocities are generally between 0–0.5 m/s, based on EA model outputs (FRA Figure 11).

## Defended tidal flooding accounting for climate change

6.3.10 Three climate-change models have been provided by the EA under the defended scenario: 0.5% AEP + CC2030, 0.5% AEP + CC2070, and 0.5%

AEP + CC2100. These epochs represent the projected increases in extreme tidal water levels for the 0.5% AEP event under future climate conditions in 2030, 2070, and 2100. Climate change uplifts according to UKCP18 guidance have been applied to the 0.5% AEP event tidal curve for the 95th percentile of the RCP 8.5 emissions scenario. This is the worst-case of the UKCP18 scenarios. The 2100 epoch best represents the 75 year assessment period required by the Environment Agency.

6.3.11 The details are provided below:

- **Southern section of the Main Site (Sembcorp Corridor) where the proposed SAF export pipeline is likely to be located:** Across all three epochs, this area is predicted to be affected by tidal flooding when accounting for climate change. Maximum flood depths predominantly fall within the 0–2 mAOD, i.e. less than the current ground levels. However, the flood extent increases progressively from 2030 to 2100. Maximum flow velocities are generally 0–0.5 m/s, with small, localised areas reaching 0.5–2 m/s (FRA Figures 12 and 13);
- **Connection Pipeline Corridors and access routes, South Teesside:** Across all three epochs, this area is predicted to be affected by tidal flooding when accounting for climate change. Maximum flood depths predominantly fall within the 2–5 mAOD, again less than the current ground levels. However, the flood extent increases progressively from 2030 to 2100. Maximum flow velocities are generally 0.2–0.5 m/s, with small localised areas reaching 0.5–2 m/s (FRA Figures 12 and 13); and
- **Marine assessment area (including the proposed new quay and associated marine infrastructure):** Across all three epochs, this area is predicted to be affected by tidal flooding when accounting for climate change. Maximum flood depths predominantly fall within the 5-10 mAOD. A new quay will be built out into the Tees. As such, by definition it is located in a permanently wet area. Based on the modelling information available at the time of writing this report (November 2025), it is anticipated the quay elevation will need to be set to 5.65mAOD. There is potential for the new quay to impact on baseline flood levels. This will be explored at the next stage via site specific hydraulic modelling.

## 6.4 Surface water flood risk (pluvial flooding)

6.4.1 Surface water flooding, also referred to as pluvial flooding, occurs when intense or prolonged rainfall generates surface runoff that cannot be absorbed by the ground or conveyed by the local drainage system.

6.4.2 The EA Risk of Flooding from Surface Water (RoFSW) mapping categorises surface-water flood risk according to the following annual probabilities:

- **High risk:** >3.3% AEP (greater than 1 in 30 chance each year);
- **Medium risk:** 1% – 3.3% AEP (between 1 in 100 and 1 in 30);

- **Low risk:** 0.1% – 1% AEP (between 1 in 1000 and 1 in 100); and
- **Very low risk:** <0.1% AEP (less than 1 in 1000).

6.4.3 The EA RoFSW mapping identifies several small, linear, and discrete areas within the Proposed Development Boundary at risk of flooding, ranging from low to high chance of flooding from surface water within the Main Site. They are mostly in the central and eastern parts of the Main Site (FRA Figure 14). These are likely to be associated with low ground where water would pond after intense or prolonged rainfall event.

6.4.4 The EA Long-Term Flood Risk Map (Ref 19) indicates that there is predominantly a low chance of surface water flooding to depths of approximately 20–30 cm along the northern boundary of the Main Site, with some minor areas exhibiting a medium chance of flooding. This potential surface-water risk is associated with Seal Sands Road, and the immediately surrounding areas.

6.4.5 Overall, the Proposed Development is associated with a variable but predominantly low to medium risk of surface-water flooding. Notwithstanding, there are isolated areas of higher risk which are likely linked to localised low-lying ground and sections of the access route and associated corridors.

## 6.5 Groundwater flood risk

6.5.1 The Main Site is underlain at depth by Mercia Mudstone which is of low permeability and the high permeability Sherwood Sandstone Group Principal Aquifer. The bedrock is overlain by superficial deposits including Tidal Flat deposits. The superficial deposits are also predominantly of lower permeability that may store and yield limited amounts of groundwater.

6.5.2 At a local scale, groundwater within superficial deposits and made ground generally flows toward the River Tees, which is likely hydraulically connected to shallow groundwater in the Tidal Flat deposits.

6.5.3 Both the RCBC Level 1 SFRA (Ref 14) and PFRA (Ref 13) state that the overall risk of groundwater flooding in Redcar and Cleveland is low. It is noted in these assessments, that the majority of the borough may be subject to very wet ground conditions as a result of winter waterlogging. STBC hold no records of groundwater flooding problems in their area.

6.5.4 The Tees CFMP Catchment Flood Management Plan (Ref 28) states that there is little documented evidence of groundwater flooding in the Tees catchment and groundwater flooding is not known to be a major problem due to the geology of the catchment.

6.5.5 It is anticipated that any localised, emergent groundwater seepages would be managed by the new or updated drainage system. The detailed design

for the Proposed Development will also need to ensure foundation design does not adversely affect (and is not adversely affected by) changes in groundwater elevation in made ground (Main Site) and underlying superficial deposits (River Tees).

## 6.6 Reservoir flood risk

6.6.1 Reservoir flooding is categorised as flooding from an artificial source, typically resulting from the overtopping, structural failure, or breach of a reservoir or its associated outfall structures. The likelihood of such events is considered very low, owing to stringent regulatory and inspection regimes. However, the consequences of a breach can be severe, making reservoir flooding a residual but high-impact risk.

6.6.2 The EA Reservoir Flood Map indicates that the Main Site is not directly at risk of flooding from reservoirs (FRA Figure 15). However, the Main Site lies adjacent to areas identified as being at potential risk of flooding from this source; under both normal river conditions and combined fluvial–reservoir flood scenarios.

6.6.3 The reservoir flood map indicates a flood level of 3.5-3.6mAOD associated with the “Wet Day” failure. As such, the main site has significant freeboard against failure from the site. The only proposals within the reservoir floodplain are the access routes and existing pipeline corridors. The reservoir flood risk floodplain already includes residential properties, and as such, the reservoirs behind the floodplain will be Category A under the Reservoir Act (Ref 33) and shall not need to change category because of the proposals.

## 6.7 Canal and artificial flooding

6.7.1 The residual risks associated with canal flooding are primarily influenced by the location and nature of any potential structural failure.

6.7.2 There are no canal systems within the Proposed Development or the surrounding area (as noted in the STBC and RCBC SFRAs). On this basis, there is no risk of canal flooding to the Proposed Development.

## 6.8 Drainage flood risk

6.8.1 A detailed utility survey and verification exercise will be undertaken during the detailed design stage to confirm the location, condition, and capacity of all existing underground services and drainage infrastructure.

