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5. Construction Programme and Management

5.1 Introduction

5.1.1 This chapter of the Environmental Statement (ES) describes the construction phase of the Proposed Development (including commissioning).

5.1.2 This includes information on the expected construction programme and methods of working, based on current understanding at this early stage in design. At this stage a detailed construction programme is not available, as this is normally determined by the contractors who have not yet been appointed. Where construction details cannot be confirmed at this stage, reasonable worst-case estimates have been made based on experience gained on similar developments and professional judgment.

5.1.3 All construction works will be undertaken in accordance with the Construction Design and Management Regulations (2015).

5.2 Construction Programme Scenarios

5.2.1 As described in Chapter 4: Proposed Development (ES Volume I, Document Ref. 6.2), the programme is currently anticipated to commence shortly after the Development Consent Order (DCO) is granted (projected to be in Q4 2022) and after the final investment decision.

5.2.2 The construction of the project will be undertaken by:

- Inside Battery Limits (ISBL) Contractor – construction of PCC (including electrical connection and above ground connection to CO_2 Export Pipeline) and utility (water, gas and electricity) tie-ins;
- Outside Battery Limits (OSBL) Contractor – construction of natural gas and CO_2 Gathering Network and associated fibre-optic control cables; and
- Offshore Contractor – land-based interface with off-shore developments, within a four-year construction schedule including below ground section of the CO_2 export pipeline.

5.2.3 As discussed in Chapter 4: Proposed Development (ES Volume I, Document Ref. 6.2), the offshore works below Mean Low Water Springs (MLWS) are being progressed under separate consent, however potential combined effects of the onshore and offshore works are considered in Chapter 14: Marine Ecology, Chapter 24: Cumulative and Combined Effects (both ES Volume I, Document Ref. 6.2) and Appendix 24C: Statement of Combined Effects (ES Volume III, Document Ref. 6.4).

5.2.4 The key stages of the construction programme are set out in Table 5-1 and comprise:

- Site preparation and remediation works envisaged to be undertaken by Teesworks in advance of site handover;

- Enabling Works including ground improvements[1] and site establishment;
- River Tees and Coatham Dunes/Sands and foreshore Crossings;
- Construction of the Low-Carbon Electricity Generating Station and Carbon Capture Plant (Work No. 1) site works;
- Construction of utility connections for gas (Work No. 2), electricity (Work No. 3), water supply (Work No. 4), water discharge (Work No. 5);
- Construction of CO_2 Gathering Network (Work No. 6);
- High Pressure CO_2 Compressor Station (Work No. 7);
- CO_2 Export Pipeline (Work. No. 8);
- Temporary Construction and use of Laydown Areas (Work No. 9);
- Access and highway improvements (Work No. 10); and
- Plant and network commissioning.

5.2.5 It is common for much of the groundwork, for example piling and casting of concrete slabs to be completed prior to the erection of any above ground permanent structures. The completion of buildings and structural components, such as cladding and external civil works usually continue whilst mechanical erection is ongoing. However, the detailed phasing of construction is the responsibility of the appointed contractor(s) and, within the projected four year construction programme, may vary dependent on plant layout and procurement of key equipment. The proposed four year construction programme is considered robust.

5.2.6 The Low-Carbon Electricity Generating Station is located on part of the Site (within land owned by Teesworks and part of the former Redcar Steelworks) which is brownfield land. This land currently contains some above and below ground structures and redundant services associated with the former steelworks and earlier development on the site. The removal of those structures, clearance and any remediation of the Site are envisaged to be undertaken by Teesworks before the construction of the Proposed Development can commence. This ES assesses the likely significant environmental effects of undertaking these required enabling works by Teesworks in addition to the impacts of the construction of the Proposed Development by the Applicant's contractors.

[1] If required, this will include investigation of sub-surface conditions, removal of deep foundations and voids, ground improvements and targeted remediation of contamination

Table 5-1: Indicative Construction Programme

	2022				2023				2024				2025				2026			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Enabling works																				
Site establishment																				
RBT and Infrastructure Modifications																				
Tees and Dunes/Foreshore Crossings																				
PCC Construction																				
PCC Utilities																				
Electrical Connection																				
Gas Connection																				
CO_2 Gathering Network																				
Commissioning																				

5.2.7 A Final Construction Environmental Management Plan (CEMP) will be prepared by the Contractor prior to construction. The submission, approval and implementation of this will be secured through a Requirement of the draft DCO. A Framework CEMP is included in Appendix 5A of the ES (ES Volume III, Document Ref. 6.4), and sets out the key measures to be employed during the main works phase to control and minimise the impacts on the environment. The Final CEMP will be prepared by the Contractors in accordance with the Framework CEMP. Further information on the CEMP is presented in Section 5.3 below.

