

The Lighthouse Green Fuels Order

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Glossary

Acronym	In Full / Term
AGI	Above Ground Installation
AGRU	Acid Gas Removal Unit
ASU	Air Separation Unit
CDM	Construction Design and Management
CHP	Combined Heat and Power
COMAH	Control of Major Accident Hazards
CO ₂	Carbon dioxide
DAD	Design Approach Document
CO ₂	Carbon dioxide
DAD	Design Approach Document
DESNZ	Department for Energy Security and Net Zero
DPD	Development Plan Document
DCO	Development Consent Order
EIA	Environmental Impact Assessment
ES	Environmental Statement
FEED	Front End Engineering Design
HDD	Horizontal directional drilling
HGV	Heavy Goods Vehicles
HSE	Health and Safety Executive
km	kilometre
LGF	Lighthouse Green Fuels
MW	Megawatts
Mwe	Megawatts electrical
NEP	Northern Endurance Partnership
NPS	National Policy Statements
NSIPs	Nationally Significant Infrastructure Projects
PA 2008	Planning Act 2008
PINS	Planning Inspectorate
PRoW	Public Rights of Way
RCBC	Redcar and Cleveland Borough Council
RSPB	Royal Society for the Protection of Birds
SAF	Sustainable Aviation Fuel
SoS	Secretary of State
SPD	Supplementary Planning Document

SPA

Special Protection Area

SSSI

Site of Special Scientific Interest

STBC

Stockton-on-Tees Borough Council

Executive Summary

- 1.1.1 This Design Approach Document (DAD) has been prepared to describe the approach that has been taken to the design of the Proposed Development and to demonstrate how regard has been had to the surrounding context and to the principles of 'Good Design' as set out in the National Policy Statements (NPS). These principles have been considered and developed throughout the design decision making process, and a good design process has been followed.
- 1.1.2 While there is no statutory requirement for applicants to prepare a DAD for DCO applications, the Planning Inspectorate's guidance relating to good design for NSIPs [Ref 19] encourages the preparation and use of such documents.
- 1.1.3 The DAD sets out the policy background, appraises the Site, describes the good design approach adopted by the Applicant and sets out how the design of the Proposed Development has evolved and how good design outcomes will be appropriately secured.
- 1.1.4 Section 3 of the report summarises the design-related legislative context and planning policy framework with respect to developments for which development consent under the PA 2008 is required, with particular emphasis on the relevant NPSs. Regard has also been had to local plan policies and other local design guidance.
- 1.1.5 Section 4 of the report describes and appraises the Site and its context. This includes a description of the Site's location and individual areas, the surrounding area and access. It also describes key planning constraints. Finally, it appraises the characteristics of the Site, including the opportunities and constraints it presents for development.
- 1.1.6 Section 5 of the report sets out the Design Vision and Design Process for each key part of the Proposed Development.
- 1.1.7 Sections 6 to 8 of the report set out the Design Evolution of the Main Site and Laydown, the Quay and Connection Corridors and Utility Connections in Wider Site respectively.
- 1.1.8 Section 9 of the report introduces the Outline Design Principles and confirms how they, and other aspects of the design, are secured.

2 Introduction

2.1 Overview

- 2.1.1 This **Design Approach Document (DAD) (Application Document Ref 5.3.1)** has been prepared by DWD Property and Planning Ltd on behalf of LGF Projects Limited (the Applicant), to support an application (the Application) seeking development consent for the construction, operation, maintenance and decommissioning of the Lighthouse Green Fuels (LGF) project (the Proposed Development) on land within the administrative boundaries of Stockton-on-Tees Borough Council (STBC) and Redcar and Cleveland Borough Council (RCBC).
- 2.1.2 The Order limits for the Proposed Development are made up of the Main Site and Wider Site, together 'the Site'. A more detailed description of the Site is set out at section 2.4.
- 2.1.3 The Application has been submitted to the Planning Inspectorate (PINS), and the decision whether to grant a Development Consent Order (DCO) will be made by the Secretary of State (SoS) for Energy Security and Net Zero pursuant to the Planning Act 2008 (the PA 2008) [Ref 1].
- 2.1.4 The Proposed Development comprises a commercial-scale second generation Sustainable Aviation Fuel (SAF) production facility and associated infrastructure.

2.2 The Applicant

- 2.2.1 The Applicant is wholly owned by Alfanar Energy Limited (Alfanar). Alfanar is part of a global project development, manufacturing, and engineering group headquartered in Saudi Arabia. Alfanar has developed significant in-house feedstock-to-SAF expertise. This experience will be utilised to construct and operate the Proposed Development.

2.3 Overview of the Proposed Development

- 2.3.1 The Proposed Development is anticipated to be the UK's first commercial-scale second generation SAF production facility.
- 2.3.2 The Proposed Development includes the construction, operation, maintenance and decommissioning of a commercial-scale facility that will produce approximately 180 million litres of advanced SAF and approximately 30 million litres of renewable naphtha each year.
- 2.3.3 The Proposed Development includes the following elements (the location of each Work No. is shown on the **Works Plans (Application Document Ref. 2.4)**):

Table 2.1 Works Description Summaries

Work Number:	
Work No. 1	SAF production facility comprising: 1A - feedstock pre-treatment facility including flue gas treatment and stack 1B - SAF processing facility including thermal oxidiser, flue gas treatment, and stack 1C - up to two flare structures
Work No. 2	Combined heat and power (CHP) generating station comprising: 2A - boilers and steam turbine generators 2B - flue gas treatment and stack
Work No. 3	Feedstock and intermediate and final product handling and storage
Work No. 4	Cooling infrastructure for SAF production facility and CHP plant
Work No. 5	Bridge and culvert crossings of existing infrastructure
Work No. 6	Marine infrastructure comprising: 6A - construction of permanent quay 6B - permanent quay 6C - capital and maintenance dredging
Work No. 7	Electrical connection works comprising: 7A - underground and overground cable connections to the existing North Bank Supply Point 7B - electrical connection works
Work No. 8	Modified or new natural gas connection and above ground infrastructure (AGI)
Work No. 9	Supply of industrial gases: Only one of Work No. 9A or Work No. 9B would be developed; 9A - industrial gases connection works comprising installation of new and repurposing of oxygen and nitrogen pipeline connections, and connection to existing low pressure nitrogen supply 9B - air separation unit (ASU) facility and connections to Work No. 1
Work No. 10	Modification or removal and replacement of industrial wastewater pipeline connection works
Works No. 11	- Export connection works: 11A - pipeline(s) for the export of SAF and renewable naphtha 11B or 11C - a pipeline for the export of carbon dioxide (CO₂) connecting to AGI by others (being either AGI C1 or C2 of the Northern Endurance Partnership (NEP) transport and storage pipeline) Only one of Work No. 11B or Work No. 11C would be developed
Works No. 12	Surface water attenuation, and drainage and discharge works
Works No. 13	Laydown areas comprising: 13A - temporary construction compounds and laydown areas

	• 13B - permanent laydown and storage
Work No. 14	Access works and private street improvements

- 2.3.4 In addition a range of associated development, both specified and unspecified, is proposed in relation to the above.
- 2.3.5 The new quay on the River Tees (**Work No. 6**) will allow delivery of modular plant and construction materials by ship during construction and biomass and waste wood feedstock during operation, reducing reliance on road transport. Feedstock will be stored (**Work No. 3**) then pre-treated at the Main Site and processed into SAF through gasification and gas-to-liquids processes (**Work No.1**).
- 2.3.6 To support operations, the Proposed Development will include a biomass and waste wood-fired CHP plant (**Work No. 2**) with an electrical output capacity of up to 200 megawatts electrical (MWe), providing a low-carbon energy supply for the SAF process. Cooling infrastructure (**Work No. 4**) will be required for the SAF process and the CHP plant. Connections will provide electricity for start-up and to maintain ancillary site supplies (**Work No. 7**), natural gas for start-up and as auxiliary fuel for some processes during operation (**Work No. 8**), and oxygen and nitrogen which will either be delivered to the Site via pipelines or produced by a new ASU in the Main Site (**Work No. 9A or 9B** respectively). Waste materials, including off-specification materials will be exported from the Main Site by road. Finished products (SAF, and a secondary product of the process, renewable naphtha) will be transferred via pipeline(s) (**Work No. 11A**) to local marine loading facilities for marine export or export by road. CO₂ from the acid gas removal unit in Work No. 1B will be exported via pipeline (**Work No. 11B or Work No. 11C**) subject to a suitable agreement to connect to one of two proximate AGIs in the NEP project.
- 2.3.7 The Proposed Development will also include replacement and new wastewater pipeline connection works (**Work No. 10**), surface water drainage systems (**Work No. 12**) and access and street improvements (**Work No. 14**). Space within the Wider Site is identified for temporary construction and laydown and space within the Main Site identified for permanent laydown and storage areas (**Work No. 13**).
- 2.3.8 The preliminary layout of the Proposed Development is shown on **Indicative General Arrangement Plan (Application Document Ref. 2.5.1)** and **Indicative General Arrangement Isometric (Application Document Ref. 2.5.2)**.

2.4 The Site

- 2.4.1 The Site location and boundary (which is also known as the 'Order limits') are shown on **Site Location Plan (Application Document. Ref 2.1)**. The Site is located in Teesside on land to the north and south of the River Tees with connection corridors crossing the Tees.
- 2.4.2 The Main Site is located in the industrial area of Seal Sands approximately 5km east of Billingham town centre and 4km north-east of Middlesbrough town centre, on the north bank of the River Tees in the borough of Stockton-on-Tees). The majority of the Main Site lies south of Seal Sands Road and largely comprises previously developed land formerly used as a chemical plant from the early 1970s. It was last operated by INEOS Nitriles.
- 2.4.3 The Main Site comprises the main SAF facility development area of the Site, lying to the south and north sides of Seal Sands Road and bounded by the proposed quay in the River Tees, with the River Tees to the east.
- 2.4.4 The eastern boundary of the Main Site is formed by the River Tees, where existing jetties will be demolished and a new quay developed.
- 2.4.5 The Wider Site comprises the connection corridors, including land required for road access, pipelines (including under the River Tees), dredging near to the Main Site, and utility connections and construction laydown in both North Tees and (in the borough of Redcar and Cleveland) South Tees.

2.5 The DCO Process

- 2.5.1 Part 3 of the PA 2008 defines which projects constitute a nationally significant infrastructure project (NSIP). Once classed as an NSIP, development consent (in the form of a DCO) is required under Part 4 of the PA 2008.
- 2.5.2 In legislative terms the Proposed Development comprises both a SAF production facility and a CHP generating station together with development associated with the SAF production facility and the CHP generating station.
- 2.5.3 The construction and operation of the main SAF production facility does not automatically fall within the definition of an NSIP. Therefore, on 12 August 2025, the Applicant formally requested a direction by the SoS for Energy Security and Net Zero, pursuant to section 35(1) of the PA 2008, that the following elements be treated as one for which development consent is required. The Section 35 direction request was made in respect of: a main gasification facility to process sustainably sourced biomass; feedstock pre-treatment, syngas clean-up apparatus; Fischer-Tropsch process units; refining units; feedstock, intermediates and finished product storage; quayside with ship loading/ offloading infrastructure; supporting

infrastructure and utility connections (hereafter called the ‘Specified Elements’).

- 2.5.4 The SoS for Energy Security and Net Zero issued a direction under Section 35 of the PA 2008 [Ref 1] on 08 September 2025 to confirm that the Specified Elements of the Proposed Development, together with any matters/ development associated with them, should be treated as development for which development consent under the PA 2008 is required.
- 2.5.5 The CHP plant (**Work No. 2**) surpasses the 50 Megawatt (MW) threshold for generating stations defined in Section 15 of the PA 2008 and is therefore a NSIP in its own right.
- 2.5.6 An application for development consent for the Proposed Development has been submitted to PINS acting on behalf of the SoS. Subject to the Application being accepted, PINS will then examine it and make a recommendation to the SoS who will then decide whether to grant a DCO.
- 2.5.7 The application for development consent for the Proposed Development supersedes a previous application that was being progressed by Lighthouse Green Fuels Limited centred on a site off Huntsman Drive in Seal Sands, TS2 1TT (PINS ref. EN010150). Statutory consultation on that application took place between 16 May 2024 and 20 June 2024. As shown on the PINS website¹, that application is discontinued.