# 7. Sequential and Exception Tests

## 7.1 Development type and vulnerability classification

7.1.1 The NPPF classifies all types of developments in accordance with their vulnerability to flood risk[iv], which allows more vulnerable developments to be steered into areas of lowest flood risk. The vulnerability classification has a specific meaning under the flood risk assessment guidance to inform the Sequential and Exception tests and determine the selection of the appropriate climate change allowance for design flood levels (see Table 7-1 and Table 7-2). Proposed developments can be classified as Essential Infrastructure, Highly Vulnerable, More Vulnerable, Less Vulnerable or Water-Compatible. Note that the flood receptor vulnerability classification under NPPF does not imply the degree of susceptibility to damage or disruption during flood events.

**Table 7-1 Flood risk vulnerability and compatibility (based on Table 2 of the NPPG)**

| Flood Zone | Essential infrastructure | Highly vulnerable | More vulnerable | Less vulnerable | Water compatible |
|---|---|---|---|---|---|
| Flood Zone 1 | ✓ | ✓ | ✓ | ✓ | ✓ |
| Flood Zone 2 | ✓ | Exception test required | ✓ | ✓ | ✓ |
| Flood Zone 3a | Exception test required | ✗ | Exception test required | ✓ | ✓ |
| Flood Zone 3b “Functional Floodplain” | Exception test required | ✗ | ✗ | ✗ | ✓ |

**Table 7-2 Flood risk vulnerability classification**

| Vulnerability classification | Description |
|---|---|
| Essential infrastructure | • Essential transport infrastructure (including mass excavation routes) which has to cross the area at risk;<br>• Essential utility infrastructure which has to be located in a flood risk are for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood;<br>• Wind turbines; and |

[iv] **Ministry of Housing, Communities and Local Government (2024)** *Flood risk and coastal change.* Available online at: https://www.gov.uk/guidance/flood-risk-and-coastal-change [Accessed 15 September 2025].

| Vulnerability classification | Description |
|---|---|
| | • Solar farms. |
| Highly vulnerable | • Police stations, ambulance stations and fire stations and command centres and telecommunications installations required to be operational during flooding;<br>• Emergency dispersal points;<br>• Basement dwellings;<br>• Caravans, mobile homes and park homes intended for permanent residential use; and<br>• Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as “essential infrastructure”). |
| More vulnerable | • Hospitals;<br>• Residential institutions such as residential care homes, children’s homes, social services homes, prisons and hostels;<br>• Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels;<br>• Non-residential uses for health services, nurseries and educational establishments;<br>• Landfill* and sites used for waste management facilities for hazardous waste; and<br>• Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan. |
| Less vulnerable | • Police, ambulance and fire stations which are not required to be operational during flooding;<br>• Buildings used for shops, financial, professional and other services, restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non-residential institutions not included in “more vulnerable”, and assembly and leisure;<br>• Land and buildings used for agriculture and forestry;<br>• Waste treatment (except landfill* and hazardous waste facilities);<br>• Minerals working and processing (except for sand and gravel working);<br>• Water treatment works which do not need to remain operational during times of flood;<br>• Sewage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place); and<br>• Car parks. |
| Water-compatible development | • Flood control infrastructure;<br>• Water transmission infrastructure and pumping stations;<br>• Sewage transmission infrastructure and pumping stations; |

| Vulnerability classification | Description |
|---|---|
| | • Sand and gravel working;<br>• Docks, marinas and wharves;<br>• Navigation facilities;<br>• Ministry of Defence installations;<br>• Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location;<br>• Water-based recreation (excluding sleeping accommodation);<br>• Lifeguard and coastal stations;<br>• Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms; and<br>• Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to specific warning and evacuation plan. |

7.1.2 Based on the criteria in Table 7-1 and Table 7-2, the Proposed Development, including the quay as associated development, could be classified as "Essential Infrastructure". The Section 35 Direction issued by the Secretary of State for Energy Security and Net Zero (dated 8th September 2025) confirms that the Proposed Development is a Nationally Significant Infrastructure Project. The primary function of the Proposed Development is to produce, store and export sustainable aviation fuel, which will require hazardous substance consent. The Proposed Development needs to be located in a water-side location to receive feedstock by ship. The biomass generating plant if considered on a standalone basis could also be essential infrastructure. However, certain components of the Proposed Development will be more flood resilient (such as the new quay and the ground pipelines/corridors) and may not be required to function during a flood event. Further discussions with the EA will be undertaken to finalise the classification at the next design stage.

## 7.2 Sequential Approach

7.2.1 In-line with the NPPF, a sequential approach should be taken to Proposed Development selection and layout, to avoid inappropriate development in areas at risk of flooding from all sources and to steer new development to areas with the lowest risk of flooding.

7.2.2 The sequential approach prioritises development in low-risk flood areas over higher risk ones, considering all sources of flooding. Avoiding flood risk through the Sequential Test is the most effective method to do this.

7.2.3 The sequential approach follows a sequential, risk-based method to direct new development towards areas with the lowest flood risk, considering all sources of flood risk and climate change.

7.2.4 If development cannot be located in low-risk areas, the Sequential Test should compare reasonably available sites:

- First, within medium risk areas; and
- Then, if no reasonable sites are available in both low and medium risk areas, within high-risk areas.

*7.2.5* STBC Level 1 SFRA states *"Planning should seek to avoid inappropriate development in areas at risk of flooding by directing development away from areas at highest risk and ensuring that all development does not increase risk and where possible can help reduce risk from flooding to existing communities and development."*

*7.2.6* As stated in the previous sections the Main Site is located in Flood Zone 1, with sections of existing pipeline and access routes located within Flood Zone 2 and 3, as well as the quay proposed within the River Tees.

7.2.7 The Main Site requires access to quayside facilities and an area that is large enough to accommodate the infrastructure of the Main Site. Furthermore, the infrastructure needs to be within proximity to Bran Sands WwTW and with access to existing pipeline and transport access routes. This greatly limits the number of sites available; most available quayside sites are likely to subject to similar, if not greater levels of flood risk.

7.2.8 A previous site was under consideration for the Proposed Development (PINS Reference EN010150), located approximately 100m south of the southern boundary of the current Main Site. However, that previous site did not have direct access to the River Tees and was, therefore deemed less suitable for delivery of construction modules and feedstock. The previous site was also smaller in size, which would have meant that the biomass feedstock pre-treatment would have had to be undertaken off-site. A significant portion of that site was at a lower level than the current Main Site, and therefore at higher flood risk. These important technical reasons contributed to the decision to discontinue use of the previous site and change the location of the SAF Production Facility to the Main Site.

7.2.9 No other alternative sites have been identified that are both available and suitable, in according with the requirements outlined above. Considering these factors, the Proposed Development is considered to comply with the principles of the Sequential Test.