5.3 Construction Methods

Construction Equipment

5.3.1 For the purposes of this ES, reasonable worst case estimates have been made of the types and numbers of plant and machinery likely to be used on the Site during the construction period, as well as the potential use of piling for foundations of the main structures and any marine works required on the water connection corridors. Plant is likely to include:

- mobile plant and civils equipment;
- heavy lifting equipment (including cranes); and
- mobile power generating equipment.

5.3.2 For more details on construction equipment likely to be used see the construction noise assessment presented in Appendix 11A: Construction Noise (ES Volume III, Document Ref. 6.4).

5.3.3 There may be a requirement for point of use generators for site power during construction. Details of the number of generators, sizing and modes of operation are not yet available. These will be defined by the appointed contractor, as appropriate and, as appropriate depending on aggregated plant capacities, an Environmental Permit or Medium Combustion Plant Permit will be applied for from the Environment Agency, which will regulate emissions from the generators.

Site Preparation and Remedial Works

5.3.4 The site preparation and remedial works at the PCC Site, including demolition, soil remediation, levelling using excavated and imported materials, are expected to be completed by Teesworks' demolition and civils contractor to create a suitable development platform for the Proposed Development. This will be undertaken prior to the Applicants' ISBL Contractor taking over the PCC Site for the construction phase of the Proposed Development.

5.3.5 The following works to be undertaken by Teesworks' demolition and civils contractors have been assessed in the ES:

- demolition of existing structures within the boundary of the PCC Site and laydown areas within the Teesworks site: principally the former raw materials handling facility, sinter plant and conveyor systems;
- turn-over of the man-made ground within the subsurface to a depth of up to 2.5 m below ground level (bgl) including removal and crushing of

derelict underground structures and obstructions, removal and treatment of historic environmental contamination as required;

- targeted removal of additional underground structures and remediation as requested by the Applicants; and
- placement of suitable clean material (either reused excavation spoil or imported fill) to form appropriate platform levels for development.

5.3.6 In some areas of the PCC Site, large derelict structures associated with former development are expected to be encountered below ground. Where these, or identified environmental contamination, extend below 2.5 mbgl, the requirement for deeper excavation works will be assessed on a case specific basis. Ground and remediation works will be controlled through the Final CEMP as secured by a Requirement of the draft DCO and in accordance with the remediation permitting process developed by Teesworks following consultation with stakeholders such as the Environment Agency and Redcar and Cleveland Borough Council (RCBC).

5.3.7 Measures to manage the risk of encountering Unexploded Ordnance (UXO) during remedial works which requires removal and disposal will be set out in the Final CEMP. It is anticipated that there will be full time attendance throughout intrusive works either during investigation, remedial works or during construction from a UXO specialist who will have extensive experience of works similar to those required at the Site.

5.3.8 During these works, spoil material generated will be managed in accordance with the Final CEMP and as outlined in paragraphs 5.3.71 to 5.3.81 below. Appropriate measures to minimise short-term and long-term impacts on land drainage will also be discussed with each landowner. Such measures will principally be relevant for the Gas Connection (Work No. 2), Electrical Connection (Work No. 3), Water Supply Connection (Work No. 4), Water Discharge Connection (Work No. 5) and CO_2 Gathering Network (Work No. 6). These measures will be secured in the Final CEMP through the discharge of a DCO Requirement.

Construction Laydown Areas and Welfare Facilities

5.3.9 Proposed laydown areas required during construction, including equipment and material storage, site offices, batch concrete facilities, welfare facilities, car parking, environmental/waste handling areas, vehicle wheel wash areas and re-bar preparation areas will be located at identified locations within the Site boundary dependent on the contractor's working methods. Laydown areas will be required for the duration of construction in particular areas of the Site as set out in the construction programme. The proposed location of laydown areas is identified on Figure 5-1 (ES Volume II, Document Ref. 6.3). Designated contractor parking is also expected to be included close to the PCC Site, within the Site boundary on the laydown area on Teesworks land, as shown in Work No. 9A on the Works Plans (Document Ref. 4.4) submitted with the Application.

5.3.10 There will be additional laydown areas at various locations to facilitate the construction of the connections associated with the Proposed Development. These laydown areas are shown in Table 5-2, on Figure 5-1 (ES Volume II, Document Ref. 6.3) and identified on the Works Plans (Work Nos. 9A – 9E,

Document Ref. 4.4). The laydown areas will be used for the temporary storage of materials, fabrication, welfare facilities and to facilitate the management of special crossings. Use of these laydown areas has been assessed in the relevant ES chapters using conservative assumptions regarding the nature of activities to be undertaken. Where required, power will be provided using mobile diesel generators. Water will be supplied by tanker and stored on-site. Sanitary facilities will be provided and waste will be stored for off-site disposal.

