

LIGHTHOUSE GREEN FUELS PROJECT

Preliminary Environmental Information Report

Chapter 2: Site and Proposed Scheme Description

The Inspectorate Reference: EN010150

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Volume 1

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2. SITE AND PROPOSED SCHEME DESCRIPTION

2.1. SITE DESCRIPTION

- 2.1.1. The Site (defined as the Order Limits of the Proposed DCO Application Boundary shown in **Figure 1-1 (Volume 2)**) comprises 274.49 hectares (ha) located within the administrative areas of Stockton-on-Tees Borough Council and Redcar and Cleveland Borough Council. The indicative layout of the Proposed Scheme within the Site is shown in **Figure 1-2 (Volume 2)**.
- 2.1.2. The boundary includes the existing operational Wilton Engineering Wharf and Clarence Wharf at Port Clarence in the west and extends eastwards and north of the River Tees to include the Navigator Wharf jetties off Riverside Road and the Navigator North Tees Rail Terminal, off Seaton Carew Road. The northern most boundary of the Proposed Scheme follows the A1185 and Seal Sands Link Road, from the National Grid Saltholme Substation to the west to Navigator Terminals Seal Sands to the east.
- 2.1.3. The Proposed Scheme boundary also follows an existing pipeline corridor from Navigator Terminal, and a tunnel that passes beneath the River Tees, to Northumbrian Water's Bran Sands Wastewater Treatment Plant (WWTP) at Tees Dock Road, some 3km west of Redcar. It encompasses a section of the A1053 Tees Dock Road between South Bank and Grangetown, and its junction with the A1085 Trunk Road.
- 2.1.4. An area within the Site assigned for the Sustainable Aviation Fuel (SAF) Plant shown in **Figure 1-2 (Volume 2)** was partially developed by Air Products Plc pursuant to planning permissions for energy generation facilities (using plasma gasification technology) granted in 2011 (11/0359/EIS) and 2013 (13/0780/EIS). Air Products Plc developed part of the Site (previously referred to as TV1) and were in the process of developing a second adjacent part of the Site (previously referred to as TV2) until construction works were suspended in November 2015. In April 2016 Air Products Plc announced that it would be exiting the energy from waste market in the UK and that the TV1 and TV2 sites would not be progressed to become operational.
- 2.1.5. The area of former reclamation pond, to the north of the TV1 and TV2 (also within the area within the Site assigned for the SAF Plant as shown on **Figure 1-2 (Volume 2)**) has also been subject to planning permission for levelling the existing ground levels to a development platform (01/2203/P) granted in 2004. The area designated as the SAF Plant Site remains subject to those extant partially implemented planning permissions (as varied and amended), and this is reflected in the future baseline reported in the Technical Chapters.
- 2.1.6. In 2018, the Applicant (via its group companies) acquired the TV1 and TV2 facilities (of the area assigned to the SAF Plant Site) and a plan was made to redevelop it to create a facility capable of producing liquid fuels from waste and/or waste biomass and/or biomass residues. The Site was considered suitable due to the above-described previous uses and existing planning permissions, the proximity of the area designated

for the SAF Plant Site to key supporting and complementary infrastructure within the Teesside region, and the potential for use of rail and water transport to move products into and out of the Site. The Applicant is currently exploring all potential logistical options and this may include land and facilities within third party ownership. This is outlined in **Section 2.2** and **Table 2-2** below. Engineering and logistical studies continue and will be further informed by responses received during this statutory consultation period.

- 2.1.7. TV1 and TV2 are existing structures, with TV1 being partially demolished (retaining the existing 49.9MW Combined Cycle Gas Turbine (CCGT) and supporting facilities) and TV2 being fully demolished along with the majority of the area cleared in advance of any early preparatory works related to the Proposed Scheme (some utility infrastructure to be retained). At present it is anticipated that the demolition works will be completed by summer 2025 under a separate consent (22/2411/DEM), well in advance of the construction of the Proposed Scheme. Therefore, it is not envisaged that there will be any timing interaction between the demolition works and the Proposed Scheme. The Proposed Scheme would be constructed on the footprint of the TV1 and TV2 sites, as well as on land surrounding these sites (see **Figure 1-2 (Volume 2)**).
- 2.1.8. Adjacent and to the west of the former TV1 and TV2 sites, there is a Materials Recovery Facility (MRF), currently operated by the N + P Group.
- 2.1.9. On site surveys have been undertaken since the EIA Scoping Report¹ was prepared and this has increased the knowledge of existing Site conditions. This includes the area of the former reclamation pond directly to the north of the former TV1 and TV2 facilities, forming the majority of the SAF Plant Site, which was initially characterised as a derelict brownfield area of previous works and uneven ground. Recent ecology surveys have characterised this area as potential saltmarsh and identified a series of waterbodies and watercourses including a mixture of natural channels, culverts or modified/diverted channels created to facilitate previous uses.
- 2.1.10. Investigations and further surveys are scheduled to determine hydrological and hydrogeological regime, (including connectivity with other water sources outside the Site), water quality of watercourses and waterbodies, and the condition and value of the habitat in addition to the quality and source of the standing water, however these have not yet been possible due to land access limitations.
- 2.1.11. Since the Scoping Report¹ was prepared and submitted, the Site boundary has increased to incorporate the following:
 - Additional areas to the east and south of the SAF Plant Site to accommodate potential construction activities (such as access, construction compounds or fabrication); and
 - Additional utility connections to the north west and east.

SURROUNDING AREA

- 2.1.12. **Figures 2-2 (Volume 2)** (sheets a-f) provide details of environmental and social constraints within and surrounding the Site. An overview of the surrounding area is provided below.
- 2.1.13. The Site is surrounded by many existing and operational industrial facilities and businesses to the east, north and south. In particular:
- Bran Sands WWTP, adjacent to the east of the Site;
 - British Oxygen Company (BOC) Industrial Gases (and associated infrastructure);
 - Teesport Container Terminal, 100m southeast of the Site;
 - Augean Waste Management Services, adjacent to the south of the Site;
 - Riverside Road Bulk Liquid Storage and Jetties, adjacent and intersecting the eastern extent of the Site;
 - Seal Sands Navigator Terminals, adjacent to the north-eastern extent of the Site;
 - Teesside Biomass, adjacent to the south of the Site;
 - Industrial Chemicals Limited, adjacent to the south of the Site;
 - Teesside Gas Processing Plant, adjacent to the north of the Site; and
 - Billingham Community Fire station, adjacent to the north-west of the Site.
- 2.1.14. The south-western extent of the Site, Wilton Engineering Wharf (in Port Clarence, operated by Wilton Group), is within Haverton Hill industrial area, located to the north of the town of Middlesbrough. Approximately 1km to the east of Wilton Engineering Wharf is Clarence Wharf, also within the Site. The eastern portion of the Site, in Redcar and Cleveland, is located on the southern bank of the River Tees, near to the Teesport Container Terminal and the wider extensive Lazenby industrial area.
- 2.1.15. Immediately to the west of the Site (and within 1km) are multiple water bodies and associated nature reserves, collectively grouped as RSPB Saltholme including:
- Dorman's Pool' Nature Reserve;
 - Saltholme East Pool Nature Reserve;
 - Saltholme West Pool Nature Reserve; and
 - Paddy's Pool Nature Reserve.
- 2.1.16. These areas of surface water bodies extend further to the west and north-west of these nature reserves, providing a clear separation between the industrial landscape associated with the Site and Billingham further to the west. To the south of the Site is the River Tees, a major River protected by ecological designations including Teesmouth and Cleveland Coast Special Protection Area (SPA), Ramsar and Site of Special Scientific Interest (SSSI), and the largest surface water body within the vicinity of the Site, that flows into the North Sea to the north-east of the Site. Also intersecting the southwest of the Site is Holme Fleet watercourse, which runs into the aforementioned River Tees.