## 7.3 Exception Test

7.3.1 According to Table 7-1, Essential Infrastructure located within a high-risk flood zone (Flood Zone 3) is also required to satisfy the Exception Test. The Exception Test necessitates that the Proposed Development demonstrates both sustainability benefits and appropriate flood risk mitigation. The Proposed Development meets the Exception Test criteria through the following measures:

- **Sustainability Benefits:** The Proposed Development represents a £2 billion strategic investment in a waste biomass-to-SAF facility in Teesside (see Section 5), delivering measurable environmental and socio-economic gains. The facility will convert biomass feedstock into advanced SAF and renewable naphtha, directly supporting the UK's Net Zero and circular economy objectives. The inclusion of low-carbon energy infrastructure, comprising a biomass-fired CHP plant enhances the Site's energy autonomy. These outcomes strengthen national energy resilience, reduce greenhouse gas emissions, positioning Teesside as a key node in the UK's green energy transition.
- **Flood Resilience and Safety**: Flood-resilient measures will be embedded into the design to ensure effective management and mitigation of flood risk. The majority of the Main Site is located within Flood Zone 1 (low risk), where the SAF production infrastructure and other critical assets are located. The Proposed Development is currently classed as Essential Infrastructure and will be designed to remain operational during flood events.
- **No cumulative impact on flood risk elsewhere:** Under NPPF Annex 3, essential infrastructure located in high flood risk areas must be designed to remain operational and safe during at least the 1-in-200-year flood event. As stated in Section 6.3, it is expected that the baseline flood risk will increase in the 1 in 200 year flood event. As parts of the Proposed Development (existing pipeline corridors) are currently within Flood Zone 2 and 3, these changes will need site-specific modelling to be able to understand and assess the impacts.

7.3.2 Hydraulic modelling will be undertaken as part of the DCO application, to demonstrate no increase in flood risk in areas of Flood Zone 2 and 3, or creation of new areas of flood risk, as a result of the Proposed Development. An iterative approach to the design will be applied to ensure no increase in flood risk, in line with the NPPF. On this basis, it is expected that the Proposed Development will pass the Exception Test.

# 8. Climate change

## 8.1 Climate Change Allowance

8.1.1 Climate change is expected to, and likely already does, influence key hydrological and coastal parameters including peak river flows, rainfall intensity, sea level rise, offshore wind speeds, and extreme wave heights. These changes are anticipated to increase both the frequency and magnitude of flooding, heightening risks in areas already susceptible to flood events and potentially introducing new areas to flood risk to areas that are currently unaffected (Ref 24).

8.1.2 There are two principal approaches to incorporating climate change into design:

- **The precautionary approach**, which entails implementing mitigation measures at the outset to account for potential climate change impacts; and
- **The managed adaptive approach**, which allows for mitigation measures to be introduced in the future, once there is greater certainty regarding the scale and nature of climate change effects on factors such as river flows and rainfall.

8.1.3 Whilst the design life of the Proposed Development will at least 25 years, the operational life is expected to be longer, subject to market conditions. EA guidance (Ref 40) requires the Flood Risk Assessment to consider a 75-year design life, although a 50-year operational life is more realistic. Construction of the Proposed Development is anticipated to commence in 2028 and is expected to be operational by 2031.

8.1.4 The NPPF and NPS outlines how the planning system should reduce vulnerability and enhance resilience to climate change impacts. The EA's climate change allowances for flood risk assessments provide guidance for designers and developers on assessing and accommodating these impacts. The applicable climate change allowances for different sources of flooding at the Site are presented under the following sub-sections.

### Peak river flow allowance

8.1.5 Peak river flow allowances have been developed for management catchments across the UK using data from the UK Climate Projections, produced by the UK Centre for Ecology and Hydrology. These allowances represent anticipated changes in peak river flows due to climate change across a series of future time epochs - the 2020s, 2050s, and 2080s - for each catchment area.

8.1.6 For each time period, a range of percentile-based allowances has been

derived to reflect varying degrees of potential change, as follows:

- **Central allowance**: 50th percentile;
- **Higher central allowance**: 70th percentile; and
- **Upper end allowance**: 95th percentile.

8.1.7 Table 8-1 summarises the peak river flow allowances applicable to the Tees Management Catchment (Ref 28).

**Table 8-1 Peak river flow allowances for the Tees Management Catchment**

| Epoch | Central | Higher | Upper |
|---|---|---|---|
| 2020s | 19% | 23% | 32% |
| 2050s | 21% | 27% | 41% |
| 2080s | 32% | 40% | 61% |
| 2020s | 19% | 23% | 32% |

8.1.8 The epochs in the Environment Agency climate change guidance represent future time periods used to apply allowances for peak river flow. For the Tees Management Catchment, they are:

- **2020s**: Applies to developments with a lifetime up to 2035 (short-term);
- **2050s**: Applies to developments with a lifetime between 2036 and 2065 (medium-term); and
- **2080s**: Applies to developments with a lifetime between 2066 and 2125 (long-term).

## Sea level rise allowance

8.1.9 Sea level rise allowances have been established for each River Basin District and future flood epoch, using percentile-based projections (Higher Central and Upper End). The allowances for the Northumbria River Basin District (NRBD) are presented in Table 8-2.

**Table 8-2 Sea level allowances* for the NRBD**

| Allowance/Epoch | 2000 to 2035 (mm**) | 2036 to 2065 (mm) | 2066 to 2095 (mm) | 2096 to 2125 (mm) | Cumulative rise from 2000 to 2125 (metres) |
|---|---|---|---|---|---|
| Higher central | 4.6 (161) | 7.5 (225) | 10.1 (303) | 11.2 (336) | 1.03 |
| Upper end | 5.8 (203) | 10 (300) | 14.3 (429) | 16.5 (495) | 1.43 |

* Sea level rise estimates are provided as mm rise for each year, based on a 1981 to 2000 baseline. **Total sea level rise for each flood epoch is presented in brackets.

8.1.10 Sea level rise should be calculated manually for each time period (e.g.,

2000–2035, 2036–2065, and beyond), proportionate to the design life of the Proposed Development.

8.1.11 In addition to sea level rise, wave heights may also vary due to increased ocean energy and potential changes in the frequency, duration, and intensity of storm events. Where not already incorporated into modelling, additional allowances should be applied to reflect projected increases in offshore wind speeds and extreme wave heights for the English coastline (Ref 26), as outlined in Table 8-3.

**Table 8-3 Offshore wind speed and extreme wave height allowances for the English coast**

| Variable | 2000 to 2055* | 2056 to 2125* |
|---|---|---|
| Offshore wind speed allowance | 5% | 10% |
| Offshore wind speed sensitivity test | 10% | 10% |
| Extreme wave height allowance | 5% | 10% |

* Offshore wind speed and extreme wave height are relative to a 1990 baseline.