5.3.11 Site clearance, levelling and ground preparation works for laydown areas may be required to provide a suitable working area. The surface material of laydown areas will be permeable so as to allow rainwater to percolate to ground, with suitably bunded locations identified as storage areas for any hazardous, polluting materials or chemicals to prevent the risk of pollution.

5.3.12 Habitats that would be temporarily lost or damaged during construction, mainly comprising species-poor grassland, would be reinstated on a like-for-like basis in accordance with the requirements of the relevant landowner. Associated requirements for protection of retained vegetation (e.g. during vehicle movements and construction/re-instatement works), soil protection and handling, and temporary soil storage will be specified in the Final CEMP prepared by the relevant contractor. These specifications will reflect current industry good practice and will be location specific. This is outlined within the Indicative Landscape and Biodiversity Strategy (Document Ref. 5.12) submitted with the Application.

Table 5-2: Laydown Areas

Work No.	Location	Period Required*	Use
9A	South bank of Tees, on Teesworks Land adjacent to PCC Site	2023 - 2026	Temporary construction and laydown area (including parking)
9B	North bank of Tees, land at Navigator Terminals	2023 – 2026	Temporary construction and laydown area
9C	North bank of Tees, land at INEOS	2023 – 2026	Temporary construction and laydown area (including parking)
9D	North bank of Tees, Saltholme (off Seaton Carew Road)	2023 – 2026	Temporary construction and laydown area (including parking and welfare)
9E	North bank of Tees, Saltholme	2023 – 2026	Temporary construction and laydown area (including laydown and access)
9F	North bank of Tees, Haverton Hill	2023 – 2026	Temporary construction and laydown area (including parking and welfare)

* Indicative, based on a construction start date of Q4 2022

Main Civil and Process Works

5.3.13 The ISBL Contractor will prepare and, if necessary, level the site of the Low-Carbon Electricity Generating Station (Work No. 1). This will be followed by piling and excavation for the main foundations of some of the larger elements of the Proposed Development. It is anticipated that bored piles to rock head

(up to 25 m below existing ground level) may be required for heavily loaded/ movement-sensitive structures such as the absorber tower and regenerator, the Heat Recovery Steam Generator (HRSG) and associated stack, and the turbine halls and CO_2 compression facilities. Lightly loaded structures/ less critical plant will be founded on shallow raft foundations.

5.3.14 A Piling Risk Assessment and associated Piling Methodology, will be undertaken in accordance with Environment Agency guidance (Environment Agency, 2001) to consider and mitigate the risks of causing new pollutant linkages and/or worsening existing linkages with respect to risks to controlled waters (particularly the Sherwood Sandstone Principal Aquifer) during construction of the Proposed Development. This will be secured by a Requirement in the draft DCO.

5.3.15 The main plant components for the Low-Carbon Electricity Generating Station are likely to be modular, constructed partially off-site and over-sized (classified as Abnormal Indivisible Loads[2] (AILs). These will be delivered by ship to the RBT. Other shipborne containerised construction deliveries and AILs of less than 100 tonnes in weight may be delivered via Teesport. AIL deliveries are discussed further in paragraphs 5.3.92 to 5.3.100 below.

5.3.16 Following ground and civils works, the contractor will commence the installation of plant, such as the gas turbine, generators, steam turbine, HRSG, stacks, capture plant, compression facilities and utilities. Building erection and plant installation will be carried out as concurrent activities noting that not all buildings will be erected prior to the commencement of plant installation. Large plant may be first placed on foundations with steelwork erected around it after.

5.3.17 As set out in Chapter 11: Noise and Vibration, Chapter 12: Terrestrial Ecology and Chapter 15: Ornithology (ES Volume I, Document Ref. 6.2), the piling method will be designed to minimise the risk of disturbance to birds (particularly bird species in the Teesmouth and Cleveland Coast SPA/Ramsar) or other noise sensitive human and ecological receptors as far as practicable. This may be either through the choice of piling method or the seasonal timing of piling works, depending on the nature of the piling activity and the distance to the sensitive receptors. This is further discussed in the Habitat Regulations Assessment Report (Document Ref. 5.13) submitted with the Application. The Piling Methodology will be secured under a Requirement of the draft DCO.