- 2.1.17. The potential saltmarsh area, including informal watercourses, within the Site is also potentially a key area in relation to these nature reserves and waterbodies in terms of hydrological and ecological connectivity.
- 2.1.18. In addition, large portions of the south, west and east of the Site, and in particular the land surrounding the east and west of the Site, are within Flood Zone 2 and Flood Zone 3 areas.
- 2.1.19. Further details on ecological sites and surface water bodies can be found in **Chapter 7: Terrestrial Ecology (Volume 1)**, **Chapter 8: Freshwater and Marine Ecology (Volume 1)** and **Chapter 9: Water Environment and Flood Risk (Volume 1)**.
- 2.1.20. The nearest residential area to the Site is Port Clarence, located adjacent to the south-western point of the Site (Able Port Clarence facilities). The residential properties are concentrated within 400m of the River Tees along the A1046. Further south and west of the Site are the towns of Middlesbrough, Billingham and Stockton-on-Tees. Middlesbrough is separated from the southern extent of the Site by the River Tees, spanning approximately 250m. Some community facilities are present on the south bank of the River Tees within 300m of the Site, such as the Riverside Stadium, Middlesbrough College and the Middlesbrough Transporter Bridge. Further to the north of the Site (approximately 5km) is the town of Hartlepool. Further details on residential properties can be found in **Chapter 6: Noise and Vibration (Volume 1)** and **Chapter 15: Population and Human Health (Volume 1)**.
- 2.1.21. The road network adjacent to the Site includes the A1046, A1185 and Seaton Carew Road/A178 to the south-west (A1046) and west/north-west (A1185 and A178). These three roads connect the Site to Haverton Hill industrial area, Billingham and Hartlepool respectively. The west of the Site incorporates commercial railway lines, heading west into Haverton Hill and Stockton-on-Tees. To the east of the Site are the A66 and A1085, providing connectivity between Middlesbrough, Redcar and the Lazenby industrial zone. Further details on the road network can be found in **Chapter 16: Traffic and Transport (Volume 1)**.
- 2.1.22. The routes of the King Charles III England Coast Path and Teesdale Way pass close to the western boundary of the Proposed Scheme, as do the Clough Walk long distance footpath, E2 Scotland to England European long-distance path, National Cycleway Routes NCN1 and NCN 65. Nearby visitor attractions include RSPB Saltholme Reserve, the River Tees Viewpoint, Teesmouth National Nature Reserve, Middlesbrough Transporter Bridge, and Riverside Stadium. The Saltholme RSPB Reserve visitor centre is located approximately 0.8km to the west of the Site and vehicular access to the centre is through the A178 Seaton Carew Road. The Saltholme RSPB Reserve comprises the visitor centre with a café and interpretative facilities and pedestrian access to the reserve by a network of boardwalks and footpaths. Teesmouth National Nature Reserve which includes a network of trails providing access to the Teesmouth National Nature Reserve and hides overlooking wetland systems is located approximately 1.5km to the north of the Site.

- 2.1.23. To the south of the River Tees, the Coast Path and the Teesdale Way cross over the Bran Sands WWTP access road within the south eastern boundary of the site. Further details on the local footpath network can be found in **Chapter 10: Landscape & Visual** and **Chapter 15: Population and Human Health (Volume 1)**.
- 2.1.24. The historic Tees Transporter Bridge is situated adjacent to the Proposed Scheme boundary at Port Clarence and is approximately 2 km from the proposed SAF production plant.

2.2. PROPOSED SCHEME DESCRIPTION

DESIGN

- 2.2.1. At this stage of the planning process the project description should be considered indicative to allow the appropriate design development to progress. In accordance with industry standard practices and The Inspectorate Advice Note 9 ‘the Rochdale Envelope’², a parameter-based ‘design envelope’ approach has been adopted in respect of the Proposed Scheme. The current status of the design is described within this Chapter and detailed on **Figure 1-2 (Volume 2)** and **Figure 2-1 (Volume 2)**.
- 2.2.2. The indicative design envelope is intended to identify key parameters that are suitable to enable initial environmental appraisals to be carried out in a robust and proportionate manner. This PEIR continues to use this indicative design envelope first presented in the EIA Scoping Report¹, with additions summarised in **Paragraph 2.1.11** above. This will also enable the subsequent ES to be based on a description of the location, design and size of the Proposed Scheme that is suitable to allow a comprehensive assessment of its likely significant environmental effects, whilst retaining sufficient flexibility to accommodate further refinement during detailed design. Further details of this approach are provided in **Chapter 3: Approach to EIA (Volume 1)**.
- 2.2.3. At this stage a maximum envelope has been used, with maximum parameters provided where relevant. The assessments contained within this PEIR therefore assesses a worst-case scenario or presents options, including a worst-case realistic option.
- 2.2.4. The design envelope will be refined as the Proposed Scheme continues to evolve through the key subsequent stages of the iterative design and EIA process, culminating in the ES that will form part of the DCO application, alongside the associated Works Plans and Land Plans.

OVERVIEW OF THE PROPOSED SCHEME

- 2.2.5. The Proposed Scheme is expected to be the UK’s first, commercial scale, waste-to-SAF project, converting waste and/or waste biomass into aviation fuel for ongoing sale. The plant would be one of the largest of its kind in Europe, converting over 1 million tonnes of waste and/or biomass into over 175 million litres of advanced SAF and approximately 30 million litres of green naphtha per annum. The Proposed Scheme will utilise the Fischer-Tropsch (FT) process to create the SAF. This is a proven technology and is already in use around the world. Large-scale examples of the technology can be found

in Nigeria (Escravos Project), Qatar (Pearl & Oryx Projects), and Uzbekistan (UzGTL Project).

2.2.6. The main components of the Proposed Scheme are as follows (see **Figure 1-2 (Volume 2)**):

- SAF Plant including the following but not exhaustively (see **Figure 2-1 (Volume 2)** with accompanying numbered identifiers):
 - Feedstock Storage & Pre-Processing Area (1);
 - Gasification Plant (2);
 - Syngas Clean-up (3);
 - FT Reactor (4);
 - Product Upgrading Unit (5);
 - Future FT Reactor (6);
 - Future Product Upgrading Unit (7)
 - Miscellaneous Tankage (8);
 - Wastewater Treatment Plant (9);
 - Flare Area (10);
 - Auxiliary Boiler and Generating Equipment (11);
 - Surface Water Pond (12);
 - Utilities (13 & 14)
 - Air Separation Unit (15);
 - Process Waste Storage (16);
 - Consumables Storage Facilities (17);
 - General Administration & Storage Facilities (18);
 - Car Parking (19); and
 - Existing CCGT Plant (20).
- Bulk Liquid Storage (for SAF and Naphtha);
- Pipeline and cable connections (import and export) and Utility Corridors;
- Flares;
- Heavy Haul Road (for construction phase only);
- Conveying Corridors;
- Rail Terminal; and
- Marine Transport Infrastructure (for construction and operational usage).

2.2.7. A range of other associated development including administration buildings, kiosks and welfare facilities, boundary treatments, security infrastructure, temporary and permanent compound areas, hard and soft landscaping, drainage, cables, pipelines, plant and equipment will also be required. These are included within the stated design envelope.