8.1.12 It should be noted that the present-day extreme sea levels, published in Coastal Design Sea Levels – Coastal Flood Boundary Extreme Sea Levels (2018), already account for storm surge but do not include adjustments for offshore wind or wave height effects. These extreme levels should therefore be treated as indicative and reported to one decimal place only.

## Peak rainfall intensity allowance

8.1.13 Allowances for changes in peak rainfall intensity have been developed for defined management catchments across the UK. These allowances are intended for use in site-specific assessments, such as drainage design, surface water mapping within small catchments (less than 5 km²), and assessments in urbanised catchments. Alternative methodologies are available and more appropriate for larger catchments.

8.1.14 The peak rainfall intensity allowances applicable to the Tees Management Catchment are summarised in Table 8-4.

8.1.15 Climate change is likely to increase the frequency and/or magnitude of rainfall events/storms, which will relatively increase risk of flooding from this source for the Main Site.

**Table 8-4 Offshore wind speed and extreme wave height allowances for the English coast**

| AEP and Epoch | Central | Upper |
|---|---|---|
| 3.3% AEP (2050s) | 20% | 35% |
| 3.3% AEP (2070s) | 30% | 40% |
| 1% AEP (2050s) | 25% | 40% |
| 1% AEP (2070s) | 30% | 45% |

* Use '2050s' for development with a lifetime up 2060 and use the 2070s epoch for development with a lifetime between 2061 and 2125

## 8.2 Future flood risk accounting for climate change

### Fluvial and tidal/coastal flooding

8.2.1 As identified in the baseline fluvial and tidal/coastal flood risk assessment (in Sections 6.2-6.3), the existing pipeline corridors are likely to be exposed to fluvial and tidal flood risk. To assess potential future flood risk under climate change conditions, the EA has provided defended flood modelling representing a 1 in 200-year return period event (0.5% Annual Exceedance Probability, AEP).

8.2.2 The EA incorporates climate change impacts within the 0.5% AEP event through the application of climate change uplifts. This assessment follows UKCP18 guidance, applying uplifts to the tidal curve corresponding to the 70th percentile of the RCP 8.5 emissions scenario, representing the worst-case climate projection currently available.

8.2.3 The uplifts have been applied across three epochs:

- 2030: Reflecting short-term climate projections;
- 2070: Representing mid-century impacts; and
- 2100: Indicating long-term changes and significant sea-level rise.

8.2.4 The water levels within the River Tees are expected to increase between 2-5mAOD across the three epochs A new quay will extend into the Tees in a permanently wet area. It must be built to 5.65 mAOD to avoid future flooding. Potential impacts on the existing model will be assessed in the next stage using site-specific hydraulic modelling with climate change allowances.

### Surface water flooding and Drainage

8.2.5 Climate change is expected to increase the frequency and intensity of rainfall events, which may heighten the risk of surface water flooding. Future climate surface water maps have been reviewed, and no significant changes to the flooding mechanism are anticipated.

8.2.6 As the detailed drainage design is not yet developed, assessment of this risk remains preliminary; however, the final drainage strategy will incorporate appropriate climate change allowances in accordance with EA and LLFA guidance.

## Groundwater flooding

8.2.7 In the absence of site-specific data, professional judgement has been applied to assess the potential future flood risk from groundwater sources. Climate change is anticipated to increase rainfall, which may enhance infiltration rates and subsequently raise groundwater levels within underlying aquifers. As a result, a slight increase in groundwater flood risk relative to baseline conditions may occur.

8.2.8 Overall, the Proposed Development is considered to be at low risk of groundwater flooding. It is recommended that the Flood Emergency and Evacuation Plan also accounts for potential groundwater flooding to maintain safe access and egress over the operational lifetime of the Proposed Development.

## Artificial Flood Sources (Sewer Flooding, Canals and Reservoirs)

8.2.9 In the absence of detailed data, professional judgement has been applied to evaluate the potential future flood risk from artificial sources. Climate change may increase the frequency and intensity of rainfall events, potentially leading to a slight rise in flood risk from sewer systems, although this remains a residual risk under baseline conditions.

8.2.10 There remains no risk from canal failure under future climate conditions.

8.2.11 While future climate conditions may increase the likelihood of reservoir failure, the management of this risk will remain tightly controlled. The potential magnitude of coincident floods in the “Wet day” conditions may be increased by future climate conditions, but the overall volume of reservoir water released in any incident would remain the same. As such the future flood risk from reservoirs is considered low.

# 9. Flood risk management measures

## 9.1 Overview

9.1.1 Due to the early stage in the project development, detailed design is not yet confirmed and thus mitigation design has not yet been developed.

9.1.2 Design of mitigation will be informed by site-specific hydraulic modelling, which will consider changes in flood risk, as a result of climate change over the lifetime of the Proposed Development. The results of the hydraulic modelling will be used to inform the design flood levels[v] for the Site, and be used to prepare a site-specific FRA.

9.1.3 The design standards of protection (SoP) for the Proposed Development will be clearly defined to provide context for flood resilience measures. Based on the Environment Agency's response to the Scoping Report, an assumed freeboard of 0.60 m is proposed at this stage. However, this value will be subject to refinement through a Residual Uncertainty Assessment in future design iterations. Design levels will be derived from the best available data, acknowledging that these may change as hydraulic models and detailed designs are updated. This approach ensures transparency on the scale of interventions, such as how much proposed levels exceed existing ground elevations.

9.1.4 A tiered approach to setting design levels is applied. The general existing ground level of approximately 5.08 mAOD already provides a SoP equivalent to the Higher Central 0.5% event + 0.30 m allowance. Adaptable and less vulnerable components could be set to Higher Central 0.5% event + 0.60 m (5.38 mAOD), while vulnerable or hard-to-adapt components (e.g., finished floor levels) could adopt Upper End 0.5% event + 0.60 m (5.63 mAOD). Sensitivity testing against the H++ scenario will also be undertaken, noting that this represents an additional 0.88 m above the Upper End scenario.

9.1.5 To ensure resilience over the lifetime of the Proposed Development against sea level allowances, the H++ scenario will likely be adopted as a stress test, representing a total projected rise of 1.9 m by 2100, with an additional 2 mm per year increase from 2017 onwards to account for potential changes in storm surge behaviour. In addition, a 10% sensitivity allowance will be applied to both offshore wind speed and extreme wave height, in line with Environment Agency guidance (Ref 25), to provide a robust and conservative assessment of long-term tidal flood risk.

[v] The property Finished Floor Level (FFL) is the uppermost surface of a floor after all structural work is complete, i.e. the level at the point of entry.