2.6 Purpose of this Document

- 2.6.1 This DAD has been prepared to describe the approach that has been taken to the design of the Proposed Development and to demonstrate how regard has been had to the surrounding context and to the principles of ‘Good Design’ as set out in the National Policy Statements (NPS). These principles have been considered and developed throughout the design decision making process, and a good design process has been followed. While there is no statutory requirement for applicants to prepare a DAD for DCO applications, PINS guidance relating to good design for NSIPs [Ref 19] encourages the preparation and use of such documents to demonstrate good design and explain the design process that has been followed.
- 2.6.2 The DAD sets out the policy background, appraises the Site, describes the good design approach adopted by the Applicant and sets out how the design of the Proposed Development has evolved. The DAD also sets out how the design principles are secured in the **draft DCO (Application Document Ref. 3.1)**.

3 Good Design in Policy

3.1 Introduction

3.1.1 This section summarises the design-related legislative context and planning policy framework with respect to developments for which development consent under the PA 2008 is required, with particular emphasis on the relevant NPSs. Regard has also been had to local plan policies and other local design guidance.

3.1.2 An explanation of the decision making framework in the PA 2008, the status of the various planning policy documentation, and consideration of the planning balance for the Proposed Development is considered within the **Planning Statement (Application Document Ref. 5.2.1)** while the compliance of the project with relevant NPS and accordance with planning policy is considered within the **Policy Compliance Tables (Application Document Ref. 5.2.2)**.

3.2 Overarching NPS for Energy (EN-1)

3.2.1 NPS EN-1 [Ref 2] establishes the urgent need for nationally significant energy infrastructure and sets out certain assessment principles and criteria against which applications for such infrastructure should be considered. This includes Section 4.7 'Criteria for good design for Energy Infrastructure'.

3.2.2 Paragraph 4.7.1 sets out that high quality and inclusive design goes far beyond aesthetic considerations and that functionality, including fitness for purpose and sustainability is equally important.

3.2.3 Paragraph 4.7.2 states that *"Applying good design to energy projects should produce sustainable infrastructure sensitive to place, including impacts on heritage, efficient in the use of natural resources, including land-use, and energy used in their construction and operation, matched by an appearance that demonstrates good aesthetic as far as possible."* It goes on to acknowledge that the nature of energy development will often limit the extent to which it can contribute to the enhancement of the quality of the area.

3.2.4 Paragraph 4.7.3 of NPS EN-1 notes that good design is a means by which many policy objectives in the energy NPSs can be met, for example, good design, in terms of siting and use of appropriate technologies, can help mitigate adverse impacts such as noise. It goes on to promote the use of sustainable timber, low carbon concrete and the reuse of material.

3.2.5 Paragraphs 4.7.5 to 4.7.9 of NPS EN-1 set out policy considerations for the assessment of design by the Applicant. Paragraph 4.7.5 of NPS EN-1 states that design principles should be established at the outset of the

project to guide the development from conception to operation and that applicants should consider how their design principles can be applied post-consent.

- 3.2.6 Paragraph 4.7.6 recognises that *“Whilst the applicant may not have any or very limited choice in the physical appearance of some energy infrastructure, there may be opportunities for the applicant to demonstrate good design in terms of siting relative to existing landscape character, landform and vegetation. Furthermore, the design and sensitive use of materials in any associated development such as electricity substations will assist in ensuring that such development contributes to the quality of the area. Applicants should also, so far as is possible, seek to embed opportunities for nature inclusive design within the design process.”*
- 3.2.7 Paragraph 4.7.7 states that applicants must demonstrate in their application documents how the design process was conducted and how the proposed design evolved. However, paragraph 4.7.12 explains that, in considering applications, the SoS should take into account the ultimate purpose of the infrastructure and bear in mind the operational, safety and security requirements that the design has to satisfy. Paragraph 4.7.9 signposts the further advice on good design within the technology specific NPSs.
- 3.2.8 Paragraphs 4.7.10 to 4.7.15 of NPS EN-1 set out how the SoS should apply the design policy and balance this against other objectives and requirements of the project. Paragraph 4.7.10 confirms that in deciding applications, the SoS will need to be satisfied that energy infrastructure developments are sustainable and, having regard to regulatory and other constraints, are as attractive, durable and adaptable (including taking account of natural hazards such as flooding) as they can be. In doing so, paragraph 4.7.11 states that the SoS should be satisfied that *“...the applicant has considered both functionality (including fitness for purpose and sustainability) and aesthetics (including its contribution to the quality of the area in which it would be located, any potential amenity benefits, and visual impacts on the landscape or seascape) as far as possible.”*
- 3.2.9 Sections 4 and 5 of NPS EN-1 discuss Assessment Principles and Generic Impacts of nationally significant energy schemes respectively and include a range of guidance and policy, some of which is relevant to the design of the Proposed Development and is considered within the **Planning Statement (Application Document Ref. 5.2.1)**.
- 3.3 [NPS for Renewable Energy Infrastructure \(EN-3\)](#)
- 3.3.1 NPS EN-3 [Ref 3] highlights the importance of good design throughout the planning, construction, and operational phases of renewable energy

projects, ensuring that these developments are sustainable, visually acceptable, and environmentally sensitive. This includes Section 2.5 'Consideration of good design for energy infrastructure'.

- 3.3.2 Paragraph 2.5.2 states that proposals should demonstrate good design, particularly in respect of landscape and visual amenity, opportunities for coexistence/ co-location, and in the design of the project to mitigate impacts such as noise and effects on ecology and heritage.
- 3.3.3 Section 2.6 'Flexibility in the project details' sets out how flexibility can be incorporated into the application and managed by the Secretary of State.
- 3.3.4 NPS EN-3 identifies in Chapter 2.7 'Biomass and Energy from Waste'(paragraphs 2.7.7 to 2.7.15) that, in respect to biomass and energy from waste developments, waste treatment capacity and transport infrastructure can influence site selection and design.
- 3.3.5 Paragraph 2.7.69 states that *"Good design that is sympathetic and contributes positively to the landscape character and quality of the area will go some way to mitigate adverse landscape and visual effects."*
- 3.3.6 Paragraph 2.7.72 states that *"the primary mitigation for noise for biomass and EfW generating stations is through good design to enclose plant and machinery in noise-reducing buildings, wherever possible, and to minimise the potential for operations to create noise."*
- 3.3.7 Locational constraints do not exempt applicants from balancing good design considerations. The document stresses that applicants should aim to avoid, reduce, and mitigate adverse environmental effects through thoughtful site selection, layout design, and operational management.

3.4 [NPS for Gas Supply Infrastructure and Gas and Oil Pipelines \(EN-4\)](#)

- 3.4.1 NPS EN-4 [Ref 4] is considered to possess relevance in relation to the determination of natural gas connection related elements of the Proposed Development within Work Nos. 8 and 9.
- 3.4.2 Paragraph 2.4.1 of NPS EN-4 [Ref 4] states that the 2008 Act requires the SoS to have regard, in designating an NPS, to the desirability of good design. Paragraph 2.4.2 states that applicants should consider the criteria for good design set out at Section 4.7 of NPS EN-1 at an early when developing proposals.
- 3.4.3 Section 2.21 of NPS EN-4 relates to the applicant's assessment of natural gas and oil pipelines. Paragraph 2.21.1 states that when designing the route of new pipelines, applicants should research relevant constraints including proximity of existing and planned residential properties, schools

and hospitals, railway crossings, major road crossings, below surface usage and proximity to environmentally sensitive areas, main river and watercourse crossings. Section 2.22 of NPS EN-4 sets out how appropriate design and mitigation measures for pipelines should be incorporated into a proposed development to minimise impacts.

3.5 NPS for Electricity Networks Infrastructure (EN-5)

3.5.1 NPS EN-5 [Ref 5] is considered to possess relevance in relation to the determination of the below ground and surface level electrical connections element of the Proposed Development.

3.5.2 NPS EN-5 is clear (paragraph 2.4.2) that applicants should consider the criteria for good design set out in Section 4.7 on NPS EN-1 at an early stage when developing projects. However, paragraph 2.4.3 states that:

“... the Secretary of State should bear in mind that electricity networks infrastructure must in the first instance be safe and secure, and that the functional design constraints of safety and security may limit an applicant’s ability to influence the aesthetic appearance of that infrastructure.”

3.6 NPS for Ports

3.6.1 The NPS for Ports [Ref 6], as published in 2026 but not yet designated, is considered to possess relevance to the quay element of the Proposed Development.

3.6.2 Paragraph 1.4 of the NPS for Ports states that:

“This NPS sets out the Government’s policy on the need for new port infrastructure, considering the current place of ports in the national economy, the available evidence on future demand and the options for meeting future needs. It explains to planning decision-makers, applicants and others the approach they should take to proposals, including the main issues which, in the Government’s view, will need to be addressed to ensure that future development is fully sustainable and resilient, as well as the weight to be given to the need for new port infrastructure and to the positive and negative impacts it may bring. It stresses that ports are critical to the Government’s economic growth mission due the UK’s reliance on imports, but also have an important role in transitioning to a green economy, and making Britain a green energy superpower.”

3.6.3 Paragraph 1.7 goes on to state that:

“ This NPS applies, wherever relevant to associated development, such as road and rail links, for which consent is sought alongside that for the principal development. Non-ports associated development should be

considered on a case-by-case basis, using appropriate assessment methods consistent with this NPS and with applicable official guidance.”

- 3.6.4 Paragraph 3.6.1 onwards covers the criteria for good design for port infrastructure. Paragraph 3.61 states:

“Good design should be embedded throughout the project. High quality and inclusive design goes far beyond aesthetic considerations. Engineering, safety, operational and wider environmental considerations should take precedence but good aesthetics (though secondary in weighting) may be compatible with the primary design objectives. The functionality of an object – be it a building or other type of infrastructure – including fitness for purpose and sustainability, is equally important. Applying good design should produce sustainable infrastructure sensitive to place, efficient in the use of land and natural resources and energy used in their construction and operation, matched by a layout that mitigates the visual impact of development and facilitates efficient and effective operation underpinned by an appearance, landscape and setting and demonstrates good aesthetic as far as possible. Appropriate conservation of heritage assets would factor in well-considered design. While it is acknowledged, that the nature of much port infrastructure development will often limit the extent to which it can contribute to the enhancement of the quality of the area, effort should be made to embed the principles of good design in the development of port schemes (and may be of particular importance to ports with a passenger offer). For projects covered by this NPS, safety considerations are essential to good design.”

3.7 Local Planning Policy

- 3.7.1 The Proposed Development Site is located within the administrative areas of Stockton-on-Tees Borough Council (STBC) and Redcar and Cleveland Borough Council (RCBC) on either side of the river Tees.
- 3.7.2 The Main Site is located within the administrative boundary of STBC. The connection corridors in the Wider Site involve subsurface crossings of the River Tees and land extending into the administrative boundary of RCBC.
- 3.7.3 The relevant development plan document (DPD) and supplementary planning document (SPD) policy for the Proposed Development are set out below.

3.8 Stockton-on-Tees Borough Council

- 3.8.1 The Development Plan for STBC comprises the Stockton-on-Tees Local Plan (Adopted January 2019) [Ref 7], which seeks to promote economic growth and value, protect and enhance the diversity, quality and character

of the natural and built environment, in addition to the Tees Valley Minerals and Waste Core Strategy DPD [Ref 8] and Minerals and Waste Policies and Sites DPD [Ref 9].

- 3.8.2 The Local Plan policies of most relevance to the design of the Proposed Development are considered to be:
- a) SD5 - Natural, Built and Historic Environment;
 - b) SD8 – Sustainable Design Principles;
 - c) EG4 – Seal Sands, North Tees and Billingham;
 - d) ENV1 – Energy Efficiency;
 - e) ENV2 – Renewable and Low Carbon Energy Generation;
 - f) ENV4 – Reducing and Mitigating Flood Risk;
 - g) ENV5 – Preserve, Protect and Enhance Ecological Networks, Biodiversity and Geodiversity;
 - h) ENV6 - Green Infrastructure, Open Space, Green Wedged and Agricultural Land;
 - i) ENV7 - Ground, Air, Water, Noise and Light Pollution;
 - j) HE1 – Conservation and Enjoyment of the Historic Environment; and
 - k) HE2 – Conserving and Enhancing Stockton’s Heritage Assets.
- 3.8.3 The Tees Valley Joint Minerals and Waste Core Strategy DPD policies of most relevance to the design of the Proposed Development are considered to be:
- a) MWC4 – Safeguarding of Mineral Resources from Sterilisation;
 - b) MWC10 – Sustainable Transport; and
 - c) MWC11 – Safeguarding of Port and Rail Facilities.
- 3.8.4 No policies from the Tees Valley Joint Minerals and Waste Policies and Sites DPD are considered to be of particular relevance to the design of the Proposed Development.
- 3.8.5 The STBC Local Design Guide SPD [Ref 10] is also of relevance to the design of the Proposed Development. While focussed on residential development, it identifies that some principles can be translated to other forms of development. While the Proposed Development does not form a commercial or town centre development, the SPD is considered to be of some relevance in its defining of the character of the borough and the

setting out of the Design Process, from initially appointing the design team through to application determination.