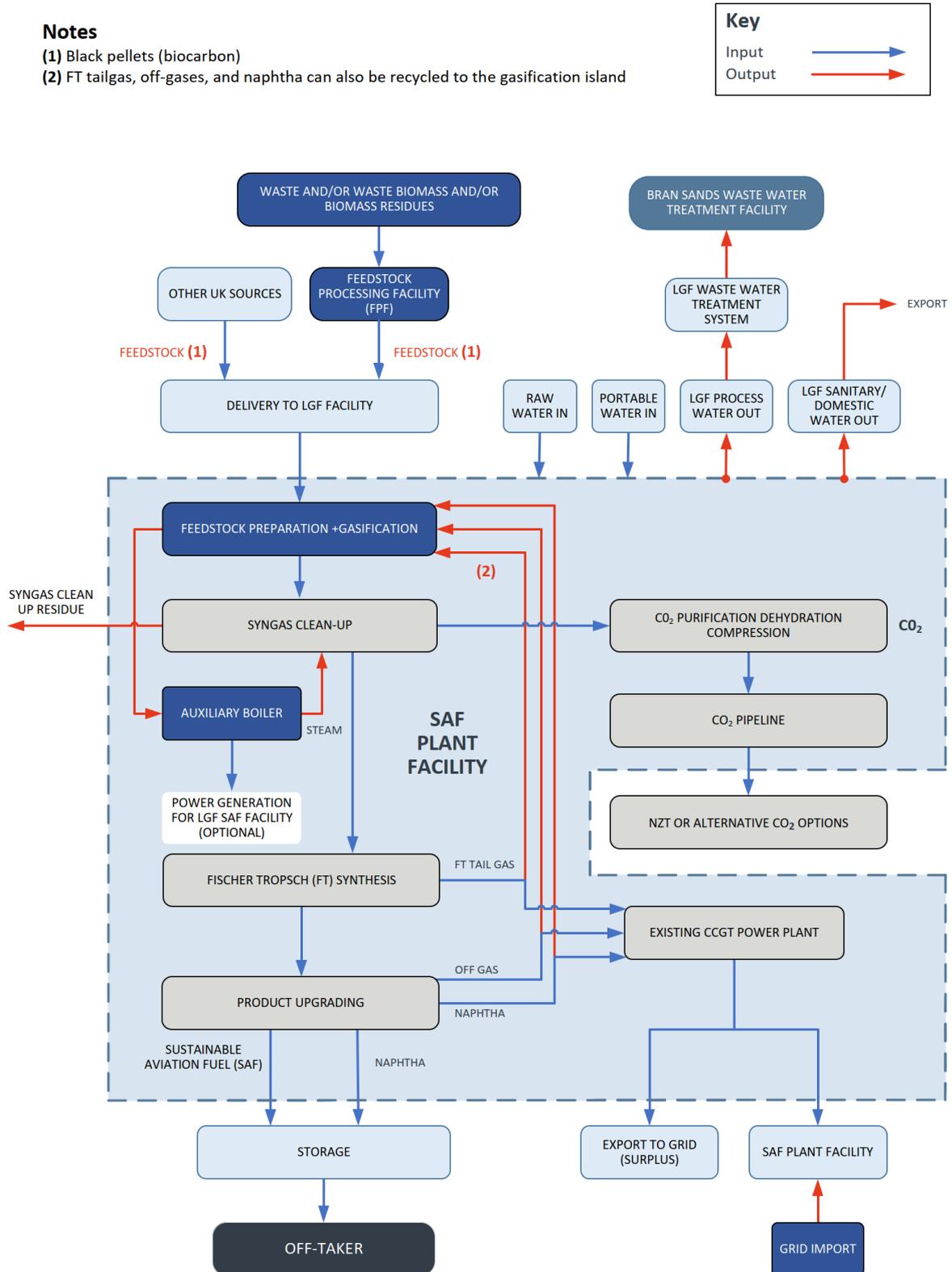
Layout and Orientation

- 2.2.8. The Proposed Scheme will be subject to ongoing design development. One orientation for the SAF Plant Site is currently proposed subject to further modelling and design refinement such as air dispersion modelling and safety buffers. This is shown in **Figure 2-1 (Volume 2)**.
- 2.2.9. In order to provide suitable information on likely scale and massing, this initial orientation has been utilised for the purposes of generating information for consultation. This is contained predominantly within **Chapter 10: Landscape & Visual (Volume 1)** and is referenced as appropriate within other Topic Shapters where it forms the basis of this preliminary assessment.
- 2.2.10. Some ancillary buildings may also be required subject to further refinement during the Front End Engineering Design (FEED) process which is expected to be completed prior to the grant of the DCO. Any required flexibility will be within the design envelope and assessed as required within the ES at submission. This also means that any components such as flares, vents, stacks and buildings associated with the Proposed Scheme will be subject to micro-siting within the parameters of the as-submitted orientation in addition to final confirmation of architectural finish, materials, and layout.
- 2.2.11. The layout is governed predominantly by safety, ensuring that there is sufficient separation distances as required by:
- GAP 2.5.2 Oil and Chemical Plant Layout and Spacing (September 2001); and
 - PIP PNE 0003 (June 2013 and PIP PNE 00003 ED Process Unit and Offsites Layout Guide by GlobalSpec.
- 2.2.12. As ecological surveys continue, potential areas for biodiversity net gain (BNG) and mitigation will be identified, and the requirement for and extent will be confirmed and reported in the DCO submission.
- 2.2.13. The potential requirement for flood compensation areas is still to be determined and will be presented as part of the DCO submission. Information on the consultation and engagement on this issue and supporting assessment is detailed in **Chapter 9: Water Environment and Flood Risk (Volume 1)**.

Description of the SAF Production Process

- 2.2.14. This Section provides an overview of the SAF production process which is also depicted in **Figure 2-3** below.

Figure 2-3: SAF Process



- 2.2.15. Since the EIS Scoping Stage, the Applicant has amended the design of the SAF Plant to enable it to process waste biomass and/or biomass residues in addition to waste feedstocks, for example Solid Recovered Fuel (SRF) or Refuse Derived Fuel (RDF). Processing biomass feedstocks generates biogenic CO₂ which is effectively carbon neutral, since it does not contribute more carbon to the atmosphere. The Applicant intends to process biomass feedstocks until CO₂ T&S Infrastructure is available.
- 2.2.16. The Proposed Scheme will utilise waste and/or waste biomass and/or biomass residues as the raw input feedstock. Raw waste and biomass feedstocks will be received at remote Feedstock Processing Facilities (FPFs) located in several locations across the UK before being thermally treated and processed into a biomass black pellet or other densifier form (also known as “Biocarbon Feedstock”). The FPFs may also receive raw biomass feedstocks from international sources, subject to it meeting appropriate sustainability criteria.
- 2.2.17. Biocarbon Feedstock produced at the remote FPFs located across the UK will be transported predominantly by rail to the Navigator North Tees Rail Terminal within the Site boundary. Up to three trains per day will deliver feedstock to the terminal. Intermediate buffer storage is expected to be constructed at the rail terminal. The Biocarbon Feedstock will then be transferred to the onsite Feedstock Storage & Pre-Processing Area via conveying equipment (either conveyors or internal road transportation) to be installed between the rail terminal and the main SAF Plant.
- 2.2.18. Feedstock (all sources) could be delivered to the Proposed Scheme by road (directly to the SAF Plant), either as an alternative to rail transportation or if the rail terminal is not available. Assuming a worst case scenario of 100% delivery by road, this would equate to up to 100 Heavy Goods Vehicle (HGV) deliveries a day.
- 2.2.19. Feedstock from the Feedstock Storage & Pre-Processing Area is transferred to the Grinding unit(s). Here, the feedstock is pulverised creating a fine powder before being transferred to the intermediate buffer storage within the Gasification Facility.
- 2.2.20. Pulverised feedstock from the intermediate buffer storage is converted into synthesis gas (“syngas”) in the Gasification Facility. By-products, such as particulate matter, ammonia and sulphur species are removed from the raw syngas in the raw syngas clean-up units, which include high temperature tar cracking and wet scrubbing steps. Effluent from the wet scrubbing steps is sent for further processing in the onsite Wastewater Treatment Plant. The partially cleaned syngas is directed to the Syngas Clean-Up Unit where it is further cleaned.
- 2.2.21. Within the Syngas Clean-Up section, there are several adsorbent and catalytic processes designed to remove residual contaminants from the syngas and adjust the ratio of hydrogen to carbon monoxide. Cleaned syngas is sent to an acid gas removal unit (AGRU) that removes acid gases from the syngas. The AGRU strips CO₂ and hydrogen sulphide (H₂S) species from the syngas. CO₂ removed by the AGRU is separated and recycled back to the gasifier island(s) to be used as an inert purge and carrier gas as well as being purified and compressed before exporting to the CO₂

pipeline, subject to availability. H₂S streams from the AGRU will be treated in a thermal oxidiser followed by caustic scrubbing. A pressure swing absorber (PSA) unit will also be installed to recover high purity hydrogen from the syngas. Hydrogen is required for the product upgrading unit. The treated syngas leaving the AGRU is sent to further downstream Syngas Polishing steps, generating an ultra-pure gas for conversion to liquid products in the FT Reactor.

- 2.2.22. Ultra-clean syngas is converted into long-chain hydrocarbon waxes and other light hydrocarbon species in the FT Reactor. Light hydrocarbons are recycled to the Gasification Facility and/or used to produce power and / or steam for the process. Hydrocarbon waxes are upgraded in an onsite hydrocracker, producing a mixed hydrocarbon stream. Conventional fractionation technology is used to separate the desired final synthetic paraffinic kerosene (SPK, known also as SAF) product and by-product Green Naphtha. Off-gases from the product upgrading units and FT Tail gases are recycled to the Gasification Facility and/or used in the CCGT power plant for power generation and/or steam generation. Naphtha can also be utilised in the power plant if required.
- 2.2.23. SAF and naphtha will be sent to a small buffer storage area onsite where it will be tested and quality checked before being transferred to offsite bulk liquid storage via separate pipelines (see **Figure 1-2 (Volume 2)**). Bulk liquid storage within the adjacent tank farm, operated by a third party, will also be provided. Off-gases from the product upgrading units and FT Tail gases are recycled to the Gasification Facility and/or used in the CCGT power plant for power generation and/or steam generation. Naphtha can also be utilised in the power plant if required.
- 2.2.24. Third party liquid handling facilities may also be used for the export of product by road. The Proposed Scheme therefore will incorporate export facilities via rail, road and marine infrastructure.
- 2.2.25. Captured CO₂ from the AGRU (as described above) is sent to the CO₂ compression unit (located within the Syngas Cleanup area) where it is purified/dehydrated, compressed and directed to permanent storage via the CO₂ pipeline being developed as part of the Net Zero Teesside (NZT) project^a. This enables the reduction of greenhouse gas (GHG) emissions from the Proposed Scheme and helps reduce the carbon intensity of the final SAF product. It is preferred that NZT will be operational and connected to the Proposed Scheme from the beginning of the operational phase of the Proposed Scheme. However, as this is not a certainty, and the Proposed Scheme is not dependent on the operational NZT project, an alternative scenario of a delay between the Proposed Scheme's operational phase to the operational connection to NZT is assumed. This is to account for delays on the NZT project and works to facilitate connectivity with the Proposed Scheme. This includes a scenario of potential connection to alternative CO₂

^a <https://www.netzeroteesside.co.uk/>

transport and storage (T&S) infrastructure (as described further in **Chapter 3: Approach to EIA (Volume 1)**).

- 2.2.26. The EIA Scoping Opinion³ requested details of an alternative scenario whereby the connection to NZT was not available. Alternative scenarios are being investigated (such as biogenic venting or export offsite via pipeline (to another Teesside facility, rail or marine vessel) and will be confirmed in the ES.

ELEMENTS OF THE PROPOSED SCHEME

- 2.2.27. The following sections provide further detail on the components which make up the Proposed Scheme. Where relevant, indicative design / physical parameters have been provided which comprise the proposed design envelope and form the basis of the technical assessments scoped into the EIA.