9.1.6 Mitigation will be developed at the ES stage, in accordance with the requirements for the site-specific flood risk assessment, as set out in the Flood Risk and Coastal Change section in the NPPG, NPSs and STBC and RBC SFRAs. The NPPG states that passive measures should be prioritised, opposed to active measures, as they are more likely to be more effective and reliable. Consideration shall be given to avoidance, flood resistance, and flood resilience mitigations such as:

- Adoption of sequential approach to the layout of the Proposed Development. This will take account for the results of site-specific hydraulic modelling, which is to be undertaken to inform the detailed design stage;
- Finished Floor Levels (FFLs) of buildings to be set to the greater of: 0.60m above the design flood levels, or 0.30m above ground level (to minimise surface water flood risk)
- Ground floor finishes should be made using durable materials that are less likely to be affected by saline water, such as ceramic/concrete/stone, plastics and/or water-resistant composite woods;
- Any critical infrastructure, machinery and electrical equipment should be elevated above the predicted design flood levels corresponding to the part of the site in which they are to be located. For instance, all electrical fittings and appliances at the quay will need to be raised above an indicative level of 5.65 mAOD[vi] (quay finished level for flooding);
- All other electrical fittings and appliances (including equipment/machinery) should be raised as high as practicable above the ground floor levels, electrical ring mains should be installed above the identified flood levels (or as high as is practicable), with drops to ground floor sockets and switches;
- All water sensitive electrical components for the quay should be 'contained' within a waterproof protection system to make them flood resilient;
- All other infrastructure that could be damaged by flood waters should be protected and sealed and/or raised as high as practicable above design flood levels;
- Storage of any stockpiled materials, hazardous materials/waste (e.g. chemicals) should be elevated as high as practicable above the ground floor levels. Chemical storage may need to be bunded;
- Non-return valves should be fitted to all water supply, sewerage and drainage infrastructure;
- Wherever possible, construction methods that promote easy draining should be used;

[vi] It should be noted that is currently an estimate and is subject to change following further investigation. This will be confirmed at the next stage.

- Use of sacrificial materials (i.e. materials and fittings that are likely to be damaged in times of flood, but that can be easily replaced) should also be considered;
- Provision must be made for safe access, egress and/or refuge to enable evacuation and/or access by emergency services, as part of the detailed design; and
- A site-specific Flood Warning and Evacuation Plan (FWEP) must be prepared for the Site (see Section 9.2). This must account for all sources of flood risk, including the effects of climate change over the lifetime of the Proposed Development. This plan must clearly identify the roles and responsibilities for staff working at the Proposed Development to ensure safe access and egress in times of flood. Flood evacuation plan including roles and responsibilities and training are within the remit of the site user and would therefore be developed separately and informed by the Proposed Development final designs.

## 9.2 Flood warning and evacuation plan (FWEP)

9.2.1 The Proposed Development workers and users will need to have sufficient warning and notice prior to any flood event inundating the Proposed Development, recognising this is low risk for the Main Site. The proposed mitigation could include the following:

- signing up to the EA's flood warning service to act as an early warning system. The EA flood warnings can provide advance notice of areas at risk of flooding from rivers, tidal, and groundwater sources; and
- A FWEP could be developed and made available to users of the Proposed Development.

## 9.3 Safe route of access/egress

9.3.1 Safe evacuation of staff, visitors and vehicles from the Proposed Development will be required in response to an EA Severe Flood Warning.

## 9.4 Surface water (overland) flood flow mitigation

9.4.1 The Main Site is already predominantly at a height above predicted flood levels and largely flat; as such it does not have any existing natural overland flow paths.

9.4.2 Proposed drainage will be designed in accordance with current regulations and guidance, and as appropriate, incorporating overland flood flow routes for the conveyance of excess floodwater towards areas of low vulnerability land use.

# 10. Conclusions

## 10.1 Overview

10.1.1 This Level 2 FRA has provided an assessment of flood risk of the Proposed Development and design at the time of writing (November 2025). The FRA will be updated at the ES stage, with the finalised design and the results of the hydraulic modelling.

10.1.2 The FRA has considered flooding from fluvial and tidal, surface water, groundwater, and artificial sources.

10.1.3 The Main Site lies predominantly within Flood Zone 1, indicating low baseline risk, although certain access routes, pipeline corridors, and the proposed quay fall within Flood Zones 2 and 3. Climate change projections suggest that parts of the Proposed Development may experience increased flood risk over the minimum 25 year (expected design life), 50 year and 75 years.

10.1.4 To maintain resilience, the quay will need to be constructed at a minimum level of 5.65 mAOD, and finished floor levels for essential infrastructure should incorporate a freeboard of 0.60 m above design flood levels. A tiered approach is proposed: general ground levels at 5.0.8 mAOD, adaptable components at 5.38 mAOD, and vulnerable assets up to 5.63 mAOD. These measures will be refined through site-specific hydraulic modelling and potential sensitivity testing against the H++ scenario (as a stress test).

10.1.5 In a climate change event flood risk is expected to increase over the 75-year life of the Proposed Development. The EA existing defended model outputs indicate that tidal flood extents will increase progressively across future epochs (2030, 2070, and 2100), with the quay and low-lying corridors most affected. To mitigate these risks, a tiered approach to design levels is recommended, incorporating a minimum freeboard of 0.60 m.

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# Annex A: FRA Figures

1. Proposed Development Boundary
2. Existing Land Use
3. Topography
4. Indicative Project Elements
5. Environment Agency Flood Defences
6. Environment Agency Historical Flooding
7. Environment Agency Flood Zones 2 and 3 (present day and climate change)
8. Environment Agency Existing Flood Model: Undefended Scenarios for the 1 in 200 Year and 1 in 1000 year (Depths)
9. Environment Agency Existing Flood Model: Undefended Scenarios for the 1 in 200 Year and 1 in 1000 year (Velocities)
10. Environment Agency Existing Flood Model: Defended Scenarios for the 1 in 200 Year and 1 in 1000 year (Depths)
11. Environment Agency Existing Flood Model: Defended Scenarios for the 1 in 200 Year and 1 in 1000 year (Velocities)
12. Environment Agency Existing Flood Model: Defended 1 in 200 year Climate Change Scenarios (Depths)