- 3.8.6 It identifies seven themes that form part of the design process and includes recommendations for each. These key themes comprise:
- a) Green & Blue Infrastructure;
 - b) Movement;
 - c) Built form;
 - d) Placemaking;
 - e) Homes & Buildings;
 - f) Resources; and
 - g) Lifespan.

3.9 Redcar and Cleveland Borough Council

- 3.9.1 The Development Plan for RCBC comprises the Redcar and Cleveland Local Plan [Ref 11] and Policies Map (Adopted May 2018) [Ref 12], which seeks to strike a balance between protecting our natural and historic environments and providing an attractive place to live, while still supporting the economic growth that is necessary for the borough and its businesses and residents to prosper, in addition to the Tees Valley Minerals and Waste Core Strategy DPD [Ref 8] and Minerals and Waste Policies and Sites DPD [Ref 9] (as discussed above).
- 3.9.2 The policies of most relevance to the design of the Proposed Development are considered to be:
- a) SD4 – General Development Principles;
 - b) SD6 – Renewable and Low Carbon Energy;
 - c) SD7 – Flood and Water Management;
 - d) LS4 – South Fees Spatial Strategy;
 - e) ED6 – Promoting Economic Growth;
 - f) N2 – Green Infrastructure;
 - g) N4 – Biodiversity and Geological Conservation; and
 - h) TA1 – Transport and New Development.
- 3.9.3 The Minerals and Waste policies of most relevance to the design of the Proposed Development are set out above in paragraph 3.8.3.

- 3.9.4 The RCBC South Tees Area SPD (Adopted May 2018) [Ref 13] is also of relevance to the design of the Proposed Development. It is intended to support adopted planning policies to guide and inform future planning applications that will support both the expansion of existing business operators and future employment opportunities who wish to locate to the South Tees Area. The key policies of relevance to the design of the Proposed Development are considered to be:
- a) STDC1 – Regeneration Priorities;
 - b) STDC6 – Energy Innovation;
 - c) STDC7 – Natural Environmental Protection and Enhancement;
 - d) STDC8 – Preserving Heritage Assets; and
 - e) STDC9 – Site Remediation.
- 3.9.5 The RCBC Landscape Character SPD (Adopted March 2010) [Ref 14] is referred to within the RCBC Local Plan and Policies Map and is of relevance to the design of Proposed Development. It explains the role of landscape character areas and sets out guidance to be used in designing development and new landscape features in each area. It is considered in detail within the Landscape and Visual Impact Chapter of the ES [Ref 14].
- 3.9.6 The RCBC Urban Design Guidelines (Adopted April 2006) [Ref 15] is despite its age also considered to be of relevance to the landscaping and design of the Proposed Development. It seeks to promote a vision for the Borough and provides a basis for maintaining and raising design quality. It includes a number of design guidelines, some of which are of some relevance to the Proposed Development and provides contextual analysis of the Borough in 2006. The design guidelines which are of relevance to the Proposed Development are considered to be:
- a) Context and Local Distinctiveness;
 - b) Urban Design;
 - c) Architectural Design;
 - d) Development in Historically or Architecturally Sensitive Locations; and
 - e) Design Statements;
- 3.9.7 It should be noted that the majority of the elements of the Proposed Development located in RCBC will be underground and the abovementioned policies will be primarily of relevance to the above ground elements.

3.10 The National Infrastructure Commission's Design Principles for National Infrastructure (2020)

- 3.10.1 The National Infrastructure Commission ('NIC') is an executive agency that reports to HM Treasury and provides impartial advice on national and long-term infrastructure needs and delivery. The NIC have published Design Principles for National Infrastructure [Ref 16] which sets out four overarching principles to set an ambitious vision for design of national infrastructure.
- 3.10.2 In 2024, the NIC Design Group published a Project Level Design Principles Guidance Document [Ref 17]. This expands upon the 2020 Design Principles through providing additional guidance on how to develop and embed project level design principles into a proposed development.
- 3.10.3 Securing good design outcomes through the use of design principles, parameters and design codes is further endorsed by the National Design Guide (2019) [Ref 18] setting out ten characteristics to inform the good design. These characteristics include Context, Identity, Built Form, Nature, Resources and Lifespan which are all considered to be of particular relevance to the Proposed Development.
- 3.10.4 The four overarching principles set out in the Design Principles for National Infrastructure are summarised below.

Climate

- 3.10.5 This principle relates to mitigating greenhouse gas emissions and adapting to climate change. It seeks to ensure opportunities are taken during design and construction to enable decarbonisation, including mitigating and offsetting residual impacts, within and outside the site boundary. It goes on to state that good design incorporates flexibility and adaptation to ensure resilience against climate change.

People

- 3.10.6 This principle relates to reflecting what society wants and sharing benefits widely. It states that infrastructure should be designed for people to a human scale, and makes reference to accessible, enjoyable and safe spaces. It states that a range of views should be taken into account and reflected in design, and engagement should be diverse, open and sincere. It goes on to state that good design will plan for future changes in demographics and population.

Places

- 3.10.7 This principle relates to providing a sense of identity and improving our environment. It states that well-designed infrastructure supports the natural and built environment and should respect and enhance local culture and character without being bound by the past. It goes on to state that good design should support local ecology, enrich our ecosystems and deliver a net biodiversity gain. It includes reference to restoring wildlife and protecting irreplaceable habitats.

Value

- 3.10.8 This principle relates to achieving multiple benefits and solving problems well. It states that good design adds value and ensures opportunities for economic, environmental and social benefits inside and outside the red line boundary are pursued and also seeks to solve multiple problems with single solutions.

3.11 [Annex A of the Planning Inspectorate's Nationally Significant Infrastructure Projects: Advice on Good Design](#)

- 3.11.1 The Planning Inspectorate's Nationally Significant Infrastructure Projects: Advice on Good Design [Ref 19] provides further advice on achieving good design through following a good design process and securing good design outcomes. 'Good design issues to consider' are found at Annex A of this Advice on Good Design. These set out the considerations relating to good design which applicants should consider before submitting an application for development consent. The Annex sets out design issues that an applicant should consider demonstrating that a good design process has been followed and that through design evolution the proposed development will deliver a good design outcome.

- 3.11.2 The Planning Inspectorate's Nationally Significant Infrastructure Projects: Advice on Preparing Applications for Linear Projects [Ref 20] also provides relevant design guidance for the linear elements of the Proposed Development. It provides further context to the Advice on Good Design specifically with regard to linear infrastructure, noting that *"It is particularly important for linear projects that the design process described addresses challenges and constraints and demonstrates the benefits."*

3.12 [National Infrastructure Strategy](#)

- 3.12.1 The National Infrastructure Strategy [Ref 21] sets out that *"The government wants the planning process to stimulate proposals that are well-designed and will enhance the environment, health and character of local areas."* It goes on to state that the government is committed to embedding good design in all infrastructure projects.

3.13 North East Inshore and North East Offshore Marine Plan

- 3.13.1 The North East Inshore and North East Offshore Marine Plan [Ref 22] contains two separate plans, one that covers the north east inshore marine area and the other that covers the north east offshore marine area. Only the former is of relevance to the design of the Proposed Development. The plan seeks to enhance and protect the marine environment and achieve sustainable economic growth while respecting local communities both within and adjacent to the marine plan area and paragraph 62 specifically states that it “*assists in proposal development and design, including refining the preferred proposal location.*”

4 Appraisal of Site

- 4.1.1 This section describes and appraises the Site and its context. This includes a description of the Site's location and individual areas, the surrounding area and access. It also describes key planning constraints. Finally, it appraises the characteristics of the Site, including the opportunities and constraints it presents for development.
- 4.1.2 The location and extent of the different parts of the Site are described in detail in **Chapters 3 and 4 (ES Volume I, Application Document Ref. 6.1.3 and 6.1.4)** and are shown on the **Works Plans (Application Document Ref. 2.3)**. An image of the Site as it exists from above is included at Figure 4.1 and a key summary is included in the following sections.

Figure 4.1: Existing Site



4.2 The Main Site including the proposed Quay

- 4.2.1 The Site for the Proposed Development is situated in Teesside. The area on which the SAF plant is proposed to be built (the 'Main Site') is predominantly brownfield land on Seal Sands, north of the river Tees. The proposed quay and associated activities are also part of the Main Site, however, due to the particular design considerations and design process for

marine infrastructure, this document considers the marine infrastructure separately to the rest of the Main Site (see section 4.4.7 below for detail).

- 4.2.2 Historically, the majority of the Main Site was operated as a chemical plant most recently owned and operated by INEOS Nitriles. This plant has been decommissioned and cleared, leaving mainly concrete hardstanding with some vegetated areas and disused wharfage comprising two jetties along the river frontage. The Main Site is also surrounded by an existing perimeter fence. The western end of the Main Site includes an historic landfill vegetated with grass and scrub, while the section north of Seal Sands Road is undeveloped land. The onshore extent of the Main Site is fairly level.
- 4.2.3 The onshore elements of the Main Site are adjacent to (and the proposed quay is within) nationally and internationally designated conservation sites, including the Teesmouth and Cleveland Coast Special Protection Area (SPA), Teesmouth and Cleveland Coast Ramsar Site (a wetland of international importance designated under the Ramsar Convention on Wetlands), and Teesmouth and Cleveland Coast Site of Special Scientific Interest (SSSI).
- 4.2.4 These designations encompass intertidal sand and mudflats, saltmarsh, saline lagoons, sand dunes, and coastal waters that support significant bird populations. The Tees Estuary and nearby Bran Sands Lagoon form part of this ecological network. To the south-west of the Main Site is the Royal Society for the Protection of Birds (RSPB) Saltholme Nature Reserve.
- 4.2.5 The proposed quay is located within the River Tees. The quay is partially located within the boundary of the Teesmouth and Cleveland Coast SPA and the Teesmouth and Cleveland Coast SSSI.
- 4.2.6 The majority of the Main Site falls within Flood Zone 1 and is at low fluvial and tidal flood risk and this is further considered in **Chapter 12: Water Environment (ES Volume I, Application Document Ref. 6.1.12)**. There are a number of Health and Safety Executive (HSE) Control of Major Accident Hazards (COMAH) based consultation zones within the vicinity of the Main Site, including an Inner Consultation Zone, as set out in **the Planning Statement (Document Ref. 5.2.1)**.
- 4.2.7 The Main Site is connected to the public highway network via Seal Sands Road which joins the public highway network at Seal Sands Roundabout where it meets Seaton Carew Road (A178). From this roundabout, Seaton Carew Road (A178) runs north to Hartlepool and south to Port Clarence. The western arm of this roundabout connects to the A1185 which links the Seal Sands industrial area to the trunk road network via the A689 and A19 north of Billingham. The A19 provides north-south links into the strategic

road network; including Hartlepool, Peterlee and Sunderland to the north, Darlington to the southwest via the A66, and to Thirsk and York and the A1(M) to the south.