SAF Plant

- 2.2.28. **Table 2-1** outlines the principal components of the SAF Plant (which can be seen in **Figure 2-1 (Volume 2)**) with numbered elements corresponding to the components below.
- 2.2.29. The SAF facility will be regulated by an environmental permit, which will be sought in parallel to the DCO process and determined separately to the DCO process by the Environment Agency. Air and water emissions will be subject to strict emission limit values (ELVs). The SAF production process results in a number of emissions to air but where required (in order to meet ELVs) they are subject to required abatements. Air quality modelling (including determination of dimensions of key elements of the SAF Plant, such as stack heights) will be undertaken to minimise impacts on ecological and residential receptors (for further details see **Chapter 5: Air Quality (Volume 1)**, **Chapter 7: Terrestrial Ecology (Volume 1)** and **Chapter 8: Freshwater and Marine Ecology (Volume 1)**). Feedstock Storage Facilities will be required within the Feedstock Storage & Pre-Processing Area for the storage of feedstock. Up to 28 days operational storage will be provided. As outlined in **Table 2-1**, three storage options are being considered – either vertical silos (up to 55 m in height agl) or covered storage buildings featuring bay or bunker storage.
- 2.2.30. It is anticipated that the Feedstock Storage Facilities will provide bulk solid material buffer feedstock storage to accommodate operational regime differences between the Site and Feedstock Processing Facilities (FPFs). The storage facility will allow the SAF facility to build up suitable buffer capacity to maintain operations while the FPFs supplying the feedstock are shut down for maintenance, and vice versa. These storage volumes will also mitigate any feedstock supply issues.
- 2.2.31. Feedstock from the Feedstock Storage Facilities will be transferred to the onsite Milling/Grinding unit(s) where it will be pulverised into a fine powder suitable for processing in the Gasification Facility. Fine powder will be conveyed to the Gasification Facility intermediate storage vessels.

Table 2-1: Components of the SAF Plant

Figure 2-1 Identifier	Component	Description	Indicative Parameters W (m) x L (m) x H (m)	Plus “Associated Equipment (AE)” (m) e.g. Columns/Stacks
1	Feedstock Storage & Pre-Processing Area	Onsite buffer storage for biomass and/or biocarbon feedstocks. Grinding / Pulverisation Unit(s) may also be housed in the Feedstock Storage & Pre-Processing Area.	Feedstock Storage Area (three options presented): up to 450 x 88 x H (see options).	Feedstock Storage Area (three options): Option 1 for Silos –multiple silo structures – up to 55 m in height; and Option 2 for Bays – Bays per building – up to 4 Buildings, approximately 25m in height. Option 3 for A-frame bunker storage– up to 2 A-frame buildings each approximately 40 m in height In addition to the above, the grinding area will be 55m high with Stack circa 65m
2	Gasification Plant	Up to four “gasifier trains” which gasify the feedstock into a synthesis gas (syngas).	Approximately 130 x 65 x 60	Up to 4 Stacks - each approximately 70m in height
3	Syngas Clean-up	Syngas from the gasifier train(s) is purified in the secondary gas clean-up unit to reduce the contaminants to suitable levels to avoid damaging the FT catalyst. The Syngas Clean-up features an Acid Gas Removal Unit (AGRU) to remove acid gas species – CO ₂ and H ₂ S – and other contaminants from the syngas.	Approximately 180 x 130 x 25	Assumed heights of columns in AGRU: <ul style="list-style-type: none"> • Re-absorber: approximately 80m; • Hot Regenerator: approximately 60m; • CO₂ Absorber: approximately 52m; • Flash Column: approximately 40m; • Methanol Water Column: approximately 35m; • H₂S absorber: approximately 30m. • Caustic Scrubber stack 30 m

Figure 2-1 Identifier	Component	Description	Indicative Parameters W (m) x L (m) x H (m)	Plus “Associated Equipment (AE)” (m) e.g. Columns/Stacks
		<p>Captured CO₂ is recycled back to the Gasification Plant (2) as well as being compressed and exported to the third-party Carbon Capture and Storage infrastructure (e.g. Net Zero Teesside (NZT)); subject to availability. Captured CO₂ from the AGRU is sent to the CO₂ compression unit to be purified/ dehydrated, compressed and directed to permanent storage either via the CO₂ pipeline being developed as part of the NZT project, or alternative scenarios being investigated (as described in Paragraph 2.2.25).</p> <p>The Syngas Clean-up unit will also include a thermal oxidiser with caustic scrubber and associated stacks to treat the H₂S stream removed in the AGRU.</p>		<ul style="list-style-type: none"> CO2 vent stack approximately 80m
4	FT Reactor	<p>One Reactor and ancillary equipment shall be installed and fed by the purified syngas. The resulting ultra-clean syngas is then catalytically converted in the Reactor into long chain hydrocarbon waxes and other light hydrocarbon products.</p>	Approximately 220 x 80 x 25	<p>FT Reactor approximately 70m in height; Cat. Hopper approximately 55m in height; and Water fractionator approximately 35m in height.</p>

Figure 2-1 Identifier	Component	Description	Indicative Parameters W (m) x L (m) x H (m)	Plus “Associated Equipment (AE)” (m) e.g. Columns/Stacks
5	Product Upgrading Unit	The products from the FT Reactor are processed in the Product Upgrading Unit (PUU) to produce synthetic paraffinic kerosene (SPK) and naphtha.	Approximately 130 x 80 x 25	Fractionator vessel up to 40m in height.
6	Future FT Reactor	One Reactor and ancillary equipment shall be installed and fed by the purified syngas. The resulting ultra-clean syngas is then catalytically converted in the Reactor into long chain hydrocarbon waxes and other light hydrocarbon products.	Approximately 220 x 80 x 25	Future but similar to item 4
7	Future Product Upgrading Unit	The products from the FT Reactor are processed in the Product Upgrading Unit (PUU) to produce synthetic paraffinic kerosene (SPK) and naphtha.	Approximately 130 x 80 x 25	Future but similar to item 5
8	Miscellaneous Tankage	Intermediate wax and buffer storage facility for SAF/naphtha (including metering and transfer equipment).	130 x 85 x 14	
9	Wastewater Treatment Plant	All wastewater streams produced by the facility are treated in the wastewater treatment plant (WWTP) in order to maximise re-use and minimise water usage and minimise wastewater discharge / enable compliance with	Approximately 130 x 75 x 10	

Figure 2-1 Identifier	Component	Description	Indicative Parameters W (m) x L (m) x H (m)	Plus “Associated Equipment (AE)” (m) e.g. Columns/Stacks
		discharge limits. The effluent will be discharged to Northumbrian Water's Bran Sands WWTP.		
10	Flare Area	Three flare systems (high pressure (HP) and low-pressure (LP & LLP)) for emergency / abnormal operational scenarios.	<p>The maximum height of a flare stack is anticipated to be 130m above ground level (agl) within a 60m radius sterile area (subject to dispersion modelling).</p> <p>There are 3 flare systems (HP, LP & LLP). Associated with these flare systems are 2 flare stacks, a HP/LP flare stack (up to 130 m in height) and an LLP flare stack (approximately 46m in height).</p>	
11	Auxiliary Boiler	An Auxiliary Boiler will assist in shortening the plant start-up schedule. The boiler will generate additional steam for use in the Syngas Clean-up section of the plant. The Auxiliary Boiler will have multi-fuel	Approximately 90 x 75 x 45	1 stack: up to 60 m in height

Figure 2-1 Identifier	Component	Description	Indicative Parameters W (m) x L (m) x H (m)	Plus “Associated Equipment (AE)” (m) e.g. Columns/Stacks
		<p>capability, operating on either biomass feedstock, process off-gases of natural gas.</p> <p>Steam generated by the Auxiliary Boiler may also be used for onsite power generation via a steam turbine generator (STG). Up to 49.9 MW of power generation is expected from the STG.</p>		
12	Surface Water Pond	Collects surface water run-off which will be tested prior to discharge. This determines if run-off needs to pass through WWTP first before discharge.	<p>Approximately 120 x 46 x 3*</p> <p>*Assumes that there may be walls/some above ground storage due to high water table.</p>	
13 & 14	Utilities	<p>Separated into two components:</p> <p>Utilities 1 - Plant/Instrument Air, Fire Water systems and storage, Raw water treatment, Potable Water, Demin Water treatment and Condensate recovery; and & Power distribution.</p> <p>Utilities 2 - Cooling water (CW) system & Power distribution.</p>	<p>10: Approximately 230 x 145 x 10</p> <p>11: Approximately 130 x 50 x 10</p>	There may be some vessels / tanks / structures up to 15 m in height.