## 13. Environment Agency Existing Flood Model: Defended 1 in 200 year Climate Change Scenarios (Velocities)

## 14. Risk of surface water flooding

## 15. Risk of reservoir flooding

# Annex B: Third party data

## a. Detail of recorded floods

| Location | Flood source | Flood cause | Start date | End date |
|---|---|---|---|---|
| Premier Road, Middlesbrough | main river | channel capacity exceeded (no raised defences) | 2009-07-17 | 2009-07-17 |
| High Street, Ormesby | drainage | obstruction/blockage - culvert | 2009-07-17 | 2009-07-17 |
| Grovehill, Mddlesbrough | main river | channel capacity exceeded (no raised defences) | 2009-07-17 | 2009-07-17 |
| 1995 Flood Event | unknown | overtopping of defences | 1995-01-28 | 1995-02-04 |
| The Link, Ormesby | main river | channel capacity exceeded (no raised defences) | 2009-07-18 | 2009-07-18 |
| Berwick Hills, Middlesbrough | main river | channel capacity exceeded (no raised defences) | 2009-07-18 | 2009-07-18 |
| Bewick Hills, Middlesbrough | main river | channel capacity exceeded (no raised defences) | 2008-08-19 | 2008-08-19 |
| Claxton 1978 | main river | unknown | 1978-01-11 | 1978-01-11 |
| Claxton 1978 | main river | unknown | 1978-01-11 | 1978-01-11 |
| Seaton 1978 | main river | overtopping of defences | 1978-01-11 | 1978-01-11 |
| Thornaby 1978 | main river | overtopping of defences | 1978-01-11 | 1978-01-11 |
| Thornaby 1978 | main river | overtopping of defences | 1978-01-11 | 1978-01-11 |
| Claxton 1978 | main river | unknown | 1978-01-11 | 1978-01-11 |
| Claxton 1978 | main river | unknown | 1978-01-11 | 1978-01-11 |
| Claxton 1978 | main river | unknown | 1978-01-11 | 1978-01-11 |
| Claxton 1978 | main river | unknown | 1978-01-11 | 1978-01-11 |
| Claxton 1978 | main river | unknown | 1978-01-11 | 1978-01-11 |
| Claxton 1978 | main river | unknown | 1978-01-11 | 1978-01-11 |
| Claxton 1978 | main river | unknown | 1978-01-11 | 1978-01-11 |
| Seaton 1978 | main river | overtopping of defences | 1978-01-11 | 1978-01-11 |
| Claxton 1978 | main river | unknown | 1978-01-11 | 1978-01-11 |
| Thornaby 1978 | main river | overtopping of defences | 1978-01-11 | 1978-01-11 |

| Location | Flood source | Flood cause | Start date | End date |
|---|---|---|---|---|
| Claxton 1978 | main river | unknown | 1978-01-11 | 1978-01-11 |
| Stockton 1979 | main river | channel capacity exceeded (no raised defences) | 1979-03-23 | 1979-03-23 |
| Stockton 1979 | main river | channel capacity exceeded (no raised defences) | 1979-03-23 | 1979-03-23 |
| Autumn 2000 Event | unknown | unknown | 2000-10-30 | 2000-11-15 |
| Autumn 2000 Event | drainage | local drainage/surface water | 2000-10-30 | 2000-11-15 |
| Autumn 2000 Event | unknown | unknown | 2000-10-30 | 2000-11-15 |
| Autumn 2000 Event | unknown | unknown | 2000-10-30 | 2000-11-15 |
| Lustrum Beck | main river | unknown | 2000-11-03 | 2000-11-03 |
| Autumn 2000 Event | unknown | unknown | 2000-10-30 | 2000-11-15 |

## b. Detail of flood defences within the area

| Asset ID | Asset name | Asset type | Primary purpose | Protection type | | Water body name | Current condition | Design-return period | Design-AEP (%) | Asset length | Asset maintainer | Asset operator |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 105717 | Not Available | Natural High Ground | Flood Risk Management | Fluvial/Tidal | Ormesby Beck | Not available | 100 | 0.01 | 23.91 | Private individual, Company or Charity | Unknown | Unknown |
| 107118 | Not Available | Natural High Ground | Flood Risk Management | Fluvial/Tidal | Ormesby Beck | Not available | 100 | 0.01 | 240.42999 | Private individual, Company or Charity | Unknown | Unknown |
| 107122 | Not Available | Embankment | Flood Risk Management | Fluvial/Tidal | Ormesby Beck | Good | 2 | 0.50 | 10.26 | Environment Agency | Unknown | Private individual, Company or Charity |
| 107123 | Not Available | Wall | Flood Risk Management | Fluvial/Tidal | Ormesby Beck | Not available | 2 | 0.50 | 68.760002 | Private individual, Company or Charity | Unknown | Unknown |
| 125914 | Not Available | Natural High Ground | Flood Risk Management | Tidal | | Not available | 2 | 0.50 | 1596.5699 | Private individual, Company or Charity | Private individual, Company or Charity | Private individual, Company or Charity |
| 126401 | Not Available | Natural High Ground | Flood Risk Management | Fluvial/Tidal | Ormesby Beck | Not available | 100 | 0.01 | 235.23 | Private individual, Company or Charity | Unknown | Unknown |
| 127811 | Not Available | Natural High Ground | Flood Risk Management | Fluvial/Tidal | Ormesby Beck | Not available | 2 | 0.50 | 20.65 | Private individual, Company or Charity | Unknown | Unknown |
| 127810 | Not Available | Wall | Flood Risk Management | Fluvial/Tidal | Ormesby Beck | Not available | 2 | 0.50 | 80.120003 | Private individual, Company or Charity | Unknown | Unknown |
| 129082 | Not Available | Natural High Ground | Flood Risk Management | Fluvial/Tidal | River Tees | Not available | 2 | 0.50 | 5673.2998 | Private individual, Company or Charity | Unknown | Unknown |
| 129291 | Not Available | Natural High Ground | Flood Risk Management | Tidal | River Tees | Not available | 2 | 0.50 | 184.94 | Private individual, Company or Charity | Unknown | Unknown |
| 155686 | Not Available | Natural High Ground | Flood Risk Management | Fluvial | Middle Beck | Not available | 1000 | 0.00 | 20.719999 | Private individual, Company or Charity | Unknown | Unknown |
| 178509 | Not Available | Natural High Ground | Flood Risk Management | Fluvial | Holme Fleet | Not available | 2 | 0.50 | 494.69 | Private individual, Company or Charity | Unknown | Unknown |
| 178587 | Not Available | Natural High Ground | Flood Risk Management | Tidal | Ormesby Beck | Not available | 2 | 0.50 | 122.01 | Private individual, Company or Charity | Unknown | Unknown |
| 178588 | Not Available | Natural High Ground | Flood Risk Management | Tidal | Ormesby Beck | Not available | 2 | 0.50 | 103.48 | Private individual, Company or Charity | Unknown | Unknown |
| 178589 | Not Available | Natural High Ground | Flood Risk Management | Tidal | Ormesby Beck | Not available | 50 | 0.02 | 19.75 | Private individual, Company or Charity | Unknown | Unknown |
| 178591 | Not Available | Natural High Ground | Flood Risk Management | Tidal | Ormesby Beck | Not available | 100 | 0.01 | 167.39999 | Private individual, Company or Charity | Unknown | Unknown |
| 178592 | Not Available | Natural High Ground | Flood Risk Management | Tidal | Ormesby Beck | Not available | 100 | 0.01 | 53.119999 | Private individual, Company or Charity | Unknown | Unknown |
| 178593 | Not Available | Natural High Ground | Flood Risk Management | Tidal | Ormesby Beck | Not available | 100 | 0.01 | 72.599998 | Private individual, Company or Charity | Unknown | Unknown |
| 178594 | Not Available | Natural High Ground | Flood Risk Management | Tidal | Ormesby Beck | Not available | 50 | 0.02 | 20.940001 | Private individual, Company or Charity | Unknown | Unknown |
| 179648 | Not Available | Natural High Ground | Flood Risk Management | Fluvial | | Not available | 2 | 0.50 | 2153.75 | Private individual, Company or Charity | Unknown | Unknown |
| 179856 | Not Available | Embankment | Flood Risk Management | Fluvial | Holme Fleet | Not available | 5 | 0.20 | 71.470001 | Private individual, Company or Charity | Unknown | Unknown |
| 179857 | Not Available | Embankment | other | Fluvial | Holme Fleet | Not available | 5 | 0.20 | 1326.9 | Private individual, Company or Charity | Unknown | Unknown |
| 179858 | Not Available | Embankment | Flood Risk Management | Fluvial | Holme Fleet | Not available | 5 | 0.20 | 431.44 | Private individual, Company or Charity | Unknown | Unknown |
| 179859 | Not Available | Embankment | Flood Risk Management | Fluvial | | Not available | 5 | 0.20 | 181.83 | Private individual, Company or Charity | Unknown | Unknown |
| 179950 | Not Available | Natural High Ground | Flood Risk Management | Tidal | Ormesby Beck | Not available | 100 | 0.01 | 182.88 | Private individual, Company or Charity | Unknown | Unknown |
| 179951 | Not Available | Natural High Ground | Flood Risk Management | Fluvial/Tidal | Ormesby Beck | Not available | 100 | 0.01 | 28.5 | Private individual, Company or Charity | Unknown | Unknown |
| 181796 | Not Available | Wall | Flood Risk Management | Fluvial | Marton West Beck | Not available | 10 | 0.10 | 41.5 | Private individual, Company or Charity | Unknown | Unknown |
| 181797 | Not Available | Wall | Flood Risk Management | Fluvial | Marton West Beck | Good | 75 | 0.01 | 93.089996 | Environment Agency | Unknown | Unknown |
| 181813 | Not Available | Natural High Ground | Flood Risk Management | Tidal | River Tees | Not available | 2 | 0.50 | 1667.96 | Local Authority | Unknown | Unknown |
| 181983 | Not Available | Wall | Flood Risk Management | Fluvial/Tidal | Marton West Beck | Good | 75 | 0.01 | 22.01 | Environment Agency | Unknown | Unknown |
| 181984 | Not Available | Bridge Abutment | Flood Risk Management | Fluvial | Marton West Beck | Not available | 10 | 0.10 | 11.75 | Local Authority | Unknown | Unknown |
| 183040 | Not Available | Natural High Ground | Flood Risk Management | Tidal | River Tees | Not available | 2 | 0.50 | 1244.39 | Local Authority | Unknown | Unknown |