- 4.2.8 The Main Site is not crossed by any PRowWs.
- 4.2.9 Connection Corridors and Utility Connections in Wider Site The remainder of the Site, beyond the Main Site, includes land extending on both the north and south banks of the River Tees, with a connection corridor crossing under the river through existing infrastructure.
- 4.2.10 Directly north and also within the Main Site includes a rectangular section of undeveloped grassed land with a small number of trees, to be used for Laydown and the Works area for the ASU. This section has largely remained undeveloped barring a road to the west of this section. Surrounding Seal Sands Road and the pipelines north east of the Main Site are grass verges which are within the Site. Industrial facilities and grassland are located north east of the wider Site, beyond the Order Limits.
- 4.2.11 The Connection Corridors to the north east run underneath the river Tees and then along the north and south of Dabholm Gut, alongside existing above ground pipelines to the north and underground pipelines to the south.
- 4.2.12 Access is provided to the west of the Wider Site by three connections to the A178 and by Seal Sands Road which connects to Seal Sands roundabout. Access is provided to the east of the Wider Site by a connection to Tees Dock Road and by a connection to the Trunk Road roundabout via the Wilton International North Gate.
- 4.2.13 The Connection Corridors to the north east are adjacent to and intersect nationally and internationally designated conservation sites, corridors cross the Teesmouth and Cleveland Coast SSSI, SPA and Ramsar at the north east where the utilities pipelines run underneath the river Tees. These designations encompass intertidal sand and mudflats, saltmarsh, saline lagoons, sand dunes, and coastal waters that support significant bird populations.
- 4.2.14 The Wider Site is mostly within Flood Zone 1 and is at a low fluvial and tidal flood risk. A small section of the access roads to the west of the Wider Site is in Flood Zone 3, as well as the pipeline corridors which run adjacent to the Dabholm Gut. There are a number of HSE COMAH based consultation zones within the vicinity of the Wider Site, as set out in the **Planning Statement (Document Ref. 5.2.1)**.

- 4.2.15 There is a Public Footpath in Redcar and Cleveland which runs from the end of Tees Dock Road to the eastern end of Dabholm Gut and crosses the Proposed Development boundary.

4.3 The Surrounding Area

- 4.3.1 On the south bank of the Tees, a man-modified channel off the Tees called Dabholm Gut runs parallel to Work Nos. 9A and 10, which comprise the industrial gas connection and wastewater pipelines. This is adjacent to the closed former ICI landfill site at Bran Sands and the Northumbrian Water Ltd.'s Bran Sands Waste Water Treatment Works (WwTW). To the south-east of Dabholm Gut is Teesport one of the largest ports in the UK and operated by PD Ports.
- 4.3.2 To the north of the Main Site is the proposed location of the H2NorthEast blue hydrogen development which is an NSIP. A Scoping Opinion for this project was issued by PINS in March 2025 but a Programme Document cannot be found online and so future timescales are unclear.
- 4.3.3 To the north east of the Site on the south bank of the Tees is the former site of Redcar steelworks which was demolished and now forms part of the Teesworks development site. Whilst currently largely vacant, part of Teesworks has been granted development consent for the Net Zero Teesside project; a carbon capture enabled power station and associated carbon dioxide compression facility. The consented Northern Endurance Partnership CO₂ Gathering Network will run from the Net Zero Teesside site, under the Tees and through the eastern part of the Main Site and then along the southern boundary of the Main Site within the Sembcorp pipeline corridor.
- 4.3.4 The Teesworks site was also the proposed location for the H2Teesside blue hydrogen project which was the subject of a Development Consent Order application. The Examining Authority's recommendation for that project was sent on 28 May 2025 to the Secretary of State for Department for Energy Security and Net Zero (DESNZ) for his decision, but the Applicant withdrew the application in December 2025 due to plans to build a data centre on some of the site. The route of the proposed H2Teesside hydrogen distribution pipeline was proposed to run through the eastern part of the Main Site and then along and southern boundary of the Main Site within the Sembcorp pipeline corridor.
- 4.3.5 As can be seen in sheet 1 of the **Access and Rights of Way Plans (Application Document Ref. 2.4)**, the route of the King Charles III England Coast Path passes close to the western boundary of the Proposed Development as it follows the A178 and crosses the boundary on an access

road. The routes of the King Charles III England Coast Path and the Teesdale Way also run close to the Proposed Development Boundary in South Tees. A Public Footpath in Redcar and Cleveland (designated in sections as 102/2A/1, 102/2A/2, 116/31/3, 116/31/2 and 116/31/1) runs from the end of Tees Dock Road to the eastern end of the Dabholm Gut, adjacent to the Proposed Development.

- 4.3.6 Visitor attractions within 2km include the Teesmouth NNR 800m south of the Main Site and the RSPB Salthome Reserve visitor centre 1.3km to the south-west of the Main Site.
- 4.3.7 For the purposes of Section 5 of this document onwards a specific split has been adopted, reflecting the three different design processes adopted as follows:
- f) The Main Site (along with the construction Laydown area north of Seal Sands Road that sits within the 'Wider Site' and excluding the proposed quay) was informed by Front End Engineering Design (FEED) considerations and associated constructability requirements. This comprises the main focus of the DAD and hereon referred to as the 'Main Site and Laydown'.
 - g) The design of the proposed quay (which is a part of the Main Site for operational purposes, and its construction and dredged areas are part of Wider Site) requires specific navigational risk and marine design and durability considerations so is considered separately.
 - h) Thirdly, the linear elements within the Connection Corridors and Utility Connections in Wider Site and their construction areas are considered in their own section.

4.4 Site Appraisal – Main Site including Quay

- 4.4.1 The Main Site and Laydown comprises two land parcels. A larger southern parcel adjacent to the river Tees and a separate smaller northern parcel. The northern parcel is approximately 26.5ha, low lying and flat, comprises mostly grassland and trees, and has not been previously developed. The parcel is entirely within Flood Zone 1 and does not intersect nor is it adjacent to any environmental designations. The northern parcel is approximately 900m south of areas of environmental designations which could form a constraint. A section of these environmental designations runs to approximately 400m west of the northern parcel.
- 4.4.2 The closest residential receptors are over 3km from the northern parcel at Port Clarence and therefore the Proposed Development is unlikely to impact upon these receptors. Major settlements close to the site include Middlesbrough 4.5km south of the northern parcel; Seaton Carew 5km

north; Redcar 7km southeast; Hartlepool 8km north; and Stockton-on-Tees 9km southwest.

- 4.4.3 The northern parcel benefits from existing access via Seal Sands Road which connects to the public highway network via Seal Sands roundabout to the west.
- 4.4.4 The southern parcel is approximately 90ha, flat, and comprises mainly brownfield land following the relatively recent clearance of the INEOS facility. There is grassland with trees, scrub and reedbeds at the western end, much of which has formed on and near an historic landfill. . The previous industrial use of the land was the INEOS Nitriles Seal Sands Site which was decommissioned in 2023 and cleared to ground slab level. The parcel is entirely within Flood Zone 1.
- 4.4.5 The southern parcel is adjacent to ecological receptors, namely the Teesmouth and Cleveland Coast SSSI, Ramsar and SPA at the western extent, which forms a constraint.
- 4.4.6 The closest residential receptors are 2.5km from the southern parcel at Port Clarence and therefore this is not considered to be a constraint. Major settlements close to the site include Middlesbrough 4km south of the southern parcel; Seaton Carew 5.5km north; Redcar 7km southeast; Hartlepool 8.5km north; and Stockton-on-Tees 9km southwest.
- 4.4.7 The southern parcel benefits from existing access via Seal Sands Road which connects to the public highway network at Seal Sands roundabout to the west.
- 4.4.8 The area for construction of the proposed quay (**Work No. 6A**) located in the east corner of the Main Site comprises a mixture of flat brownfield land and tidal waters in the river Tees. This will include land associated with demolition of existing jetties, dredging and construction of new development.
- 4.4.9 The proposed quay is a further from the closest residential receptors than the Main Site and Laydown and so this is not considered to form a constraint.
- 4.4.10 The section of the proposed quay in the river Tees intersects Teesmouth and Cleveland SSSI and SPA. The associated Ramsar area is approximately 500m north of the proposed Quay.
- 4.4.11 Part of the location of the proposed quay is in Flood Zones 2 and 3. The majority of the Main Site is within Flood Zone 1.

- 4.4.12 The purpose of the quay is to enable the Site to be accessed by water for the import of modules and materials during construction and for the import of feedstock during operation. The design of the quay and its dredge pocket will allow for a range of large vessels to maximise accessibility.

4.5 [Site Appraisal – Connection Corridors and Utility Connections in Wider Site](#)

- 4.5.1 There are many existing above and below ground pipelines and access tracks along the Connection Corridors, including the Linkline Corridor which transports and supplies a wide variety of industrial chemicals, gases and hydrocarbons to and from different users across Teesside. The Connection Corridors are mostly low lying, flat and on previously developed or brownfield land. Some areas have grass verges alongside access roads or grass underneath existing aboveground pipelines. From the east of the Main Site, the pipelines and utility connections run underneath the river Tees via existing tunnels and pipeline routes before running along both banks of the Dabholm Gut in the Wider Site. The Connection Corridors comprise existing pipeline and tunnel infrastructure that pass under a number of ecological designations in the river Tees.
- 4.5.2 At the easternmost extent, the access track at Wilton International North Gate is adjacent to Dormanstown and just over 2km west of Redcar. Other residential receptors include Grangetown which is 1.7km south of road access at the south east of the Site. At the westernmost extent, residential receptors include Port Clarence 1.25km southwest, Middlesbrough 2.5km southwest and Billingham 4.5km west.
- 4.5.3 Access to the Connection Corridors is via existing access tracks themselves which connect to the public highway network at Seal Sands roundabout, the A178, the Trunk Road roundabout or Tees Dock Road. Access is provided to the pipelines and utility corridors from the internal road network and the access to the public highway network as described above.

5 Design Approach

5.1 Design Vision

- 5.1.1 The overarching design vision for the LGF Project is to deliver a pioneering, world-class Sustainable Aviation Fuel SAF facility that acts as a cornerstone for the UK's transition to a low-carbon economy. The design seeks to balance the rigorous, large-scale engineering demands of heavy industrial processing with the delivery of a highly sustainable and safe, development that reflects its heavy industrial context.
- 5.1.2 To ensure the project goes beyond basic functionality and delivers high-quality infrastructure, the design vision is firmly anchored in the four Design Principles for National Infrastructure as published by the National Infrastructure Commission [Ref 16].
- 5.1.3 **Climate (Mitigation and Resilience):** The facility's primary purpose is to drive decarbonisation through the production of sustainable fuels and potential integration with emerging carbon capture networks, and this underpins the need for functionality and efficiency in the design vision.
- 5.1.4 **People (Safety and Inclusion):** The design vision prioritises a safe, inclusive, and welcoming environment for all staff, visitors and nearby receptors .
- 5.1.5 **Place (Context and Integration):** The design vision seeks to minimise visual and acoustic impacts through intelligent masterplanning, context-driven colour strategies, and the consolidation of massing. Furthermore, the design vision extends to the marine environment, seeking to ensure that new infrastructure at the quay integrates safely with existing navigational channels while seeking opportunities for nature-inclusive design at the river's edge.
- 5.1.6 **Value (Identity and Future-Proofing):** Visually, the design shown in 3D renderings seeks to ensure the administration facilities are designed to establish a strong, contemporary corporate identity that reflects the architectural quality of Alfanar's global headquarters. However, these are indicative and the design vision also seeks to ensure the masterplan is designed to retain critical flexibility, ensuring that future value-engineering decisions, such as final silo typologies, can be seamlessly accommodated without compromising the project's foundational environmental or aesthetic parameters.

5.2 Design Process Overview

- 5.2.1 Design fed into all aspects of the project at an early stage and the design process followed the process outlined in PINS Guidance [Ref 19] (Assemble, Research, Co-Ordinate, Secure). Initially, a multidisciplinary project team was assembled, given a clear brief, and tasked with establishing a clear vision of what the project sought to achieve, both with respect to its primary purpose and the wider benefits it could offer.
- 5.2.2 This initial team was led by Worley, who developed the FEED, heavy industrial process engineering, and overall technical integration. As the FEED engineering contractor, Worley brought world-class expertise in complex SAF facilities, establishing the core operational infrastructure, including feedstock handling, gasification, Fischer-Tropsch synthesis, utilities, storage, and potential integration with Teesside's emerging CCS network.
- 5.2.3 Crucially, a comprehensive wider multidisciplinary team was on board from the outset. This established group included environmental planners, landscape architects, marine engineers, and acoustic consultants, ensuring that site context, navigational safety at the quay, and environmental impact mitigation were woven into the foundational engineering parameters from day one. To maximise the effectiveness of this process, the core design team was fully integrated with the EIA team.
- 5.2.4 Weedon Architects inputted into this established structure, drawing upon their extensive capability in delivering complex, process-led energy facilities. Providing specialist masterplanning and architectural advice, Weedon focused on embedding the statutory 'good design' principles mandated by national policy. Their role included supporting Construction (Design and Management) (CDM) compliance to design out foreseeable health and safety risks relevant to the stage of design, whilst working closely with lead technology suppliers to ensure the accurate spatial and aesthetic integration of the heavy plant. Furthermore, Weedon applied their extensive commercial experience to humanise the occupied buildings, ensuring they met the high-quality design standards expected of modern infrastructure.
- 5.2.5 Throughout this process, the Weedon Architects team collectively acted as the project's Design Champion, holding the aesthetic and architectural vision together. Operating within Worley's broader engineering-led framework, the team ensured their specialist architectural advice was successfully integrated into the overarching masterplan, bridging the gap between rigorous technical demands and the planning requirements for sustainable, high-quality design.