Figure 2-1 Identifier	Component	Description	Indicative Parameters W (m) x L (m) x H (m)	Plus “Associated Equipment (AE)” (m) e.g. Columns/Stacks
15	Air Separation Unit	An air separation unit (ASU) to facilitate the production of oxygen and nitrogen required by the SAF Plant.	Approximately 85 x 180 x 15	Cold Box: approximately 45m in height Cooling Tower: approximately 28m in height
16	Process Waste Storage	Waste storage area for Slag (inorganic components that are larger than fine ash, including materials such as metals, glass, rocks and ceramics)	Approximately 135 x 80 x 10	
17	Consumables Storage Facilities	Storage of operational consumables such as catalysts and bulk chemicals	90 x 60 x 15	
18	General Administration & Storage Facilities	Offices, welfare, control room, warehousing, maintenance building, laboratories, garages, and security.	Approximately 125 x 105 with structures up to 25m in height.	
19	Car Parking	Car parking for operational personnel	135 x 135 x 0 with perimeter fencing lights etc.	
20	Existing CCGT Power Plant	The existing 49.9MW CCGT power plant comprises the following: Gas Turbine (GT) generators with Heat recovery steam generators (HRSG), Auxiliary boiler,	Approximately 240 x 220 x 25 (existing)	Existing three stacks approximately 25 m in height.

Figure 2-1 Identifier	Component	Description	Indicative Parameters W (m) x L (m) x H (m)	Plus “Associated Equipment (AE)” (m) e.g. Columns/Stacks
		<p>Steam turbine and all associated utility systems.</p> <p>The existing power plant will be recommissioned/-modified/-rebuilt to have the capability to use natural gas and/or, process off-gases and/or naphtha as fuels. No additional capacity is proposed.</p>		

Bulk Liquid Storage (SAF/NAPHTHA)

- 2.2.32. The final product (SAF) and the by-product of its production process (Naphtha) will be transferred via new pipelines to large scale bulk liquid storage tanks on the neighbouring and existing tank farm to the east of the Site (i.e. offsite storage). At present, it is assumed that the storage will be in the existing tank farm and use either existing or new tanks. This area is shown on **Figure 2-1 (Volume 2)**.
- 2.2.33. If there is a requirement to construct a new bulk liquid storage tank within the existing tank farm, it is assumed that this could be anywhere within the existing tank farm where there is sufficient space and in adherence to any safety measures such as separation distances and flood protection requirements.
- 2.2.34. From this existing tank farm, the SAF/Naphtha is exported to the off-taker.
- 2.2.35. A smaller, buffer storage area is proposed within the Site which will be utilised for QA batch testing prior to export (see Identifier 8 in **Table 2-1**).

Utility Corridors

- 2.2.36. The Proposed Scheme will require new utilities and connections to be installed as well as the potential reuse of existing facilities if practicable. It is anticipated that any new or diverted utility corridors will likely run parallel to internal roads and between components of the Site either above ground or buried.
- 2.2.37. Due to the nature of the transported pipeline contents, all pipelines will have the required protection measures in accordance with legal requirements. Pipelines are likely to be required for the following non-exhaustive purposes:
- Combined heat and power (CHP) connections to the existing adjacent MRF;
 - Transporting gaseous oxygen, nitrogen and air from the new ASU to the SAF plant;
 - Transporting additional quantities, if required, of gaseous oxygen from existing ASU infrastructure to the SAF plant.
 - The transfer of final product/by-product (SAF and Naphtha) to and from the existing tank farm and new onsite buffer storage to existing waterside bulk liquid storage terminal;
 - The transfer of final product/by-product (SAF and Naphtha) to and from the existing tank farm and new onsite buffer storage to existing inland rail / freight terminal;
 - CO₂ pipeline and connection point required to connect the Proposed Scheme into the NZT carbon capture and storage infrastructure;
 - Other ancillary pipelines for internal use; and
 - General utilities e.g. new Natural Gas pipeline; raw/potable water and wastewater.
- 2.2.38. Cables are likely to be buried or supported off existing structures for the following non-exhaustive uses:

- Electrical cables between the Proposal Scheme and neighbouring MRF facility to provide power (generated by the Project's Integral CCGT Power Plant);
- Electrical cables between the existing CCGT, auxiliary boiler and SAF Plant;
- Electrical cables between the existing CCGT, auxiliary boiler and onsite substation;
- Electrical cables between the SAF Plant or onsite substation and external substations operated by Northern Power Grid or others (cable corridor to the Site boundary); and
- Other ancillary electrical cables for internal power use.

2.2.39. For any underground pipelines or cables, it is anticipated that construction methods may include both open cut or trenchless techniques (such as Horizontal Directional Drilling). This is expected to be confirmed when the final design is available at the completion of FEED and so the EIA will assess both techniques as appropriate.

Flares

- 2.2.40. Multiple flares will be required for service specific relief loads as part of the Proposed Scheme, however the vapour from these will tie into the main LP/HP flare systems (pressure flares for emergency/abnormal scenarios).
- 2.2.41. Two flare stacks are required with the HP/LP flare stack up to 130m agl in height with the LLP flare stack up to approximately 46m agl in height. The final heights will be confirmed taking into consideration dispersion modelling undertaken as part of the EIA.

Heavy Haul Road Access

- 2.2.42. The Proposed Scheme intends to use an existing heavy haul road utilising existing private road infrastructure during construction of the Proposed Scheme to transport construction components and equipment from chosen marine landing facilities to the Site. Minor works will be required to enable the existing heavy haul road to be suitable for use in the construction phase. Details on the exact location and nature of these works are not available in this PEIR but will be presented in the ES. Further details on the potential marine facilities and construction routes are outlined in **Paragraphs 2.3.35- 2.3.37** and **Table 2-2**.

Conveying Corridors

- 2.2.43. Different methods of conveying may be required for the transportation and connection of the Feedstock Storage & Pre-Processing Area to the SAF Plant (including transportation of feedstock). Conveying will also be required to connect the SAF Plant to the existing rail terminal in the southwest of the Site.
- 2.2.44. These methods include:
- The use of conveyors (which will have the required protection from weather and external elements). A section of the conveyors may be elevated to achieve connection to the top of the Feedstock Pre-processing and Storage Area.

- Dedicated delivery routes facilitated by extending the width of internal access roads between the Feedstock Storage and Processing Area to the SAF Plant for vehicles. These would not enter the public highway and would be completely within the Site boundary.

Rail Terminal

- 2.2.45. The Applicant proposes to utilise an existing rail terminal operated by Navigator Terminals located southwest of the Site for the transportation of feedstock to the Site and also transportation out of final products. This existing terminal is currently utilised by Navigator for the export of bulk liquids, which includes hazardous materials under its status as an Upper Tier Site under Control of Major Accidents and Hazards (COMAH).
- 2.2.46. The Applicant is currently liaising with Navigator in relation to protective provisions and likely works required, however in order to facilitate the Proposed Scheme, the following new infrastructure will be required:
- Feedstock handling and buffer storage facilities (which could include either stacking of shipping containers, silos or a permanent building);
 - Cranage and storage areas;
 - Associated utilities and connecting conveying equipment; and
 - An additional rail track and associated facilities.
- 2.2.47. Whilst it is not anticipated that any improvements or remedial works are required to the existing railway tracks, subject to further investigations and capacity surveys, some improvements could be required should a new connection to the Network Rail Tees Siding be required. This would be north of the existing connection into the Navigator rail terminal and involve vegetation clearance and refurbishment of the existing infrastructure from the terminal to the Huntsman Drive level crossing.
- 2.2.48. Operational cranage may take the form of mobile reach stackers (telescopic) or gantry cranes. It is currently assumed that the gantry cranes will be approximately 22 m high.

Marine Transport Infrastructure

- 2.2.49. The Proposed Scheme intends to utilise existing marine infrastructure for the construction and potentially decommissioning phases (transportation of equipment and modular units) and during operation, for the transportation of final products (SAF and Naphtha).
- 2.2.50. The Applicant is currently undertaking logistics studies to determine the feasibility of several options. These studies have not been completed at the time of this PEIR's preparation. The conclusion of these studies, in addition to liaison with third party operators and statutory and non-statutory consultees on the suitability and use of these facilities will be fully explained and assessed in the ES as appropriate.
- 2.2.51. For the construction phase, the following options are as described below in **Table 2-2**.