Construction of Gas Connection

Construction Options

5.3.18 There are two possible routeing options for the Natural Gas Connection to the PCC Site (Work No. 2):

[2] An 'abnormal load' is a vehicle that has any of the following:

- a weight of more than 44,000kg
- an axle load of more than 10,000kg for a single non-driving axle and 11,500kg for a single driving axle
- a width of more than 2.9 metres
- a rigid length of more than 18.65 metres

Source: https://www.gov.uk/esdal-and-abnormal-loads

1. **New Build Option:** a new below ground pipeline would run from a proposed Above Ground Installation (AGI) at Seal Sands, along the route of a disused railway line to Navigator Terminals and then beneath the Tees in a Micro-Bored Tunnel (MBT) (see Box 5-1) direct to the Teesworks site. The new pipeline would then run below ground along the Teesworks Spine Road to the gas receiving station on the PCC Site; or

   Alternatively the project could re-use the existing dis-used Trafigura pipeline that runs from Seal sands to Navigator Terminals to connect to the new tunnel above. In this instance a new AGI would be required at Seal Sands to connect the existing Trafigura gas pipeline to the pipeline within the tunnel.

2. **Sembcorp Pipeline Tie-In Option:** a new below ground pipeline constructed using open cut and horizontal directional drilling (HDD) (see Box 5-1) would run from a proposed AGI connecting to the existing Sembcorp gas pipeline at the eastern end of Dabholm Gut and then continue northwards direct to the gas receiving station on the PCC Site. This utilises the existing gas pipeline that runs under the River Tees.

5.3.19 These two routeing options are illustrated on Figure 5-2 (ES Volume II, Document Ref. 6.3) and on the Indicative Gas Connection and Above Ground Installation Plans (Document Ref. 4.7) submitted with the Application.

5.3.20 Whichever gas connection route is adopted, it will be constructed by the contractor, with connection works coordinated with National Grid Gas (NGG). The construction of the Minimum Offtake Connection (MOC) from the National Grid AGI required for both options will be undertaken by a National Grid approved contractor. The construction of the MOC will require stripping and stockpiling of soil/made ground and excavation to approximately 1 m below the depth of the existing gas main, along a length of approximately 12 m (6 m either side of the connection point).

5.3.21 A concrete pad and supports for the existing gas main either side of the connection point will then be installed together with a new ‘tee’ piece and construction valve. The existing gas main will then be drilled using specialist pressure drilling equipment (whilst the gas main is in operation), and the construction valve will be closed until the new connection pipeline is completed.

5.3.22 The construction of the contractor’s compound adjacent to the AGI will require excavation of a trench up to the interface with the AGI compound to allow installation of a swan neck to bring the pipework above ground for the Applicants’ compound, installation of valves and pipework, the Pipeline Inline Gauging (“pig”) trap, and electrical and telemetry equipment. Following installation of below ground infrastructure, the area will be backfilled, and excess soils will be used in the landscaping of the compound perimeter.

5.3.23 With the exception of the Tees Crossing and other special crossings (see Box 5-1), the majority of the gas connection to the Low Carbon Electricity Generating Station (Work No. 1) will be constructed using an open-cut method. These works will generally be as follows:

- fencing off works area and fit safety signage;
- stripping and stockpiling of topsoil;

- facilitating a working area of around 35 m to allow for temporary trackway, welding and soils storage;
- excavation of a trench;
- pipe laid (welding pipe sections together at grade level (pipe stringing), within approximately 1.2 m bgl; and
- testing the pipe integrity, re-instating land drainage, backfilling subsoil, reinstating topsoil and re-planting to the original state as required.

5.3.24 The working width required for open cut pipeline construction is generally around 35 m. This is the typical working width required to facilitate ease of construction but can be narrowed in places where other constraints exist. This width allows topsoil and spoil to be excavated and stockpiled adjacent to the point of generation, stringing and welding of sections of pipe, access along the route and laying of the pipe within the trench prior to backfilling.

5.3.25 Access arrangements during construction of the pipeline and AGIs are shown on Figure 5-2 (ES Volume II, Document Ref. 6.3) and impacts on local roads are considered in Chapter 16: Transport and Traffic (ES Volume I, Document Ref. 6.2). Access to the corridor during construction will be at defined points, using defined routes and appropriate signposting.

5.3.26 The construction of the Natural Gas Connection is expected to take up to nine months.

5.3.27 For the new-build connection to the National Gas Grid or Trafigura outlined above the River Tees crossing will use a pipeline installed within an MBT (see Box 5-1). A specific area of the laydown area at Navigator Terminals will need to be used to facilitate the construction of the MBT across the River Tees, additional land within the Site boundary will also be temporarily required either side of the river to allow for movement of additional plant. Due to the length of the MBT, three shafts will be required: one at Navigator Terminals one on Teesworks Land and one in-between. The MBT launched from the second shaft will surface on a pre-constructed arrival ramp located on the south side of the River Tees. The MBT is likely to take approximately 9 to 12 months to construct. Temporary works compounds will be required at the drilling launch site, the intermediate shaft and the drilling exit site.