5.2.6 At all stages throughout the design process, more information has become available to the project team. This research phase included initial appraisals of the different parts of the Site, the carrying out of detailed surveys, and further investigations related to the EIA. Relevant findings from the EIA were fed into the design process at appropriate points. This approach was further enriched by feedback from Non-Statutory, Statutory and Targeted Consultation, in addition to other forms of ongoing community and stakeholder engagement. Further information can be found in the **Consultation Report (Application Document Ref. 5.1.1)**.

5.2.7 This co-ordinated approach has led to a design that has evolved through a highly iterative process and will continue to refine following the submission of the Application and post-Consent. The final stage of this design methodology is to secure these high-quality outcomes. The process by which future post-consent decision-making will be made, and how the design parameters and environmental mitigation will be legally secured, is set out in **Section 9** of this report.

5.3 Main Site, excluding Quay, and Laydown Design Process

5.3.1 The design of the Main Site, excluding the quay which followed a different design process, and Laydown was underpinned by an ongoing, multidisciplinary design process interacting with FEED. Initially, key constraints were identified and considered with respect to the wider area and also the technical requirements of the Proposed Development, in particular the need to be durable in relation to operational effectiveness and maintenance assumptions, and its construction. These constraints included environmental constraints (such as those identified in **Section 4** of the report and displayed in the **ES Figures (ES Volume II, Document Ref. 6.2)**), constraints related to ground conditions and process and technical safety.

5.3.2 Access to the Main Site was also a key consideration. This included access for vehicles but also for feedstock via the quay, and proximity to the relevant grid infrastructure to allow for connections.

5.3.3 This was developed throughout the pre-application period with feedback received from consultation exercises. Further information on the design evolution of the Main Site can be found in Chapters 6 and 7 of this document.

5.3.4 Furthermore, the previous Lighthouse Green Fuels Project on Huntsman's Drive, Port Clarence, Stockton-on-Tees, TS2 1TT (PINS Ref EN010150, withdrawn 2025) indirectly formed part of the design process because it helped establish that the site proposed within that application was not

suitably sized for the SAF plant. Statutory Consultation on this project was carried out in 2024. An indicative isometric image of the Main Site can be found at Figure 5.1.

Figure 5.1: Indicative Image of Main Site



5.4 Quay Design Process

5.4.1 High level, early quay specific design work was commissioned by the Applicant with respect to the quay, separately from the rest of the Main Site which underwent a different design process. The Applicant intended for the marine works to be developed in stages, in response to feedback from internal and external stakeholders at the appropriate times. Throughout all stages durability of the quay was a key consideration, including with respect to its operational effectiveness, maintenance assumptions and how long-term performance could be guaranteed.

5.4.2 These design stages were defined as:

- Preliminary and outline design: including option appraisal and development;
- Scheme design: which forms the basis of the Rochdale Envelope parameters included in the Application' and
- Detailed design: to be undertaken post-consent under a Design and Build Contract.

- 5.4.3 Following the outline design stage, the key design inputs were summarised as functional requirements, basis of design, geotechnical technical information, third party stakeholders and consultees and existing site conditions.
- 5.4.4 The outline design was developed into scheme design following feedback from statutory consultation and any new information such as ground investigation data. An indicative isometric image of the proposed quay can be found at Figure 5.2.

Figure 5.2: Indicative Image of Quay



5.5 Connection Corridors and Utility Connections in Wider Site Design Process

- 5.5.1 The key considerations for the design of the Connection Corridors related to existing infrastructure, such as pipelines and cables previously installed by statutory undertakers. It was important that any design allowed for co-existence and compliance with required separation distances. As a result, there were numerous technical and statutory undertaker related requirements to factor in, along with optionality around which connections could be used.
- 5.5.2 Flexibility is also proposed to be secured within the **draft DCO (Application Document Ref. 3.1)** and the **Works Plans (Application Document Ref 2.3)**. The relevant works areas for the connection corridors and utility connections provide sufficient space to allow for micro-siting of the precise routes of pipelines and cables to ensure that the final design is able to

respond to constraints as they are better understood or as they are discovered.

5.6 Design Objectives

- 5.6.1 The approach that the Applicant has taken to the design of the Proposed Development included a number of design objectives which were informed by the context within which the Proposed Development will sit, the opportunities and constraints that exist, national planning policy, NIC's Good Design Principles, and local planning policy.
- 5.6.2 As described in **Section 4** of this report, the site and immediate context is comprised of a wide range of uses and constraints but characterised by industry and associated infrastructure.
- 5.6.3 The Applicant acknowledges that the approach to design should be appropriate to the context and purpose of the Proposed Development, which is to efficiently create and export SAF while keeping environmental impacts to a minimum.
- 5.6.4 The Design Objectives were established at an early stage and are set out in **Table 5.1** below. These formed the basis of questions that the project team (formed of a range of professionals) repeatedly asked itself with respect to the design of the Proposed Development throughout the pre-application period.

Table 5.1 Design Objectives

Topic	Design Objectives
Consultation	C1. The Applicant will consult widely, honestly and comprehensively – to allow representations to be incorporated into the Proposed Development to influence its development, where practicable and appropriate. C2. The Applicant will ensure that at all stages of consultation, consultees will be provided with adequate information and time to provide responses which can inform the design of the Proposed Development.
General	G1. Existing landscape features will be avoided wherever possible. G2. The Proposed Development will be set back from sensitive receptors insofar as is possible. G3. The Proposed Development will seek to avoid environmental impacts insofar as is possible. Where impacts remain, mitigation by design will be prioritised. G4. Suitable access will be included to all parts of the Site. G5. Sustainability and safety will be a key consideration in all aspects of design.
Flexibility	F1. Flexibility will be retained within the design where possible, in order to safeguard and facilitate the use of the latest technologies

	and environmental mitigations in the detailed design of the Proposed Development. F2. Flexibility will be retained to allow for the use of carbon capture within the Proposed Development.
Main Site	MS1. The layout and design of all infrastructure within the Main Site will seek to minimise adverse impacts on sensitive receptors through appropriate siting, particularly with respect to landscape and visual impacts. MS2. Fences will be designed to provide adequate security while keeping landscape and visual impact to a minimum. MS3. The layout will be functional and optimised to allow for the most efficient use of all infrastructure within the Main Site. MS4. The Main Site will be durable throughout operation.
Connection Corridors	CC1. The routing will seek to avoid disturbing undisturbed ground wherever possible. CC2. The routing will seek to take the shortest route possible. CC3. The routing will seek to avoid constrained areas where possible and provide mitigation where required.
Laydown Area	LA1. The Laydown Area will provide adequate space for activities relating to construction of the Main Site. LA2. The Laydown Area will be suitably accessible for construction traffic.
Quay	Q1. The quay will seek to avoid any negative impacts on navigational safety. Q2. The quay will be functional and allow for efficient delivery of construction loads and feedstock. Q3. The quay will seek to avoid environmental impacts insofar as is possible. Q4. The quay will be durable throughout operation.
Landscaping and Biodiversity	LB1. Existing landscaping and biodiversity will be retained wherever possible, and any impacts will be minimised. LB2. Proposals for landscape and biodiversity mitigations and enhancements will take advantage of opportunities to achieve a high Biodiversity Net Gain.

5.6.5 Consideration of these Design Objectives allowed a good design process to be followed during the pre-application period for the Proposed Development. The process was iterative and allowed the Applicant to refine and evolve the design throughout the pre-application period. Regular meetings took place between the designers and other members of the project team and reviews of the design was undertaken at key stages as new information became available, for example, following consultations. Further information on this can be found within the appendices of the **Consultation Report (Application Document Ref. 5.1.1)**.

6 Design Evolution – Main Site, excluding Quay, and Laydown

- 6.1.1 This section of the document sets out how the design of the Main Site, excluding the quay which underwent different design evolution, and Laydown Area has evolved through the pre-application process, including through consultation.
- 6.1.2 The masterplan has undergone a rigorous, iterative evolution from early feasibility layouts. This progression was underpinned by a number of industrial process design guides and standards and driven directly by emerging environmental data, early-stage acoustic modelling, and the necessity to embed 'mitigation by design' prior to fixing the final Development Consent Order (DCO) parameters.

6.2 Design Flexibility

- 6.2.1 It is important to recognise that, as with many applications for development consent under the PA 2008, the Proposed Development contains many emerging and constantly advancing technologies and that final specifications and suppliers cannot be confirmed until the post-consent stage. It is therefore not possible to know the final dimensions and layout of the infrastructure that will be installed on Site in the event that the Proposed Development is granted consent and delivered, and it is therefore necessary, proportionate, and supported by national policy to allow for a degree of flexibility in the design and layout of the Proposed Development, within the parameters of the Application and the EIA undertaken for the Application.
- 6.2.2 Development of the detailed design relies upon the appointment of a contractor. This would not take place until after the Secretary of State has granted a DCO and the Applicant has made a final investment decision to proceed with the Proposed Development. Following the award of the construction contract(s), the appointed contractor would then need to carry out a number of detailed design studies in order to inform the final design of the Proposed Development to make most effective use of available technologies and optimise the design and layout.
- 6.2.3 In order to provide sufficient flexibility and ensure a robust EIA has been prepared in accordance with the relevant regulations, the Applicant has adopted the principles of the 'Rochdale Envelope' approach and assessed maximum (and where appropriate minimum) design parameters for the elements of the Proposed Development where flexibility needs to be retained at the consenting stage. These parameters include the limits within

which the various elements of the Proposed Development can take place (as defined by the **Works Plans (Application Document Ref. 2.3)** while the dimensions of the main buildings and structures are secured by the **Outline Design Principles Document (Application Document Ref. 5.3.2)**. These parameters are set out in Part 3 of Schedule 2 of the draft DCO and secured by a Requirement in Part 2 of the same (**Application Document Ref. 3.1**), whereas the detailed designs are secured by way of a Requirement at Schedule 2 of the **draft DCO (Application Document Ref. 3.1)** and will be submitted to and approved by the local planning authority once final.

- 6.2.4 Incorporating flexibility is in line with Design Objectives F1 and, in the case of the use of carbon capture within the Proposed Development, F2. Furthermore, it allows for the avoidance of impacts during detailed design in line with Design Objectives G1, G2, G3, MS1, MS2, LB1 and LB2 and for the detailed design to be optimised for efficiency and durability in line with Design Objectives MS3 and MS4.
- 6.2.5 More information on how the worst-case scenario has been used in assessing the effects of the Proposed Development can be found in **Chapter 2: Assessment Methodology (ES Volume I, Application Document Ref. 6.1.2)**.

6.3 Early Layout and Design

- 6.3.1 As mentioned above, the previous Lighthouse Green Fuels Project on Huntsman Drive, Port Clarence, Stockton-on-Tees, TS2 1TT (PINS Ref EN010150, withdrawn 2025) indirectly formed part of the early design process, focussing the team on what was required for the Proposed Development and how to identify opportunities and constraints within the Site. More about this previous site is set out in **Chapter 6 Alternatives (ES Volume I, Application Document Ref. 6.1.6)**.
- 6.3.2 The change in site was necessary due to a switch in principal feedstock for SAF production from waste to sustainably sourced biomass and size restrictions on the Huntsman Drive site itself. It would not have been possible to carry out the full range of operations required for SAF production to be undertaken using biomass feedstock on the Huntsman Drive site. For example, it would have been necessary to use feedstock that had undergone the necessary pre-treatment processes off-site rather than being processed on the site, resulting in a requirement for double handling and transport of the feedstock. The use of a suitably sized site allows for efficiency use and is in line with Design Objectives MS3, MS4 and LA1.