| Asset ID | Asset name | Asset type | Primary purpose | Protection type | | Water body name | Current condition | Design-return period | Design-AEP (%) | Asset length | Asset maintainer | Asset operator |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 183041 | Not Available | Natural High Ground | Flood Risk Management | Tidal | River Tees | Not available | 2 | 0.50 | 2214.74 | Local Authority | Unknown | Unknown |
| 183212 | Not Available | Natural High Ground | Flood Risk Management | Tidal | River Tees | Not available | 2 | 0.50 | 2615.8301 | Private individual, Company or Charity | Unknown | Unknown |
| 183202 | Not Available | Wall | Flood Risk Management | Fluvial | Marton West Beck | Good | 75 | 0.01 | 15.96 | Environment Agency | Unknown | Unknown |
| 183205 | Not Available | Wall | Flood Risk Management | Fluvial | Marton West Beck | Good | 75 | 0.01 | 38.32 | Environment Agency | Unknown | Unknown |
| 183206 | Not Available | Bridge Abutment | Flood Risk Management | Fluvial | Marton West Beck | Not available | 10 | 0.10 | 11.91 | Local Authority | Unknown | Unknown |
| 183207 | Not Available | Engineered High Ground | Flood Risk Management | Fluvial | Marton West Beck | Not available | 10 | 0.10 | 12.8 | Local Authority | Unknown | Unknown |
| 183213 | Not Available | Natural High Ground | Flood Risk Management | Tidal | Ormesby Beck | Not available | 2 | 0.50 | 141.32001 | Local Authority | Unknown | Unknown |
| 183628 | Not Available | Natural High Ground | Flood Risk Management | Fluvial | Holme Fleet | Not available | 2 | 0.50 | 982.09003 | Private individual, Company or Charity | Unknown | Unknown |
| 29170 | Not Available | Natural High Ground | Flood Risk Management | Tidal | | Not available | 2 | 0.50 | 344.16 | Local Authority | Unknown | Unknown |
| 29171 | Not Available | Embankment | Flood Risk Management | Tidal | Greatham Creek | Fair | 25 | 0.04 | 751.89001 | Environment Agency | Unknown | Unknown |
| 29172 | Not Available | Embankment | Leisure and Amenity | Tidal | | Not available | 30 | 0.03 | 340.17001 | Private individual, Company or Charity | Unknown | Unknown |
| 29643 | Not Available | Natural High Ground | Flood Risk Management | Fluvial | | Not available | 2 | 0.50 | 2423.8 | Private individual, Company or Charity | Unknown | Unknown |
| 29648 | Not Available | Embankment | Flood Risk Management | Tidal | River Tees | Fair | 200 | 0.01 | 297.01001 | Environment Agency | Unknown | Local Authority |
| 29649 | Not Available | Natural High Ground | Flood Risk Management | Tidal | River Tees | Not available | 2 | 0.50 | 2615.1499 | Local Authority | Unknown | Unknown |
| 29650 | Not Available | Natural High Ground | Flood Risk Management | Fluvial/Tidal | River Tees | Not available | 2 | 0.50 | 2215.0601 | Private individual, Company or Charity | Unknown | Unknown |
| 395455 | Not Available | Natural High Ground | Flood Risk Management | Tidal | Holme Fleet | Not available | Not available | Not available | 2997.8999 | Private individual, Company or Charity | Unknown | Unknown |
| 395472 | Not Available | Natural High Ground | Flood Risk Management | Tidal | River Tees | Not available | Not available | Not available | 5149.48 | Private individual, Company or Charity | Unknown | Unknown |
| 395539 | Not Available | Natural High Ground | Flood Risk Management | Fluvial/Tidal | | Not available | Not available | Not available | 3140.3 | Private individual, Company or Charity | Private individual, Company or Charity | Private individual, Company or Charity |
| 409532 | Not Available | Embankment | Flood Risk Management | Fluvial/Tidal | | Fair | Not available | Not available | 1304.49 | Environment Agency | Environment Agency | Environment Agency |
| 416350 | Not Available | Embankment | Flood Risk Management | Fluvial/Tidal | River Tees | Good | Not available | Not available | 15.87 | Environment Agency | Environment Agency | Environment Agency |
| 46351 | Not Available | Natural High Ground | Flood Risk Management | Tidal | Ormesby Beck | Not available | 100 | 0.01 | 168.97 | Private individual, Company or Charity | Unknown | Unknown |
| 452698 | Not Available | Embankment | Flood Risk Management | Fluvial/Tidal | River Tees | Good | 200 | 0.01 | 108.42 | Environment Agency | Private individual, Company or Charity | Private individual, Company or Charity |
| 454219 | Not Available | Wall | Flood Risk Management | Fluvial/Tidal | River Tees | Good | 200 | 0.01 | 88.370003 | Environment Agency | Private individual, Company or Charity | Private individual, Company or Charity |
| 454231 | Not Available | Embankment | Flood Risk Management | Fluvial/Tidal | River Tees | Fair | 200 | 0.01 | 76.419998 | Environment Agency | Private individual, Company or Charity | Private individual, Company or Charity |
| 454233 | Not Available | Wall | Flood Risk Management | Fluvial/Tidal | River Tees | Good | 200 | 0.01 | 231.72 | Environment Agency | Private individual, Company or Charity | Private individual, Company or Charity |
| 454290 | Not Available | Wall | Flood Risk Management | Fluvial/Tidal | River Tees | Fair | 200 | 0.01 | 57 | Environment Agency | Private individual, Company or Charity | Private individual, Company or Charity |
| 454309 | Not Available | Demountable Defence | Flood Risk Management | Fluvial/Tidal | River Tees | Not available | 200 | 0.01 | 278.48999 | Private individual, Company or Charity | Private individual, Company or Charity | Private individual, Company or Charity |
| 454311 | Not Available | Wall | Flood Risk Management | Fluvial/Tidal | River Tees | Good | | #DIV/0! | 9.4700003 | Environment Agency | Private individual, Company or Charity | Private individual, Company or Charity |
| 458038 | Not Available | Wall | Flood Risk Management | Fluvial/Tidal | River Tees | Not available | | #DIV/0! | 25.040001 | Local Authority | Local Authority | Local Authority |
| 45827 | Not Available | Natural High Ground | Flood Risk Management | Fluvial | Middle Beck | Not available | 1000 | 0.00 | 29.73 | Private individual, Company or Charity | Unknown | Unknown |
| 458402 | Not Available | Embankment | Flood Risk Management | Fluvial/Tidal | River Tees | Not available | | #DIV/0! | 18.280001 | Local Authority | Local Authority | Local Authority |