5.3.28 For the connection to the Sembcorp Pipeline, no crossing of the River Tees is required. However, HDD techniques may be required for the connection to the Low-Carbon Electricity Generating Station near Bran Sands (see Box 5-1).

5.3.29 Trenchless technologies may also be needed for other crossing points (e.g. watercourses, transport infrastructure) and land required for such crossings has been allowed for within the Site boundary and has been incorporated into the Natural Gas Connection shown on Figure 3-2B in ES Volume II (Document Ref. 6.3).

5.3.30 A list of the special crossings required on the Natural Gas Connection routes is set out in Table 5-3. These are shown on the Indicative Gas Connection and Above Ground Installations Plans (Document Ref. 4.7) submitted with the Application.

Table 5-3. Special Crossings on the Natural Gas Connection Routes

Crossing Name	Grid Reference	Description	Type	Existing/ Upgraded /New
National Gas Grid and Trafigura Options				
GC1	454666, 524765	Tees Crossing	Tunnel	New
National Gas Grid Option Only				
GC2	454149, 524672	Minor road and pipeline (Navigator Terminals)	Open Cut	New
GC3	453978, 524655	Minor Road (Navigator Terminals)	Trenchless	New
GC4	453957, 524655	Minor Road (Navigator Terminals)	Trenchless	New
GC5	453936, 524655	Pipeline (Navigator Terminals)	Trenchless	New
GC6	4539894, 524655	Minor Road (Navigator Terminals)	Trenchless	New
GC7	453754, 524447	Minor Road (Seal Sands)	Open Cut	New
GC8	453698, 524361	Minor Road (Seal Sands)	Open Cut	New
GC9	453238, 524107	Minor Road (Seal Sands)	Open Cut	New
GC10	452230, 524110	Minor Road (Seal Sands)	Open Cut	New
Sembcorp Option Only				
GC11	457051, 524623	Blue Main (Teesworks)	Trenchless	New
GC12	456998, 524489	Railway x 2 (Teesworks)	Trenchless	New
GC13	456971, 524360	York Potash Conveyor	Trenchless	New
GC14	456919, 524174	CATS Pipeline	Trenchless	New
GC15	456697, 523753	Minor Rd (x2), Pipelines (x2 – including Breagh)	Trenchless	New

Box 5-1: Typical Approach to Trenchless Crossings

Micro-Bored Tunnels

Boring of an MBT for the Tees Crossing and Outfall is likely to require an area at the launch site to be prepared to allow excavation of a shaft to the required launch depth (c. 50 m deep). The shaft should be supported by concrete rings to prevent soil slump to ensure integrity of the tunnel bore. The shaft allows for the installation and launch of the tunnel boring machine. The opposite end of the tunnel trajectory is likely to have a sloped entry point to allow for the installation of the pre-welded & tested pipe string. Potential measures for the management of UXO risk during MBT launch shaft and receiving ramp construction are set out in Section 5.3.

The MBT head is designed to self-propel from the base of the shaft along a design trajectory surfacing at a specific point on the pre-constructed arrival ramp (for the Tees crossing) or on the sea bed (for the outfall). The boring machine is likely to be driven by hydraulic fluid from a diesel powered hydraulic pump system. Cuttings from the MTB machine will return along its own internal conveyor via slurry pumps with gravity separation in a slurry pond at the launch location. Separated solid material will be removed by road for re-use or disposal at a suitably permitted facility. Liquid wastes (including waste drilling mud) will be removed by tanker and disposed of at a suitability permitted facility. On completion, the MBT drill head will be removed from the tunnel.

A pre-welded and tested pipe may be pulled from the exit point, either on the south side of the River Tees within the Teesworks site (Tees crossing) or from a working vessel or barge (Outfall crossing) into the tunnel across its full length. Once fully installed, works at the shaft end will commence to install a single length of pre-welded and tested pipe between the pipe in the base of the shaft up to ground level. Once the weld is confirmed as good, then works to reinstate the removed spoil into the shaft and remediate the land/sea bed at the exit from the tunnel will be undertaken.

Following installation of the pipe strings into the tunnel the work site will be demobilised and the tunnel heads capped with the surrounding land reinstated. The drill contractor will then demobilise from site. Pre-hydrotesting of the pipe string will be needed before insertion into the micro tunnel, and the hydrotest water will need disposing to Tees Bay.