Table 2-2: Construction Phase Marine Transport Infrastructure Options

Option	Description and Route	Works Required to Facilitate Use
<p>1 – Wilton Engineering Wharf</p>	<p>This existing wharf operated by Wilton Engineering (see Figure 1-2 (Volume 2)) would be utilised for the delivery of modular units and equipment, which are then transported east to the Site via a short section of public highway past the transporter bridge entrance and a small number of residential properties. This would continue east and connect to a long section of an existing private road which is understood to be used as an emergency services route. Before turning north towards the Site, the road crosses an area of scrub land currently being used as an unofficial motocross area.</p>	<p>Limited works would be required to the existing wharf, predominantly to facilitate the movement of large modular units such as removal of ancillary buildings, localised vegetation clearance and temporary movement of street furniture.</p> <p>The existing private road may require turning areas and condition management to take heavy loads and provide passing places for emergency purposes. This is currently being investigated and will be confirmed in the ES. If required, localised vegetation removal may be required where present.</p> <p>No works in the marine environment or dredging is anticipated to be required.</p>
<p>2 – Clarence Wharf</p>	<p>To the east of the Wilton wharf (see Figure 1-2 (Volume 2)), this existing wharf is currently being investigated in terms of its recent operational usage and structural integrity. Depending on these investigations and operator and consultee discussions, the Applicant could reinforce the wharf to allow heavy loads to be delivered or locate a lift on/lift off barge adjacent to the wharf to facilitate transport thereby only using the wharf for mooring.</p> <p>This option would involve the provision of a connection to the existing private heavy haul road which connects north to the Site.</p>	<p>Depending upon investigations, some reinforcement directly to the existing wharf may be required to facilitate the heavy loads. Therefore, some interaction with the marine environment may be required to install additional piles or top slab reinforcement.</p> <p>A moored lift on/lift off vessel would only require mooring and no reinforcement to the wharf. However, the wharf may require reinforcement to land the modules on (subject to survey).</p> <p>Localised vegetation clearance would be required for the heavy haul road turning areas and condition management where necessary.</p>

- 2.2.52. Details on consultation activities in relation to these options can be found in **Chapter 8: Freshwater and Marine Ecology (Volume 1)** and **Chapter 18: Marine Navigation (Volume 1)**. The ES will present and assess both options, with an acknowledgement that of these options only one will form part of the Proposed Scheme.
- 2.2.53. During the operation phase, existing jetties will be utilised for transporting the operational product offsite (see **Figure 1-2 (Volume 2)**) by marine vessels. These existing and operational wharfs are operated by Navigator and no physical works to these facilities are anticipated. At this time, details on the types, number and routes of the vessels used to transport the operational product are being discussed with other operators and will be confirmed within the ES.
- 2.2.54. For the decommissioning phase, it is assumed that the existing and new wharf facilities will be available at the end of the Proposed Scheme’s operational lifespan for use in other commercial operations.

2.3. CONSTRUCTION PHASE

INDICATIVE CONSTRUCTION PROGRAMME

- 2.3.1. The construction phase is likely to be approximately three years in duration lasting from Q4 2025 to Q3 2028. These works would commence promptly on the determination of the DCO and discharge of relevant pre-commencement Requirements. The indicative construction schedule is shown below in **Figure 2-4**.
- 2.3.2. These works do not include early works, namely demolition works of the existing TV1 and TV2 facilities. These works are anticipated to take place over approximately nine months from Q3 2024. These are not being consented under the DCO but will be taken account of if required within the cumulative assessment. The works listed from this point are those included as part of the Proposed Scheme DCO for which the Applicant is seeking development consent. These works will be considered in the ES assessment, as shown in **Appendix 19A: Long List of Other Developments (Volume 3)**.

Figure 2-4: Indicative Construction Schedule

Year	2024				2025				2026				2027				2028				2029	
Quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2
TV1 / TV2 Demolition Works																						
DCO Decision																						
Construction Phase																						
Commissioning																						
Operational Phase																						

CONSTRUCTION METHODOLOGY

Early Works & Ground Preparation

- 2.3.3. As outlined in **Paragraph 2.3.2**, it is anticipated that the partial demolition of TV1 and demolition and clearance of TV2 facilities will have been completed prior to the commencement of the main civil construction works of the Proposed Scheme. No waste materials (such as concrete) are expected to be derived or reused from these demolition works.
- 2.3.4. Initial early works would be undertaken to prepare the remaining areas of the Site for the Proposed Scheme. This would include any remaining Site clearance (including vegetation clearance), ground works including demolition of any other remaining existing above ground structures, remediation works (if required) and excavation of any voids or underground services. For further details on this see **Chapter 3: Approach to EIA (Volume 1)**.
- 2.3.5. It is anticipated that early works may also include ground investigation works for both geo-environmental and geotechnical requirements.
- 2.3.6. Any waste material from activities associated with the Site preparation works will be sorted with concrete being crushed and compacted to be reused as backfill material, should geotechnical and geo-environmental testing deem the material suitable.
- 2.3.7. Piling will be required within the Site to create foundations for the main structures and this is expected to be undertaken using various methods depending on the type of pile to be installed. It is likely that continual flight auger (CFA) will be utilised however other techniques could include percussive and / or vibropiles. Piling for the purposes of the larger components is expected to be to depths of approximately 20m (based on piling works undertaken for TV1 and TV2 facilities), however this will be confirmed with a Site specific Ground Investigation to be undertaken at the appropriate time.
- 2.3.8. Should any piling be required in the marine environment depending on the marine infrastructure option, this will be confirmed at a later date, after consultation with the EA and MMO, depending on whether jetty improvement works are required.
- 2.3.9. A geotextile will be installed at the appropriate depth below ground level during the compaction works to protect the water table, and avoid any piling material from reaching groundwater.

Construction Vehicles

- 2.3.10. Construction vehicles will be required onsite and these are likely to include excavators, transportation vehicles such as Moxy earth moving equipment, piling rigs and cranes.
- 2.3.11. Most vehicles will be delivered to the Site at the start of the construction phase. Specialist equipment, such as piling rigs and cranes, will arrive at times of key activities taking place within the three-year construction phase.

2.3.12. Once delivered onsite and utilising the internal roads, there is no requirement for these vehicles to be on the public highway.

Crane Arcs and High Structures

2.3.13. The maximum height of cranes utilised during the construction phase is anticipated to be 145m (15m above the tallest structure). As per Civil Aviation Authority guidance^b, aviation lighting will be installed where necessary.

Temporary Construction Compounds

2.3.14. Construction compound areas will be located within the Site at key locations in order to facilitate safe construction activities especially those on the critical path schedule such as delivery of large modular equipment. The location of these will be confirmed within the Works Areas and assessed in the ES at submission. Proposed locations are presented on the Site Layout Plan (**Figure 1-2 (Volume 2)**). The proposed compound sited on the area previously described as potential Saltmarsh land (see **Paragraphs 2.1.9 and 2.1.17**) is conditional on the site being infilled and developed ahead of the Construction Phase of the Proposed Scheme by the third party currently in control of the land, under an existing consent. In the event that the area is not infilled, the Applicant will not utilise the area for the Proposed Scheme.

Construction Workforce

2.3.15. It is anticipated that up to 2,600 temporary construction staff will be required at peak during the construction phase.

2.3.16. It has been assumed that the vast majority of the required construction workers at peak would come from within 1 hour commute of the Site. At present no onsite worker accommodation is proposed and no offsite logistics facility (road logistics hub or worker park and ride) has been identified.

2.3.17. Therefore, for the purposes of this PEIR it is also assumed that no offsite construction worker site will be utilised, and that all workers and traffic will travel and operate directly to/on the Site. This will be further appraised in the ES. A worker accommodation strategy will be included with the DCO application. For more information see **Chapter 14: Socio-economics (Volume 1)**.

Construction Working Hours

2.3.18. It is envisaged that standard daytime working hours of 07:00 – 19:00 Hours on Monday – Friday and 07:00 – 14:30 Hours on Saturdays will be implemented during the construction phase.

2.3.19. For critical path activities, working over weekends and for 24 hours (such as for concrete pours) may be required. In these cases, it is anticipated that such hours would require agreement with the local authority in advance of works taking place

^b CAP1096: <https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=5705>

and the local residents would be notified. These activities will be outlined in the ES and secured via a DCO requirement.

Construction Lighting

2.3.20. Construction lighting will be required for both critical path activities which require working at night and also for security. The location, type and also lux levels will be designed accordingly to avoid likely significant effects to nearby users, residential dwellings and also ecological features such as bats. Further detail on the proposed lighting strategy will be available in the ES for assessment.

Construction utilities

2.3.21. Power requirements are currently being developed, however it is anticipated that the use of diesel generators may be required initially for a short duration until connections to the grid can be established. However, it is not envisaged that diesel generators will be required long term.

2.3.22. Potable water will be required during the construction phase and this is likely to utilise the existing connection.

2.3.23. A Surface Water Management Plan will be developed for the construction period. This will utilise an existing surface water drainage system within the TVI/TV2 site which discharges to the Tees via an existing outfall in the north-east of the Site adjacent to the existing tank farm.

2.3.24. Effluent from construction activities and foul water from welfare facilities are expected to be tankered offsite to a WWTP.

Construction materials & waste

2.3.25. The construction phase is expected to require the following materials in order to facilitate the construction phase:

- Buildings materials including concrete, bricks and blocks;
- Steel;
- Pipework;
- Organic material (such as soil and biomass derived from vegetation clearance);
- Cables;
- Insulation; and
- External materials such as paint and cladding.

2.3.26. Likely volumes are currently being investigated and will be available for assessment in the ES.

2.3.27. There are no proposals for an onsite concrete batching plant, and so this will be imported via tanker. The number and timing of these deliveries will be available for the ES.

- 2.3.28. The importation of aggregate is also not expected to be required, however cut and fill balances are currently being developed and will be available for assessment in the ES.
- 2.3.29. If required, the Site contains sufficient area to enable remediation and storage of construction wastes for the duration of the construction phase. Any unsuitable or contaminated construction materials may be exported via the public highway network.
- 2.3.30. Biomass from Site clearance will be collated and mulched accordingly to be reused in Site enhancement and reinstatement works where possible.
- 2.3.31. A Waste Management Plan will be prepared and included with the ES. This will also include the outline of a Materials Management Plan, both of which will be completed and finalised by the Principal Contractor.