| Asset ID | Asset name | Asset type | Primary purpose | Protection type | | Water body name | Current condition | Design-return period | Design-AEP (%) | Asset length | Asset maintainer | Asset operator |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 515361 | Not Available | Embankment | Flood Risk Management | Fluvial/Tidal | | Good | | #DIV/0! | 1693.9 | Environment Agency | Environment Agency | Private individual, Company or Charity |
| 515411 | Not Available | Embankment | Flood Risk Management | Fluvial/Tidal | | Good | | #DIV/0! | 155.39 | Environment Agency | Environment Agency | Private individual, Company or Charity |
| 515966 | Not Available | Embankment | Flood Risk Management | Fluvial/Tidal | Greatham Creek | Fair | | #DIV/0! | 760.47998 | Environment Agency | Environment Agency | Private individual, Company or Charity |
| 519510 | Not Available | Engineered High Ground | Flood Risk Management | Fluvial/Tidal | River Tees | Not available | | #DIV/0! | 728.19 | Private individual, Company or Charity | Private individual, Company or Charity | Private individual, Company or Charity |
| 520352 | Not Available | Embankment | Leisure and Amenity | Tidal | | Not available | | #DIV/0! | 457.17001 | Private individual, Company or Charity | Unknown | Unknown |
| 52933 | Not Available | Embankment | Leisure and Amenity | Tidal | | Not available | 50 | 0.02 | 151.75 | Private individual, Company or Charity | Unknown | Unknown |
| 52942 | Not Available | Wall | Flood Risk Management | Tidal | Seaton on Tees Channel | Not available | 200 | 0.01 | 485.92999 | Private individual, Company or Charity | Private individual, Company or Charity | Private individual, Company or Charity |
| 52943 | Not Available | Embankment | Flood Risk Management | Tidal | | Poor | 153 | 0.01 | 2012.75 | Environment Agency | Private individual, Company or Charity | Private individual, Company or Charity |
| 543265 | Not Available | Engineered High Ground | Flood Risk Management | Fluvial/Tidal | Marton West Beck | Not available | | #DIV/0! | 18.629999 | Unknown | Unknown | Private individual, Company or Charity |
| 543541 | Not Available | Engineered High Ground | Flood Risk Management | Fluvial/Tidal | Marton West Beck | Not available | | #DIV/0! | 11.21 | Unknown | Unknown | Unknown |
| 543944 | Not Available | Wall | Flood Risk Management | Fluvial | Marton West Beck | Very Good | 75 | 0.01 | 3.04 | Environment Agency | Unknown | Unknown |
| 565667 | Not Available | Wall | Flood Risk Management | Fluvial/Tidal | Marton West Beck | Fair | 75 | 0.01 | 73.589996 | Environment Agency | Unknown | Unknown |
| 565668 | Not Available | Wall | Flood Risk Management | Fluvial/Tidal | Ormesby Beck | Not available | 75 | 0.01 | 8.9 | Private individual, Company or Charity | Unknown | Unknown |
| 67405 | Not Available | Wall | Flood Risk Management | Fluvial | Marton West Beck | Good | 75 | 0.01 | 168.57001 | Environment Agency | Unknown | Unknown |
| 68202 | Not Available | Natural High Ground | Flood Risk Management | Fluvial | Ormesby Beck | Not available | 25 | 0.04 | 386.94 | Unknown | Unknown | Unknown |
| 68563 | Not Available | Natural High Ground | Flood Risk Management | Fluvial/Tidal | Ormesby Beck | Not available | 2 | 0.50 | 812.34003 | Private individual, Company or Charity | Unknown | Unknown |
| 69684 | Not Available | Engineered High Ground | Flood Risk Management | Fluvial | Marton West Beck | Not available | 10 | 0.10 | 30.07 | Private individual, Company or Charity | Unknown | Unknown |
| 80091 | Not Available | Natural High Ground | Flood Risk Management | Fluvial/Tidal | Ormesby Beck | Not available | 2 | 0.50 | 823 | Private individual, Company or Charity | Unknown | Unknown |
| 80092 | Not Available | Natural High Ground | Flood Risk Management | Fluvial | Ormesby Beck | Not available | 5 | 0.20 | 390.64999 | Private individual, Company or Charity | Unknown | Unknown |
| 80960 | Not Available | Natural High Ground | Flood Risk Management | Fluvial | | Not available | 2 | 0.50 | 2255.3401 | Private individual, Company or Charity | Unknown | Unknown |

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