Horizontal Directional Drilling

Use of HDD techniques is likely for the Tees crossing for the CO_2 Gathering Network (and other on-shore special crossings) and for the CO_2 Export Pipeline. The HDD will involve horizontal drilling using an HDD machine from a launch pit to a receiver site. Use of HDD will require the construction of a large, lined, above ground mud circulation pit at the launch location for storage of drilling mud for lubricating the bit and returning drill cuttings. On completion of the bore, a pre-welded and tested pipe string will be pulled from the receiver pit toward the launch pit. The hydrotest water will need disposing to Tees Bay using the site outfall.

Measures to manage UXO risk during HDD construction are set out in Section 5.3. The drilling will follow a trajectory at a depth to give the minimum depth of cover.

Construction of Water Discharge Connections

5.3.31 Two options are considered for the water discharge connections for the Proposed Development:

- treated water would be discharged using the former Redcar Steelworks outfall (the Water Discharge Corridor) (Work No. 5A); or
- a replacement outfall into Tees Bay (Work No. 5B), running alongside the CO_2 Export Pipeline (Work No. 8) would be constructed.

5.3.32 In addition, if off-site treatment of process effluent is required, above ground outward and, potentially, return flow pipelines to Bran Sands Wastewater Treatment Works (Work No. 5C) will be constructed. Treated water may be returned from Brans Sands to the PCC Site in a separate pipeline for use and/or discharge via the existing or new outfall.

5.3.33 The corridors within which the water discharge connections would run are shown on Figure 3-2D (ES Volume II, Document Ref. 6.3) and shown on the Indicative Water Connection Plans (Document Ref. 4.9) submitted with the Application.

Treated Water Outfall

5.3.34 Although still operational for small discharges, the condition of the existing outfall from the former Redcar Steelworks for long term use for the Proposed Development is unconfirmed. If it is possible to re-use the existing outfall, any refurbishment and maintenance activities are likely to be minor.

5.3.35 Owing to the relatively low discharge volumes proposed and to assist the dissipation of any plume, a diffuser at the outfall head will be retrofitted if the existing diffuser is no longer functional. Several construction activities would be required for this. Potential activities which have been taken into account in this ES include:

- dredging of pocket;
- final assembly, float and positioning of a replacement head;
- a flood and sink exercise or similar works to position the outfall head within the dredge pocket;
- either piling or pin drilling to secure the outfall head;
- backfill of the dredged pocket around the outfall head;
- the positioning of rock armouring/scour protection around the outfall head;
- final assembly, pipeline jointing, connections, fabrication and ancillary commissioning works to install a safe and fit for purpose discharge pipeline; and
- the presence of vessels such as work boat(s) and/or barge(s) to support the refurbishment process.

Replacement Outfall

5.3.36 In the event that the outfall requires replacement, this would be installed as a micro-bored tunnel from the PCC Site to the discharge point within Tees Bay (see Figure 3-2D (ES Volume II, Document Ref. 6.3) and Box 5-1). This would run parallel to the CO_2 Export Pipeline (see below) and would be carried out at the same time. The replacement outfall would also require a diffuser head to be fitted.

5.3.37 A list of the special crossings required on the Water Discharge Connection for the replacement outfall is set out in Table 5-4. These are shown on the Indicative Water Connection Plans (Document Ref. 4.9) submitted with the Application.

5.3.38 The pipeline for discharge of process water to Bran Sands WwTW for treatment will be constructed as an above ground pipeline largely using existing crossings (see Table 5-4).

Table 5-4. Special Crossings on the Water Discharge Connection

Crossing Name	Grid Reference	Description	Type	Existing/ Upgraded/ New
Replacement Outfall				
WC1	457351, 525682	South Gare Road	Tunnel	New
WC2	457888, 526020	Coatham Dunes	Tunnel	New
Bran Sands Pipeline				
WC7	456717, 523812	Minor road (Bran Sands)	Pipe bridge	New
WC8	457017, 524324	Rail (x2) (Industrial)	Pipe bridge	Existing
WC9	457125, 524490	Minor road (Teesworks)	Under road bridge	Existing
WC10	457312, 525065	Minor road (Teesworks)	Pipe bridge	Existing

Construction of Water Supply Connections

5.3.39 The corridor within which the Water Supply Connection would run is shown on Figure 3-2D in ES Volume II (Document Ref. 6.3) and shown on the Indicative Water Connection Plans (Document Ref. 4.9) submitted with the Application.

5.3.40 Raw water will be provided by Northumbrian Water Ltd (NWL) via the existing watering meter house along the Water Connection Corridor. NWL own and maintain the raw water pipes up to the Metering House with maintenance and repair of the pipes downstream of this location currently being the responsibility of the landowner. The special crossings for the raw water supply using existing or new crossings set out in

5.3.41 Table 5-5.

5.3.42 A potable water supply to the PCC Site will be provided most likely by utilising the existing connection to the NWL infrastructure. However, the condition of this infrastructure is currently unknown, therefore provision is included for the Applicants to install a new connection to the Metering House if required.