Environmental and Amenity Protection Measures

- 2.3.32. An Outline Code of Construction Practice (OCoCP) will be prepared and submitted as part of the ES to record mitigation measures proposed to minimise potential effects such as noise, vibration, dust and disturbance to terrestrial and marine receptors. The OCoCP will be the mechanism that ensures the successful management of the likely environmental effects resulting from the construction activities. A full CoCP will need to be prepared by the Applicant's appointed contractor ahead of works commencing. The CoCP will require approval from Stockton-on-Tees Borough Council ahead of the construction phase commencing.
- 2.3.33. There are no Public Rights of Way within the Site boundary. For those in proximity, it is currently not envisaged that the construction phase will require any stopping up or diversion of Public Rights of Way. Further details on the local footpath network can be found in **Chapter 10: Landscape & Visual (Volume 1)** and **Chapter 15: Population and Human Health (Volume 1)**.
- 2.3.34. Traffic management will be required for a short section of public highway in the event that the marine transport option utilising Wilton Wharf is required. However, mitigation for road users and residential inhabitants of dwellings will be included in an Outline Construction Traffic Management Plan (OCTMP) to be prepared for the DCO submission.

CONSTRUCTION DELIVERY AND ACCESS

Construction Routes

Marine Deliveries

- 2.3.35. Larger modules and equipment will be delivered to Site via the River Tees to the chosen marine infrastructure location. It is expected that up to 300 marine movements to facilitate the delivery of construction materials will be required via this route over an 18 month period within the three year construction phase.
- 2.3.36. Abnormal load vehicles (self-propelled modular transporters (SPMTs)) will be needed to facilitate movement of the plant from the wharf location to the required location for

installation in the Proposed Scheme, at specific stages within the programme. Option 1 of the marine infrastructure options would require access initially onto a short section of public highway (Port Clarence Road north of the Middlesbrough Transporter Bridge) before transitioning onto the heavy haul road (see **Figure 1-2 (Volume 2)**). Option 2 would only require the abnormal loads to be driven to the SAF Plant Site utilising the heavy haul road. Up to 250 loads will be moved by SPMT during the construction period.

- 2.3.37. Smaller equipment and materials will be delivered directly to the Site via the highway network. Two routes are currently being considered – one from the north and a second from the south (the A1185 and the A1046 respectively). It is not anticipated that these construction routes will require any improvements, but this will be confirmed within the ES once the results of the logistics study and any relevant swept path analysis has been completed. Up to 60 vehicle movements per day are expected during the construction period.
- 2.3.38. Construction worker traffic is likely to follow the same routes as construction traffic for materials detailed above, linked to the location of the construction worker site.
- 2.3.39. An Outline Construction Traffic Management Plan (OCTMP) will be prepared and submitted with the ES.

2.4. OPERATION PHASE AND MAINTENANCE

PROJECT LIFESPAN

- 2.4.1. The operational lifespan of the Proposed Scheme is estimated to be 50 years.

OPERATIONAL EXPORT

- 2.4.2. It is the current assumption that SAF/Naphtha will be exported via the Navigator wharfs during operation (see Marine Transport Infrastructure above and **Figure 1-2 (Volume 2)**). However, there may be the requirement for export via the rail terminal or by road. Export by rail is also assumed for some volumes of the SAF/Naphtha product. All options are currently being investigated. Export by road would be considered an unlikely scenario only required in an emergency situation whereby the Navigator wharfs were not operationally available, or if the Applicant secures a local SAF off-taker requiring small volumes only viable by delivery by truck.
- 2.4.3. Additionally, the Proposed Scheme proposes to also supply CO₂ to the NZT project via a connection to the CO₂ pipeline. **Chapter 3: Approach to EIA (Volume 1)** outlines the basis of assessment regarding the export of CO₂ should the NZT not progress or be delayed.

OPERATIONAL HOURS

- 2.4.4. Operational hours will be 24 hours per day once operational working conditions are initiated for the duration of the lifespan. This would be concentrated within the SAF Plant in the centre of the Site.

MAINTENANCE

- 2.4.5. Maintenance of the Proposed Scheme would involve routine, planned maintenance and system checks, as well as reactive maintenance and repairs.
- 2.4.6. Minor routine checks and maintenance may occur annually for some equipment (in line with operational permits) however it is more likely that major planned maintenance would occur approximately every 5 years. For example, this may be to change catalytic convertors and undertake equipment inspections and testing.
- 2.4.7. For the latter scenario, it is anticipated that approximately up to 100 workers would be required onsite for an estimated period of up to 4 weeks. This may also involve a plant shut down.

PERMANENT STAFF

- 2.4.8. Once operational, the Proposed Scheme will employ approximately 120 direct full time employees (FTE) at the SAF Plant. In addition, there will be approximately 120 FTEs at other facilities forming part of the Proposed Scheme and approximately 600 FTEs from indirect jobs at other locations in the UK.

PARKING FACILITIES

- 2.4.9. Once the construction phase is completed and the Proposed Scheme operational, the Construction Laydown Area(s) are intended be converted into permanent offsite parking facilities for full-time employees and contractors of the Proposed Scheme during maintenance. This is in accordance with typical bio-refinery norms. Any space not required by operational parking will be reinstated.

OPERATIONAL PERMITTING

- 2.4.10. The Applicant is currently proposing to consolidate the two existing Environmental Permits (namely related to the previous Air Products Ltd activities) and vary the resultant single permit for the new facility. It is anticipated that the permit application process will be twin tracked with the DCO application process, consolidating and varying the existing TV1 and TV2 permits.

EMERGENCY AND ABNORMAL OPERATION SCENARIOS

- 2.4.11. The Proposed Scheme requires the use of flare stacks to support normal operation phase activities. However, there may be a requirement to operate the stacks in an emergency, during plant start-up or shutdown, and other abnormal operational scenarios. These may include, for example:
- Scenario 1:
 - Flaring downstream of the Syngas Clean-up Unit during start-up to meet the treated syngas specification for the FT Reactor.
 - Scenario 2:
 - Flaring at the outlet of the Gasification Facility during start-up of the Gasifier.

- 2.4.12. In such instances, it is not anticipated that these would be long duration events, often equating to a number of hours until either the situation is resolved or remedial measures have been implemented to reinstate normal working activities.
- 2.4.13. In addition, the Applicant will be preparing an Emergency Action Plan for any other emergency or crisis management situations during the operational phase.

UTILITIES

- 2.4.14. It is currently anticipated that the Proposed Scheme will connect into existing utility services. These are outlined as follows:

Potable Water Supply

- 2.4.15. It is not anticipated that the Proposed Scheme will require significant volumes of potable water. However, two options are available:
- Generating potable water onsite from available raw water; and/or
 - The Applicant is in discussions with an existing operator regarding supplies via existing connections (subject to confirmation) to the potable water main running along Huntsman Drive. The location(s) of the new connection will be confirmed within the ES.
- 2.4.16. In the event of a water scarcity event, it is envisaged that water would be transported in via tanker, however this is expected to be for a very short duration. On the basis of the anticipated potable water use, this would equate to one tanker per week.

Raw Water

- 2.4.17. The Proposed Scheme will require volumes of up to approximately 300m³/hr of Raw Water during the operation of the SAF plant. The Applicant is in discussions with an existing operator regarding a new connection to an existing Raw Water pipeline running to the north of the site. The location of the new connection will be confirmed within the ES.
- 2.4.18. In addition to the SAF plant the Existing CCGT Power Plant and ASU will require raw water supplies. These will either be supplied from existing pipelines previously utilised by TV1 or a new internal pipeline taken from the new connection as outlined in **Paragraph 2.4.15** above. Both potential connections are internal to the Site and do not materially impact the overall water demand for the Proposed Scheme, with the final decision being made during detailed design.

Sewerage and Wastewater

- 2.4.19. The Proposed Scheme will connect to Bran Sands WWTP by interconnecting existing pipelines with new pipework to provide a connection from the SAF Plant Site to the River Tees via an existing tunnel.
- 2.4.20. Further to discussions with Northumbrian Water, the Applicant will utilise a new section of pipeline to connect the LGF plant into the existing TV1 wastewater pipeline which

runs east & north along an existing pipe track up to a compound adjacent to Seal Sands Road.