- 6.3.3 In addition to size limitations, the Huntsman Drive site also does not have the benefit of direct access to a deep-water quay for delivery of pre-constructed equipment modules, other construction materials and import of feedstock. Instead, waterborne access for import of modular plant and construction materials would have had to use an existing quay located off site and upstream of the Tees Transporter Bridge, and a new access for Abnormal Indivisible Loads (AILs) would have had to be modified and upgraded for road movements of these from the quay to the Huntsman Drive Site.
- 6.3.4 The quay was of insufficient size to accommodate the required ships suitable for import of feedstock to the Huntsman Drive site and, instead import of feedstock would have had to be by rail and road. This would have had the potential for operational impacts on the capacity of the rail freight handling facility and greater impacts on the capacity of the local road network in Seal Sands than alternative sites.
- 6.3.5 For these reasons, the Applicant search identified two alternative sites in Teesside for consideration of which the Proposed Development Site was chosen.
- 6.3.6 The progressing of a Site with suitable access for construction and operation was in line with Design Objectives G4 and LA2.

6.4 Plant Layout Philosophy

- 6.4.1 The Applicant established a plant layout philosophy along with FEED engineering contractor Worley early in the design process in accordance with Design Objectives G3, G4, G5, MS1, MS2 and MS4. The philosophy sought to ensure correct spacing and arrangements to current codes alongside good access, agrees and maintainability for all process units.
- 6.4.2 The philosophy was underpinned by current practices in the industry and relevant Government safety recommendations, and the basis of design took account of 3rd party infaces and known technology partners.
- 6.4.3 The philosophy was broken down into early design criteria which can are summarised as follows:
- Equipment and Plant Layout – this sought to ensure the layout of piping, equipment and plant will complies with the relevant Codes and Standards, Project Specifications, and sound industry practice. It went into further detail about key objectives for layout design especially with respect to safety, efficiency and minimising environmental impacts.

- General – this set out a number of criteria that applied to all aspects of design including inherent safety in design, maintenance requirements and operational requirements.
- Road and Vehicle Access – this set out the design criteria and classification for roads to specific areas within the layout.
- Platforms – this set out which infrastructure should have permanent platforms to provide access.
- Stairways and Ladders – this set out the specification to which stairways and ladders would be designed.
- Mechanical Handling – this stipulated that if equipment is not accessible by craneage or permanent overhead slinging points, monorails or other standard methods will be provided to facilitate maintenance of heavy equipment.
- Plant Site Conditions – this set out which site conditions should be taken into account when designing the layout including terrain and geological conditions, environment conditions, utilities and existing buried drainage channel.
- Layout Conditions – this set out a number of key considerations for the layout including related to safety, operational, maintenance, constructability, economics and appearance.
- Spacing of Process Units and Process Areas – this set out the spacing for specific process units and areas.
- Tankage – this provided basic guidance for the spacing and bund capacities of storage tanks.

6.5 Statutory Consultation – Evolution of the Indicative Design

- 6.5.1 Following some non-statutory engagement, a comprehensive Statutory Consultation was undertaken in December 2025 to January 2026 to ensure the design evolution was informed by the views of statutory authorities, local communities, and affected people, in accordance with the Planning Act 2008 and the principles of good design for national infrastructure. The Applicant undertook further Targeted Consultation in April 2026 to May 2026 with respect to a number of changes addressed later in this report.
- 6.5.2 Further information on of the Applicant's approach to consultation is included in the **Consultation Report (Application Document Ref. 5.1.1)**. All stages of consultation were in line with Design Objectives C1 and C2.

- 6.5.3 During the Statutory Consultation newsletters were issued to 3,242 addresses, four in-person and three online events took place, and briefings were offered to key stakeholders. The Statutory Consultation generated 59 responses which are analysed in the **Consultation Report (Application Document Ref. 5.1.1)**.
- 6.5.4 During the pre-application phase, the multidisciplinary team intentionally embedded 'mitigation by design' into the early masterplan, such as strategically siting inherently noisy infrastructure away from sensitive boundaries and segregating heavy operational traffic. Consequently, the feedback received during the Statutory Consultation largely validated these foundational design and environmental parameters.

6.6 Refined Design Approach

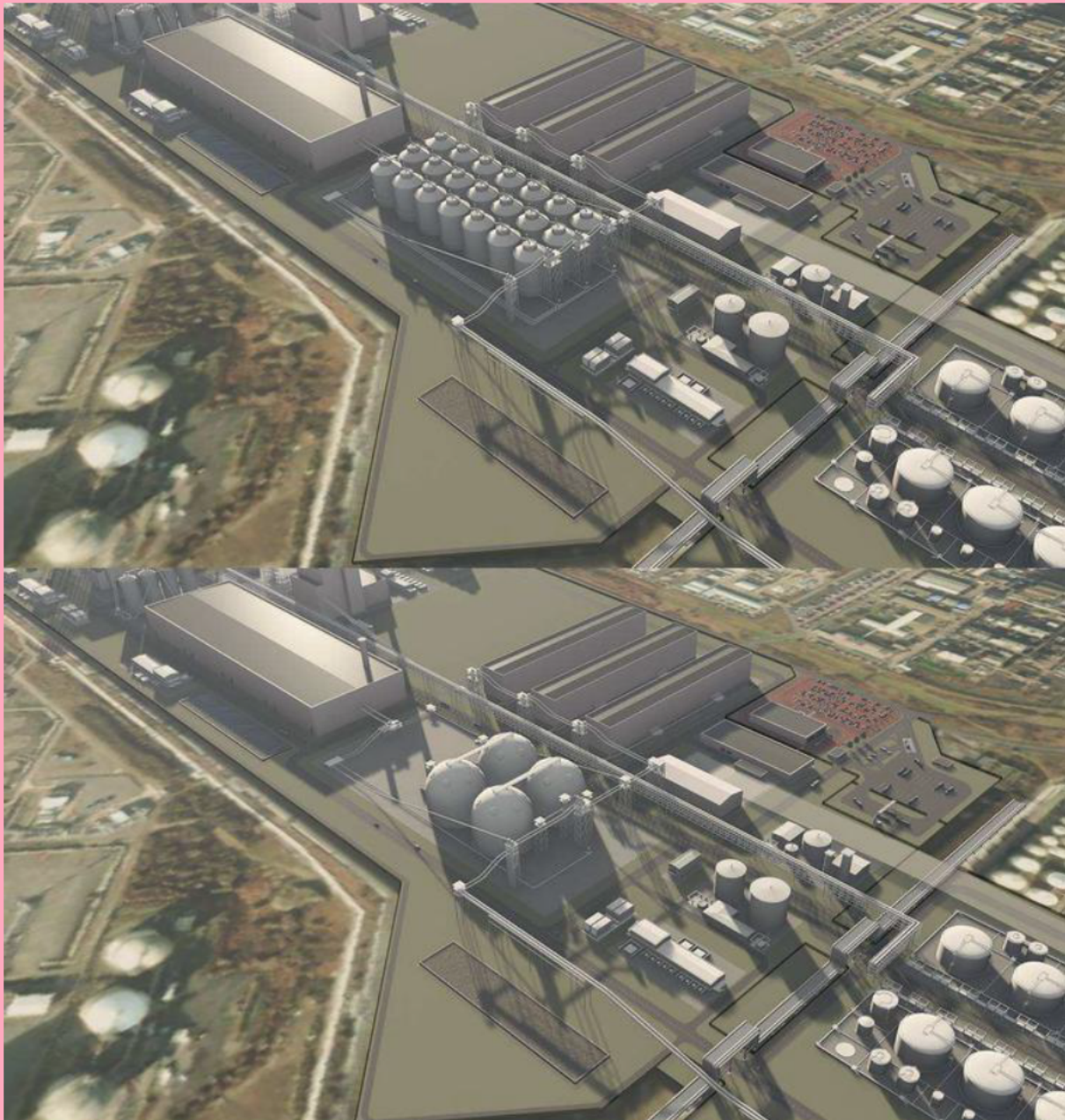
- 6.6.1 As the project progressed through the initial feasibility and detailed FEED phase, the design approach was significantly refined. Initially driven primarily by process engineering and functional requirements, the approach evolved to embed Climate, People, Place, and Value design principles.
- 6.6.2 This refinement involved transitioning from a purely functional layout to a holistically masterplanned site. The architectural team introduced 'mitigation by design' principles, ensuring that spatial arrangements actively worked to reduce acoustic and visual impacts. This refined design approach was in line with Design Objectives G1, G2, G3, MS2, MS2 and LB1.
- 6.6.3 Furthermore, the approach to the occupied buildings was refined to move away from standard industrial enclosures, instead applying a targeted architectural strategy that prioritised passive sustainability, human-scale environments, and a clear corporate identity. This was in line with Design Objective G5.

6.7 Layout

- 6.7.1 The layout of the Main Site progressed through extensive optioneering to balance the large physical scale of the SAF production process with environmental constraints and operational safety. Interrelated processes were functionally zoned to minimise internal transit, shorten pipe runs, and consolidate the overall development footprint as well as maximising efficiency in accordance with Design Objective MS3. Inherently noisy infrastructure, was strategically sited away from sensitive boundaries, utilising ancillary structures as acoustic buffers in accordance with Design Objectives G2, G3 and MS1.

- 6.7.2 A critical driver in the progression of the layout was the need to retain design flexibility for post-consent value engineering, specifically regarding the primary feedstock storage.
- 6.7.3 To retain critical flexibility for value-engineering while controlling visual impact, the masterplan evolved to accommodate either 4 large dome silos or an array of approximately 21 slip-formed silos. These options are shown in Figure 6.1 of this document. The design input ensured that regardless of the final selection, the silos must adhere to a strict geometric grid and maximum height parameters to present a unified, rationalised industrial form. This was in accordance with Design Objectives F1, G3, MS1 and MS3.
- 6.7.4 To ensure this flexibility did not compromise the visual quality or environmental baseline of the site, the layout dictates that regardless of the final option selected, the silos must be organised within a strict, logical geometric grid. Both options have been enveloped into the maximum design parameters and elevations assessed within the EIA. This ensures that while the final mechanical solution remains flexible, the overarching industrial form remains rationalised and strictly controlled.

Figure 6.1: Silo Options



6.8 Access

- 6.8.1 Heavy Goods Vehicles (HGVs) will use the A1185 to access the Site during construction, while operational access to the Main Site and associated utility connections in North Tees will be via Seal Sands Road, which connects to the trunk road network via the A1185 and the A689/A19. To ensure this routing strategy aligns with national 'People' and 'Place' design principles, the site access junctions and internal road networks have been rigorously masterplanned to mitigate local traffic impacts. This includes the provision

of sufficient internal waiting areas and holding lanes for HGVs at the gatehouse, completely preventing any operational queuing onto the public highway. Furthermore, the internal layout strictly and safely segregates this heavy operational traffic from staff and visitor pedestrian routes, ensuring a secure, highly legible environment for all personnel. Developing suitable access for during construction and operation was in accordance with Design Objectives G4, MS4 and LA2.

- 6.8.2 As set out in Appendix G of the **Consultation Report Appendix Part 1 (Application Document Ref. 5.1.2)**, the Applicant remains committed to ongoing, constructive engagement with PD Teesport to ensure that access related matters, including use of Seal Sands Rd, are addressed as the design progresses. This is in accordance with Design Objectives C1, C2, G4 and MS4.

6.9 Acoustic Mitigation by Design

- 6.9.1 Initial layouts were refined to strategically position inherently noisy infrastructure, such as compressors, further from sensitive site boundaries. Ancillary structures were placed to act as acoustic buffers. This was in accordance with Design Objectives G2, G3 and MS1.

6.10 Segregation and Human-Scale Design

- 6.10.1 The Administration and Welfare areas were specifically refined to physically segregate HGV and operational plant traffic from pedestrian routes. Furthermore, the architectural approach to these occupied buildings evolved to incorporate passive sustainability measures and reflect the overarching corporate identity to contrast with the heavier process infrastructure. An indicative image of the Administration and Welfare areas from the human perspective is shown in Figure 6.2. This was in accordance with Design Objective G5.

Figure 6.2: Indicative Image of Administration and Welfare Area



6.11 Topography and Climate Resilience

- 6.11.1 The earthworks strategy evolved beyond a simple cut-and-fill balance. It was refined to ensure the site layout could accommodate localised raising of ground levels, ensuring the infrastructure remains safe and operational during potential flood events without requiring visually harsh engineered embankments. This was in accordance with Design Objective G5.