Table 5-5. Special Crossings on the Water Supply Connections

Crossing Name	Grid Reference	Description	Type	Existing/ Upgraded/ /New
WC3	458051, 524501	Rail (Operational)	Culvert	Existing
WC4	457971, 524723	Fleet (watercourse)	Pipe bridge	Existing
WC5	457928, 524759	Minor road	Below ground	Existing
WC6	457517, 524975	Rail (Industrial)	Pipe bridge	Existing

Construction of CO_2 Export Pipeline

5.3.43 Construction of the CO_2 Export Pipeline from the High-Pressure Compressor Station across Coatham Dunes and Coatham Sands to MLWS (including across the Teesmouth and Cleveland Coast Special Protection Area (SPA)/Ramsar and the Teesmouth and Cleveland Coast Site of Special Scientific Interest (SSSI) will be using HDD techniques under the Dunes/Sands (see Box 5-1).

5.3.44 The direction of construction of the export route is yet to be determined, with options being from offshore to the PCC Site, or vice versa. The corridor within which the CO_2 Export Pipeline will run as shown on Figure 3-2A (ES Volume II, Document Ref. 6.3) and the Indicative CO_2 Export Pipeline Plans (Document Ref. 4.12) submitted with the Application. Construction of the CO_2 Export Pipeline will require use of vessels such as work boat(s) and/or barge(s).

5.3.45 The HDD is expected to be drilled from/to approximately 3 km off-shore, where there is a minimum 5 m water depth, to on-shore at the PCC Site (or vice versa) (See Figure 5-2, ES Volume II, Document Ref. 6.3).

5.3.46 A total of up to three HDD bores will be required:

- for the CO_2 Export Pipeline itself;
- for the power and fibre-optic control cable umbilical to the off-shore installation; and
- for the power and fibre-optic control cable umbilical for the off-shore isolation valve.

5.3.47 Whichever direction the HDD bores are drilled, temporary construction sites will be established onshore at the PCC site and offshore (on a lay barge(s)) where diesel-powered HDD drill rigs will be located (together with supporting systems). The drill rigs will work together to drill pilot holes, followed by reaming to the required diameter, then the pre-fabricated services pipelines would be introduced through the full length between the PCC Site and the offshore locations.

5.3.48 The drilling is likely to be on a 24 hour basis to maintain the integrity of the drill holes. To prevent the drill holes from collapsing during the drilling process (under the accumulated weight of the soil/water burden) engineered slurry will be pumped at a pre-determined pressure into the drill hole via the drill rig. The drill site offshore will require moored lay barge(s), support vessels and a pre-installed temporary structure standing on the sea bed; the purpose of this is to support the drill pipework as it creates and maintains the drill hole through to completion of service installation.

5.3.49 Drill cuttings will be recovered in the drilling fluids and separated in a unit which will be located near the HDD drill rig. For off-shore to on-shore drilling, the separated cuttings will be loaded to a service barge and brought back to shore for a disposal.

5.3.50 The drilling fluid pressure will be monitored to determine breakthrough. It is expected that the weight of the water will equalize the drilling mud which in

turn prevents significant release. The pressure of the mud in the drill bore will be monitored continuously to prevent loss of major containment.

5.3.51 The line of breakthrough will be tracked with a remotely operated vehicle. Bentonite will used as the drilling mud – a naturally occurring clay based mineral with thixotrophic properties.

5.3.52 For drilling from off-shore to on-shore, the pipes will need to be pulled into the HDD bore from on-shore to off shore with welded lengths of pipe 1 km long stored within the Site boundary prior to use. For drilling from on-shore to off-shore, the pipes will be welded into 1 km sections onshore and, air filled, will be floated off-shore from the RBT to 3 km off-shore for use. Welding of pipeline sections will be undertaken off-shore.

5.3.53 Following installation, the pipeline services will be left in a nitrogen-preserved condition awaiting tie-in above ground at the Site and at the subsea point. Following successful installation, the offshore and onshore temporary sites will be demobilised and remediated to an agreed specification.