- 2.4.21. A new tie-in will be made between the TV1 wastewater line and an existing pipeline which runs across the Tees and along the pipe track adjacent to Bran Sands WWTP. This pipeline is routed along existing pipe tracks and crosses the Tees via an existing subterrain tunnel.
- 2.4.22. As the existing pipeline passes Bran Sands WWTP a new pipeline connection will be required to connect the existing pipeline to Bran Sands WWTP for the purposes of the Proposed Scheme. It is expected the entry point into the WWTP will be in its South West corner by either:
- New section of pipeline connecting the existing pipeline corridor into Bran Sands WWTP utilising an existing road bridge and then following existing pipeline corridors into Bran Sands WWTP; or
 - New section of pipeline connecting the existing pipeline into Bran Sands WWTP further down the corridor utilising an existing pipe bridge.
- 2.4.23. Apart from the new pipework connections and tie-ins there are no expected works required to the sections of existing pipework (subject to integrity inspections).
- 2.4.24. Both new sections of pipeline are not anticipated to be any longer than 450m, utilise existing structures and pipeline corridors (where practicable) although may require additional supports or road crossing(s) and some localised vegetation clearance.
- 2.4.25. As requested in the Scoping Opinion³ received from the Inspectorate, the Applicant is investigating alternative WWTP connections as a contingency however it is not anticipated that this will be required. If required and in emergency situations whereby the existing connection is not available, there is the option to tanker wastewater offsite to a WWTP, however, this will be 3-4 tankers per hour.
- 2.4.26. Sewerage from welfare facilities is unlikely to be significant given the limited operational staff requirements. However, there is no available connection and in line with other facilities in the area, this is expected to be tankered off site to a suitable treatment facility.
- 2.4.27. Based on the indicative estimates of sewage production during operation, approximately 2-3m³ would be generated which would equate to a tanker every 3-4 days. This will be confirmed in the ES.

Power

- 2.4.28. The Proposed Scheme has three sources of power which can be utilised. The primary source of power will be via an offsite Grid Connection in addition to onsite generation.
- 2.4.29. The Applicant is in discussions with National Grid over potential points of connection. These include North Bank, Seal Sands and Saltholme substations. There are currently existing connection agreements to North Bank and Seal Sands from previous uses within the Site at 132kv and 66kv respectively. It is envisaged that the connection

required for the Proposed Scheme will be 132kv and consist of an underground cable, buried approximately 1.4m below ground level (bgl) for the length required.

- 2.4.30. Modifications will be needed to the existing substations to facilitate the grid connection which will be the responsibility of the Network Operator. The Grid Connection Statement will confirm the status of these discussions at the point of submission and therefore will be the basis of the assessment in the ES.
- 2.4.31. The existing CCGT (within TV1) will provide an onsite source power to the SAF Plant. The CCGT will be modified or rebuilt to enable the unit to operate on various fuels however any emissions will be via the existing three stacks (approximately 25m in height agl). The Applicant will modify the CCGT to operate on natural gas, low-carbon process off-gases or FT tailgas, naphtha or blends of these fuels. The existing CCGT has a maximum electrical output of approximately 49.9MW and this will not be changed. The CCGT plant will be operated flexibly – providing power to the SAF Plant when the electricity Grid connection is late or temporarily unavailable; or when the Grid connection is temporarily not commercially viable (for example when electricity prices are not commercially advantageous to utilise).
- 2.4.32. It is anticipated that the new Auxiliary Boiler (and associated steam turbine generator) will provide a further onsite source of the required power to the SAF Plant. The Auxiliary Boiler will operate on biocarbon feedstock and/or low-carbon process off-gases and/or natural gas and produce high pressure steam for use in a steam turbine. Power output from the Auxiliary Boiler plant is expected to be up to 49.9 MW and will require a new stack. The final output and stack height will be confirmed at ES.
- 2.4.33. The Applicant is also exploring the use of hydrogen as a fuel for the existing CCGT facility and/or Auxiliary Boiler.

Natural Gas

- 2.4.34. A natural gas connection may be required, and this is currently being investigated by the Applicant.
- 2.4.35. If required, this will connect to an existing Above Ground Installation (AGI) (as shown on **Figure 2-5 (Volume 2)**), requiring an extension to the existing facility and installation of new pipework connecting the AGI to the Site.
- 2.4.36. The new pipeline will route along an existing buried pipe corridor up to the Sembcorp corridor (approximately 50 m), when it then surfaces for approximately 300m before travelling underground for the final approximately 100m until its connection with the Site at the northern fence line. Pipeline details are subject to further engineering development and available routings.
- 2.4.37. The Applicant intends to utilise the existing natural gas connection to the TV1/TV2 sites to provide natural gas to the existing CCGT and potential other consumers on the SAF Plant. The existing natural gas connection routes from the Sembcorp corridor along an

existing above ground pipe corridor to the eastern fence line of the Site (approximately 1 km).

- 2.4.38. The Applicant is also exploring the use of hydrogen, with the connection as outlined in Section 2.5.

Solid Waste Effluents

- 2.4.39. It is anticipated that the SAF Plant will generate several solid waste effluent streams. The Gasification Plant will generate a solid vitrified slag material. This material will be stored onsite (in bunkers or silos) before being sold as a benign aggregate product.
- 2.4.40. Filter cake effluent will be recovered from the Gasification Plant, stored in intermediate storage and then sent offsite for treatment by a third-party.

DRAINAGE AND WATER MANAGEMENT

- 2.4.41. Surface water drainage currently exists on the Site, either through natural channels, culverts or open linear drainage channels. It is anticipated that surface water management will be controlled via appropriate protection measures (such as interceptors and appropriate attenuation measures) and runoff rates, culminating to an existing outfall to the River Tees at the agreed discharge rates and quality.
- 2.4.42. The Applicant is currently investigating mitigation for nutrient neutrality, and this may include a treated discharge to the River Tees or offsite mitigation. This will be confirmed in the ES, further to discussions with the EA.

2.5. UTILISATION OF HYDROGEN

- 2.5.1. The Applicant is currently exploring the use of hydrogen, as a further fuel source for the existing CCGT and/or auxiliary boiler to help boost SAF production and reduce CO₂ emissions. Discussions with surrounding projects continue and will be confirmed in the ES. However, the following preliminary details are available, which are subject to further confirmation.
- 2.5.2. Should this opportunity be confirmed in the ES, it is likely that connections to hydrogen will be made close to the natural gas connections described in **Paragraph 2.4.34 - 2.4.38** in the north of the Site or alternatively in the eastern extent of the Site boundary, where a new AGI is proposed.
- 2.5.3. As a result of the availability of hydrogen, it is unlikely that any construction will be required until post 2030. When hydrogen import is available and economically viable, the Project will need to construct a new FT Reactor and Product Upgrading Unit to accommodate the increased syngas capacity. The Future FT Reactor and Product Upgrading Unit physical parameters will be similar to those defined in **Table 2-1** (identifiers 4 and 5).
- 2.5.4. No additional feedstock volumes will be required, and no additional power requirements will be needed. The utilisation of hydrogen will increase productivity of SAF and therefore the production of offgases, which in turn will power the existing CCGT. This is

considered to be more sustainable as it will reduce reliance on the grid import of electricity.

- 2.5.5. As a result of increased productivity, it is anticipated that the operational export of SAF and naphtha from the allocated wharves will be incorporated within the 1 vessel per week estimate as this is currently conservative.
- 2.5.6. No additional land will be required for the new hydrogen train as this will utilise existing Construction Laydown Area(s) and storage area. In addition, the new hydrogen pipeline will be connected to existing pipeline corridors and bridges which will have been installed as part of the construction of the Proposed Scheme.

2.6. DECOMMISSIONING

- 2.6.1. It is the assumption for the EIA that most elements of the Proposed Scheme will be decommissioned at the end of the operational lifespan, either prior to or at 50 years.
- 2.6.2. Most/all above ground structures would be demolished and removed at ground level or just below. Any concrete materials would be crushed, with other materials such as metal, sorted and recycled where possible. Some removal of materials offsite is likely by road and possibly via rail and marine infrastructure.
- 2.6.3. Any silos or storage facilities would be flushed and cleaned utilising either the existing utility connections (and within the discharge limits allowable) or where this is not possible, then the material would be removed from Site.
- 2.6.4. Any below ground structures will be left in-situ, including piles, pipework and cables. Any pipework would be sealed.
- 2.6.5. Larger components such as storage silos, equipment from the SAF process and within the CCGT would be removed, dismantled and either recycling or disposed.
- 2.6.6. It is anticipated that the decommissioning phase would take approximately 15 -18 months.
- 2.6.7. A Decommissioning Plan would be prepared at the appropriate time to confirm use of marine infrastructure available and appropriate at the time, other routes for offsite removal of materials and likely phasing of activities.

2.7. REFERENCES

¹ Lighthouse Green Fuels DCO. (2023). 'Environment Impact Assessment Scoping Report: Available at: [https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010150/EN010150-000006-](https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010150/EN010150-000006-LGF%20EIA%20Scoping%20Volume%20I%20-%20Main%20Text%20and%20Figures.pdf)

[LGF%20EIA%20Scoping%20Volume%20I%20-%20Main%20Text%20and%20Figures.pdf](https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010150/EN010150-000006-LGF%20EIA%20Scoping%20Volume%20I%20-%20Main%20Text%20and%20Figures.pdf)

² Planning Inspectorate (2018). 'Advice Note 9: Rochdale Envelope'. Available at: <https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-nine-rochdale-envelope/>

³ The Planning Inspectorate. (2023). 'Scoping Opinion: Lighthouse Green Fuels Project'.

Available at: <https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010150/EN010150-000012-EN010150%20-%20Lighthouse%20Green%20Fuels%20-%20Scoping%20Opinion.pdf>