6.12 Colour Scheme

- 6.12.1 One of the key bits of feedback received from non-statutory stakeholders during the Statutory Consultation was a suggested to consider colour schemes to blend into the landscape, as set out in Appendix G of the **Consultation Report Appendix Part 1 (Application Document Ref. 5.1.2)**. The use of colour to minimise the visual impact in the scheme has fed into the **Outline Design Principles (Application Document Ref. 5.3.2)**. This was in accordance with Design Objectives C1, C2, G3 and MS1.

6.13 Inclusion of Connection to the Northern Endurance Partnership CO₂ Gathering Network

- 6.13.1 During the pre-application period, the Applicant was invited to make an application to the East Coast Cluster Track 1 expansion for a connection to the consented Northern Endurance Partnership (NEP) CO₂ Gathering

Network. This would enable CO₂ produced by the SAF production process to be directed to the NEP infrastructure and from there be transported for permanent off-shore geological storage rather than being vented to atmosphere. This would further reduce the carbon intensity of the SAF and naphtha to be produced in the Proposed Development.

- 6.13.2 Such a connection requires a new pipeline spur for export of CO₂ from the Acid Gas Removal Unit (AGRU) on the Main Site to the third party NEP CO₂ Gathering Network that runs close to the Site boundary.
- 6.13.3 The connection to the NEP infrastructure could take place at one of two potential locations where an NEP Above Ground Installation (AGI) is already proposed and consented. One connection option would require no change to the current Order limits of the Proposed Development whereas the other would require a crossing of existing third party pipelines, (using horizontal directional drilling (HDD) for example). The latter pipeline routing would require additional land for the construction and operation of the pipeline to the south of the Main Site.
- 6.13.4 This was one of the changes consulted on in April 2026 as described in the **Consultation Report (Application Document Ref. 5.1.1)**.
- 6.13.5 The change has since been included within the Proposed Development as part of Work Nos. 11B and 11C and this was in accordance with Design Objective F2.

6.14 Additional Electrical Connection

- 6.14.1 In addition to the on-site electrical connection described in the PEIR, it was proposed during pre-application that an additional off-site electrical connection to the Main Site be constructed from the existing North Bank switchyard located within the Sabic North Tees Site to the south of the Main Site.
- 6.14.2 It was proposed that the new cable would be laid underground through previously developed but now vacant and cleared land and buried using open cut techniques where possible and would follow other cables known to run in this location. A crossing of existing third party pipelines would be required, which may require use of compact HDD techniques. This would therefore require additional land for cable routing to the south of the Main Site and the proposed compact HDD crossing. This additional land will be sufficient to accommodate a number of potential alternative cable routings to the switchyard.
- 6.14.3 This was one of the changes consulted on in April 2026 as described in the **Consultation Report (Application Document Ref. 5.1.1)**.

6.14.4 The change has since been included within the Proposed Development as part of Work No. 7A and this was in accordance with Design Objectives F1 and MS3.

6.15 Main Site Order Limit Refinement

6.15.1 As outlined within the **Consultation Report Appendix Part 5 (Application Document Ref. 5.1.6)**, following Statutory Consultation, some significant modifications were made, including the removal of the rail head, certain connection corridors and Jetty 4.

6.15.2 Following Targeted Consultation and before submission of the Application, a number of areas of the Order Limits were refined as the project progressed to remove land from the Order Limits. This is described further below.

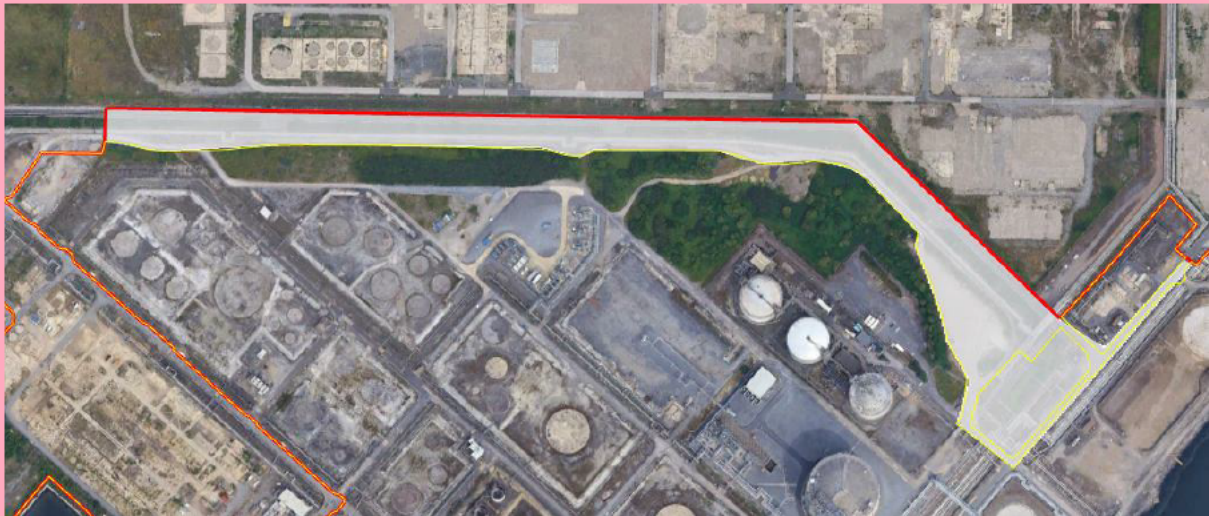
6.15.3 An area to the South East of the Main Site, South West of the Quay, was removed following landowner discussions. The land was originally included to be used as additional storage space but upon further consideration was not considered essential to the development. This is shown in Figure 6.3.

Figure 6.3: Main Site Refinement 1



6.15.4 An area to the South of the Main Site was deemed not essential to the development and removed following discussions with Sembcorp, as shown in Figure 6.4. This is now part of the Wider Site.

Figure 6.4: Main Site Refinement 2



6.15.5 The northern verge of Seal Sands Road, as shown in Figure 6.5, was removed following a plot by plot land parcel review by the Applicant's land team in order align the Order Limits with land parcel boundaries. This land had no proposed use and is now part of the Wider Site.

Figure 6.5: Main Site Refinement 3



7 Design Evolution – Quay

7.1.1 This section of the document sets out how the design of the quay, which forms part of the Main Site but evolved differently, has evolved through the pre-application process, including through consultation. The quay is part of the Main Site while the dredging of the Berthing pocket and approach channel and while some areas required for its construction are part of the Wider Site.

7.2 Design Flexibility

7.2.1 As with the Main Site and Laydown as set out in section 6.2, there is a need to incorporate flexibility into the DCO for the detailed design of the quay for matters such as the final specification of the topsides equipment. There was also a need to incorporate operational flexibility for a range of marine vessels and feedstocks using the quay. This is in accordance with Design Objective F1 and Q2.

7.2.2 The area in which the quay can be constructed is defined by the **Works Plans (Application Document Ref 2.3)** and maximum dimensions for the main buildings and structures are secured in the **Outline Design Principles Document (Application Document Ref. 5.3.2)**. Final details are secured by way of Requirement at **Schedule 2** of the **draft DCO (Application Document Ref. 3.1)** and will be submitted to and approved by the local planning authority once finalised. The construction of the quay is further controlled by the measures within the deemed marine licence at Schedule 10 to the **draft DCO (Application Document Ref 3.1)**, which requires details to be provided to the MMO for approval prior to construction.

7.2.3 More information on how the worst-case scenario has been used in assessing the effects of the Proposed Development can be found in **Chapter 2: Assessment Methodology (ES Volume I, Application Document Ref. 6.1.2)**

7.3 Early Layout and Design

7.3.1 A number of quay specific constraints were identified at an early stage during the design process, including the berth geometry, dredge design, marine structural design and quay geotechnical design. These have fed into the design of the Proposed Development in accordance with Design Objectives Q1, Q2, Q3 and Q4.

7.3.2 Some of the key design inputs for the quay were as follows:

- Functional Requirements – construction, operational and long-term needs;

- Basis of Design – core technical assumptions, design standards and site conditions that underpin the development of the quay;
- Geotechnical Factors – understand current conditions and implications on settlement, pile drivability and wall embedment;
- Third Party Stakeholders and Consultees – understanding the requirements and preferences of impacted stakeholders and consultees; and
- Existing Site Conditions – understanding the existing site conditions more widely including existing infrastructure and nearby uses/users.

7.4 Berth Geometry

7.4.1 The following key constraints were identified during the design of berth geometry:

- The length of waterfront available compared to the ideal length for 230 m Panamax vessels and efficient crane operations;
- The Navigator site immediately to the north including Navigator Terminals' Seal Sands No.1 Jetty (which is understood to be currently unused);
- reference interface on southern end of quay as this also impacts on 3rd party land.
- The proximity of the Tees navigation channel;
- Avoiding the piles for the existing INEOS Jetty No. 1 and 2, assuming that it will not be possible extract all the piles.

7.4.2 These constraints drive a number of compromises in the proposed geometry of the quay in accordance with Design Objectives Q1, Q2, Q3 and Q4.

7.5 Marine Structural Design

7.5.1 The marine structural design was addressed through the outline design stage through 2D modelling of the quay and associated infrastructure in accordance with Design Objectives Q1, Q2, Q3 and Q4. This can be developed into 3D modelling at the detailed design stage.

7.5.2 Early contractor engagement was undertaken in late 2025 and early 2026 during the outline design stage and feedback was used to inform a number of design assumptions, including with respect to corrosion protection, retaining the possibility of a temporary bund or marine works being used in construction and with respect to piling methods.

- 7.5.3 Other key matters considered during outline design were crane beams, pile design, anchor wall design, tie rod and waler design, pavement design, conveyor support design, corrosion and durability design, fender design, mooring design and scour protection design.

7.6 Dredge Design

- 7.6.1 Existing bathymetry data from the River Tees were used and measured against proposed dredge levels in order to calculate dredge volumes in accordance with Design Objective Q3. This in turn will feed into the dredge material disposal strategy.

7.7 Quay Options

- 7.7.1 The first stage of the quay design was the preliminary design stage which established the functional requirements for the Applicant, a preliminary basis of design, and included visual inspection of the quayside existing structures. During the preliminary design stage, three structural options were evaluated: a suspended deck on piles by the berth line, a solid combi wall at the berth line, and a diaphragm wall set behind the embankment crest. Additionally, a set-back combi wall variant was reviewed.

- 7.7.2 A multicriteria assessment matrix was developed in conjunction with the Applicant to assess the different quay options against an agreed set of criteria. In accordance with Design Objectives Q1, Q2, Q3 and Q4, the criteria encompassed environmental, consenting, technical, safety and commercial considerations as follows:

- Environmental and consenting considerations
- Technical and safety risks
- Commercial

- 7.7.3 A combi wall (tied piled wall) near the existing berth line was taken forward following this assessment after scoring highest between all 3 of the above considerations.

7.8 Navigational Safety

- 7.8.1 There are a number of key navigational considerations relevant to the design and subsequent operation of the quay in accordance with Design Objective Q1.
- 7.8.2 Construction will involve the demolition of the existing jetties, construction of the new quay, and associated capital dredging works. This will involve deployment of barges, tugs, workboats, and dredgers over a period of several months. These construction vessels are generally expected to be

deployed a safe distance from other shipping traffic however they will need to operate in proximity to the turning circle, navigation channel, and other existing berths for short periods. These factors had to be taken into account in the design of the quay. Further information can be found in the **Navigation Risk Assessment (NRA) (ES Volume IV, Application Document Ref. 6.4)**.

- 7.8.3 The proposed quay is 135m from the turning circle at its closest point and 55m from the main Tees navigation channel at its southern extent. The NRA indicates that there would be sufficient space between vessels moored at the proposed berth and those navigating or manoeuvring in the channel and turning circle. The quay is also in close proximity to four Navigator Terminal jetties and so this has fed into the design process.
- 7.8.4 There are two existing aids to navigation in the vicinity of the proposed quay. 'North Tees No.4 Winker Buoy' is positioned to the south and is within the Order limits. This has been taken account of in the design of the Proposed Development.

7.9 Access

- 7.9.1 Feedstock, delivered by marine vessels, is to be offloaded by Continuous Ship Unloaders or harbour cranes and transported from the quay area the storage areas via covered conveyors in accordance with Design Objectives Q2 and Q4.
- 7.9.2 Road access to the quay will be sought via the rest of the Main Site in accordance with Design Objective G4.

8 Design Evolution – Connection Corridors and Utility Connections in Wider Site

8.1.1 This section of the document sets out how the design of the Connection Corridors has evolved through the pre-application process, including through consultation.

8.2 Flexibility and setbacks

8.2.1 As set out in **Section 5.2** of this report, the key considerations for the design of the Connection Corridors related to existing infrastructure, such as pipelines and cables previously installed by statutory undertakers. Therefore, it is important that the design incorporates these separation distances to other infrastructure reduce conflict insofar as is possible and so these have fed into the evolution of the corridors.

8.2.2 The Applicant engaged with a number of statutory undertakers with infrastructure in the area, particularly within Connection Corridors in the Wider Site, during the pre-application stage including during the Statutory Consultation in accordance Design Objectives C1 and C2. The regard had to comments from Consultees is included at Appendix G of the **Consultation Report Appendix Part 1 (Application Document Ref. 5.1.2)**.

8.2.3 Similarly, as the design progresses and further surveys and investigations are done, the design needs to retain flexibility to ensure the final design can still avoid conflict. There is also a need to retain flexibility due to the reasons set out in **Section 6.2** in accordance with Design Objective F1.

8.2.4 The Connection Corridors are defined by the **Works Plans (Application Document Ref. 2.3)** and maximum dimensions for above ground elements are secured in the **Outline Design Principles Document (Application Document Ref. 5.3.2)**. Final details are secured by way of Requirement at Schedule 2 of the **draft DCO (Application Document Ref. 3.1)** and will be submitted to and approved by the local planning authority once finalised.

8.2.5 More information on how the worst-case scenario has been used in assessing the effects of the Proposed Development can be found in **Chapter 2: Assessment Methodology (ES Volume I, Application Document Ref. 6.1.2)**.

8.3 Early Routeing and Design

8.3.1 In choosing the locations for the connection corridors, the Applicant was keen to use existing cable and pipeline corridors in order to reduce the potential to create additional impacts through disturbing undisturbed land,

creating significant new areas of easement that may sterilise large areas of land or going to closer to receptors than existing connections. The Applicant sought to balance this with keeping the routing as short as possible to reduce impacts. These considerations were in accordance with Design Objectives CC1, CC2, CC2, G2 and G3.

8.4 Access for Construction and Maintenance

- 8.4.1 Operational access to the Main Site and associated utility connections in North Tees will be via Seal Sands Road which connects to the trunk road network via the A1185 and the A689/A19.
- 8.4.2 In South Tees, access for operational traffic undertaking construction, inspection and maintenance of utility connections will be from the Wilton International North Gate located off the A1085 Steelhouse Gate Roundabout and then via the internal Sembcorp Road network to Dabholm Gut, or alternatively, via the A1053, Tees Dock Road. Access to the North Tees estate for the 132kv supply will be via Huntsman Drive.
- 8.4.3 The above is in accordance with Design Objective G4.

8.5 Process Wastewater Pipeline Replacement

- 8.5.1 In the PEIR, a combination of new and existing pipelines were proposed to be utilised and repurposed to direct process effluent from the Main Site to Bran Sands Wastewater Treatment Works for treatment and disposal.
- 8.5.2 Following Statutory Consultation, due to the condition of the existing pipeline, it was proposed to replace, rather than retain it. These works would also include replacement of that part of the existing pipeline within the Sembcorp No. 2 Tunnel.
- 8.5.3 This was one of the changes consulted on in April 2026 as described in the **Consultation Report (Application Document Ref. 5.1.1)** in accordance with Design Objectives C1 and C2.

9 Setting and Securing Outline Design Principles

9.1 Outline Design Principles

- 9.1.1 The vision mentioned in **Section 5** is secured by the Outline Design Principles, which are set out in **Outline Design Principles (Application Document Ref. 6.1.2)**, based on the Design Objectives set out in **Section 5** of this report and the Design Parameters used within the **ES (Application Document Ref. 6.1)**. These Outline Design Principles will drive the project and deliver wider value and benefits, including those beyond the core purpose of the scheme.

9.2 Securing Design

- 9.2.1 Where flexibility is being sought in the design of a development, as set out in **Sections 6 to 8** of this report, it is important to ensure that appropriate mechanisms are in place to provide certainty to the local community, the local authorities and other relevant bodies that its detailed design will be in accordance with the design parameters upon which the EIA has been based.
- 9.2.2 In addition to the design secured by the Outline Design Principles at Appendix 1 of this document, the Applicant has drafted the **draft DCO (Application Document Ref. 3.1)** such that the development it authorises (as described in Schedule 1 to the DCO) must be carried out within the limits shown upon the **Works Plans (Application Document Ref. 2.3)** and the maximum design parameters set out in the **ES (Application Document Ref. 6.1)**. The DCO therefore includes number of 'articles' and 'requirements' which secure the detailed design of the Proposed Development.
- 9.2.3 The details secured by the requirements must be submitted to the relevant LPAs for approval, as set out in Schedule 2, to the **draft DCO (Application Document Ref. 3.1)**. The articles and requirements are summarised in Table 9.1. These ensure that the detailed design of the Proposed is controlled and secured.

Table 9.1 DCO Articles and Requirements relating to Detailed Design

Article or Requirement	Title	Description
Article 2/Article 3	Interpretation/Development consent etc. granted by this Order	Definition of "authorised development" linked directly to the description of development in Schedule 1. Article 3 sets out the undertaker is granted

		consent for the 'authorised development' to be carried out within the Order limits. Order limits are defined by the limits shown on the works plans.
Article 48	Certification of plans, etc.	Certifies list of documents on plans as part of the application, which includes the works plans and outline design principles.
Requirement 3	Detailed design	States that the authorised development must not exceed the parameters set out in Schedule 2 of the Order. Requires that no part of each Work No. may commence, save for preliminary works, until certain details have been submitted to and approved by the relevant planning authority. These details are specific for each Work No and reflect the information the relevant planning authority would expect to receive in relation to that type of work. In respect of Work No. 5, the requirement requires those works to be undertaken in accordance with the crossing design details. The requirement also requires that those details must be in accordance with the process and codes set out in the outline design principles document.
Schedule 2, Part 3	Design Parameters	Contains various maximum parameters which form part of the design envelope approach and which the Applicant must not exceed at detailed design stage. E.g. for height of flare structures.

10 Conclusions

- 10.1.1 This DAD sets out how the Applicant has approached design considerations throughout the pre-application period and how design will continue to feed into the detailed design of the Proposed Development following the grant of a DCO, including through the **Outline Design Principles (Application Document Ref. 5.3.2)**.
- 10.1.2 This DAD sets out the key policy related to good design for NSIPs and describes and appraises the Site and surrounding area. Together, these establish the context in which the Proposed Development has been designed.
- 10.1.3 The Design Approach is underpinned by a clear design vision which takes account of the key purpose of the Proposed Development, to produce SAF, and the need to balance the large-scale engineering demands of heavy industrial processing with delivering a highly sustainable and safe design that respects the Site's heavy industrial context.
- 10.1.4 Due to the differing requirements and constraints relating to different aspects of the Proposed Development, the Design Approaches for the Main Site and Laydown, Quay and Connection Corridors and Utility Connections in Wider Site were fundamentally different and specific to each element.
- 10.1.5 However, the whole pre-application design process was underpinned by Design Objectives which fed into the Design Evolution of each element of the Proposed Development, alongside environmental surveys, technical requirements and consultation and engagement.
- 10.1.6 There is a need for appropriate flexibility in all elements of the Proposed Development, and this is secured within the **draft DCO (Application Document Ref. 3.1)**, which also secures the detailed design of the Proposed Development by requiring the submission and approval of final details.
- 10.1.7 In light of the above, it is considered that the Proposed Development represents “good design” for the purposes of the relevant policy set out in the relevant NPSs, other relevant national and local planning policy, the purposes of the Proposed Development and the local context.

References

- Ref 1 UK Government (2008) Planning Act 2008. Available online:
<https://www.legislation.gov.uk/ukpga/2008/29/contents>
- Ref 2 Department for Energy Security and Net Zero (2025) Overarching National Policy Statement for energy (EN-1). Available online:
<https://www.gov.uk/government/publications/overarching-national-policy-statement-for-energy-en-1-2025>
- Ref 3 Department for Energy Security and Net Zero (2025) National Policy Statement (NPS) for Renewable Energy Infrastructure (EN-3). Available at:
<https://www.gov.uk/government/publications/national-policy-statement-for-renewable-energy-infrastructure-en-3-2025>
- Ref 4 Department for Energy Security and Net Zero (2023) National Policy Statement (NPS) for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4). Available at: <https://www.gov.uk/government/publications/national-policy-statement-for-natural-gas-supply-infrastructure-and-gas-and-oil-pipelines-en-4>
- Ref 5 Department for Energy Security and Net Zero (2025) National Policy Statement (NPS) for Electricity Networks Infrastructure (EN-5). Available at:
<https://www.gov.uk/government/publications/national-policy-statement-for-electricity-networks-infrastructure-en-5-2025>
- Ref 6 Department for Transport (2026) National Policy Statement (NPS) for Ports. Available at: <https://www.gov.uk/government/publications/national-policy-statement-for-ports>
- Ref 7 Stockton-on-Tees Borough Council (2019) Local Plan. Available at:
<https://www.stockton.gov.uk/local-plan>
- Ref 8 Tees Valley (2011) Minerals and Waste Core Strategy. Available at:
<https://www.middlesbrough.gov.uk/media/ec0bfmsm/planning-policy-minerals-waste-strategy-dpd.pdf>
- Ref 9 Tees Valley Unlimited (2011) The Tees Valley Joint Minerals and Waste DPDs. Available at: <https://www.middlesbrough.gov.uk/media/ec0bfmsm/planning-policy-minerals-waste-strategy-dpd.pdf>
- Ref 10 Stockton-on-Tees Borough Council (2023) Local Design Guide Supplementary Planning Document. Available at: https://www.stockton.gov.uk/media/3986/Local-Design-Guide-March-2023/pdf/Local_Design_Guide_SPD_-_March_2023_-_DP_accessible.pdf?m=1681731488610
- Ref 11 Redcar & Cleveland Borough Council (2018) Local Plan. Available at:
<https://www.redcar-cleveland.gov.uk/sites/default/files/2022-04/Local%20Plan%20Adopted%20May%202018.pdf>
- Ref 12 Redcar & Cleveland Borough Council (2018) Local Plan Policies Plan. Available at:
<https://data-rcbc.opendata.arcgis.com/maps/a440fb16218a472ab3f0f88083b6864a/about>

- Ref 13 Redcar & Cleveland Borough Council (2018) South Tees Area Supplementary Planning Document. Available at: <https://www.redcar-cleveland.gov.uk/planning/planning-strategy/supplementary-planning-documents/south-tees-area-spd>
- Ref 14 Redcar & Cleveland Borough Council (2010) Landscape Character Supplementary Planning Document. Available at: <https://www.redcar-cleveland.gov.uk/planning/planning-strategy/supplementary-planning-documents/landscape-character-spd>
- Ref 15 Redcar & Cleveland Borough Council (2006) Urban Design Guidelines. Available at: <https://www.redcar-cleveland.gov.uk/planning/planning-strategy/supplementary-planning-documents/urban-design-guidelines>
- Ref 16 National Infrastructure Commission (2020) Design Principles for National Infrastructure. Available at: <https://nic.org.uk/app/uploads/NIC-Design-Principles.pdf>
- Ref 17 National Infrastructure Commission (2024) Project Level Design Principles Guidance Document. Available at: <https://nic.org.uk/app/uploads/NIC-Design-Principles-Handbook-Digital-PDF.pdf>
- Ref 18 Ministry of Housing, Communities & Local Government (2021) National Design Guide. Available at: <https://www.gov.uk/government/publications/national-design-guide>
- Ref 19 Planning Inspectorate (2025) Nationally Significant Infrastructure Projects: Advice on Good Design. Available at: <https://www.gov.uk/guidance/nationally-significant-infrastructure-projects-advice-on-good-design>
- Ref 20 Planning Inspectorate (2025) Nationally Significant Infrastructure Projects: Advice on Preparing Applications for Linear Projects. Available at: <https://www.gov.uk/guidance/nationally-significant-infrastructure-projects-advice-on-preparing-applications-for-linear-projects>
- Ref 21 HM Treasury (2020) National Infrastructure Strategy. Available at: <https://www.gov.uk/government/publications/national-infrastructure-strategy>
- Ref 22 Marine Management Organisation (2021) North East Inshore and Offshore Marine Plan. Available at: <https://www.gov.uk/government/publications/the-north-east-marine-plans-documents>



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