5.3.54 The consenting of the part of the pipeline between Mean High Water Springs (MHWS) and MLWS is by use of a Deemed Marine Licence (DML) included in the Application (Document Ref. 2.1) (see Section 4.7, Chapter 4: Proposed Development, ES Volume I, Document Ref. 6.2). The CO_2 Export Pipeline will extend beyond MLWS to ultimately connect to the offshore storage facility, however, consent for the section below MLWS (including the part from MLWS to 3 km off-shore described above) is not being sought as a part of this Application. The Marine Licence application for the off-shore section of the CO_2 Export Pipeline will require a separate environmental impact assessment. The continuation of the pipeline below MLWS (including the works below MLWS described above) is considered in the combined effects assessment in this ES (Chapter 24: Cumulative and Combined Effects, ES Volume I, Document Ref. 6.2) and in Appendix 24C: Statement of Combined Effects (ES Volume III, Document Ref. 6.4).

5.3.55 A list of the special crossings required on the CO_2 Export Pipeline is set out in Table 5-6. These are shown on the Indicative CO_2 Export Pipeline Plans (Document Ref. 4.12).

Table 5-6. Special Crossings on the CO2 Export Pipeline

Crossing Name	Grid Reference	Description	Type	Existing/ Upgraded/ New
CEC1	457262, 525685	Minor Road	HDD	New
CEC2	457271, 525709	South Gare Rd	HDD	New
CEC3	457879, 526028	Coatham Dunes and Sands	HDD	New

Construction of Electrical Connection

5.3.56 The Electrical Connection (Work No. 3A) between the Low-Carbon Electricity Generating Station substation (Work No. 1) and a newly constructed NZT Electrical Sub-station (Work No. 3B) adjacent to the National Grid's Tod Point sub-station (would comprise a 275 kV single circuit cable and control system cables which would be installed primarily below ground.

5.3.57 The chosen Engineering, Procurement and Construction ('EPC') contractor will undertake detailed design of the Electrical Connection (and also the substation at the Low-Carbon Electricity Generating Station) and the new 275kV NZT substation at Tod Point (adjacent to the existing NGET Tod Point substation).

5.3.58 NGET will be responsible for adding two new circuit breaker bays to the existing Tod Point sub-station (also within Work No. 3B) and for extending the busbars, busducts and/or cables at NGET's existing Tod Point substation. NGET has confirmed that no other new equipment is required to be constructed or installed locally with respect to Tod Point.

5.3.59 The detailed design of the Electrical Connection will be secured by DCO Requirement No. 3 in Schedule 2 of the DCO (Document Ref. 2.1).

5.3.60 The crossing of the Redcar to Middlesbrough section of the Tees Valley railway line will be facilitated either by using an existing Teesworks bridge (Option 1A) or by using a proposed new bridge (either the conveyor bridge to be installed for the York Potash project or a new Teesworks bridge that is proposed to be developed by the landowner) (Option 1B) (see Figure 5-3, ES Volume II, Document Ref. 6.3, for the routeing of Options 1A and 1B). These two options only relate to the routeing of the cables across part of the Teesworks site and crossing the Tees Valley railway line and are due to uncertainty in the timing and exact location of third party infrastructure being developed in this part of the Site by the site operator and York Potash project. This infrastructure will be used to facilitate the crossing of the rail line by the electrical connection for the Proposed Development.

5.3.61 Underground construction will require:

- a working area up to approximately 35 m wide to allow for temporary trackway, and soils stockpiling;
- excavation of a reinforced trench; and
- cables laid at a depth of 1.1 m on a bed of cement bound sand overlain by protective tiles and backfill including warning tape.

5.3.62 A list of the special crossings required on the Electrical Connection Corridor is set out in Table 5-7. These are shown on the Indicative Electrical Connection Plans (Document Ref. 4.8). Below ground crossings, will be constructed using hand-dig or auger techniques depending on the length and service being crossed.

Table 5-7. Special Crossings on the Electrical Connection Corridor

Crossing Name	Grid Reference	Description	Type	Existing/ Upgraded/ New
Route Options 1A and 1B				
EC1	457093, 542608	Blue Main (Teesworks)	Open Cut	New
EC2	457114, 524415	Fleet (Watercourse)	HDD	New
EC5	456948, 523808	Minor Road (Tod Point)	HDD or Open Cut	New
Route Option 1A Only				
EC3	457099, 524068	Operational Rail	Road bridge	Existing
EC4	456915, 523859	Access road (Teesworks)	HDD or Open Cut	New
Route Option 1B Only				
EC6	457160, 524200	Minor Road (Teesworks)	York-Potash Conveyor	New
EC7	457226, 524116	Operational Rail	York-Potash Conveyor	New
EC8	457097, 523957	Minor roundabout (Tod Point)	HDD	New

5.3.63 The construction works for the installation of the new NZT Electrical Substation at Tod Point and the construction of new bays at the NGET Electrical Substation will only require minor above ground site clearance works to prepare the site for the installation of new bays and equipment. There is no requirement for large buildings or transformers. All above ground equipment to be installed will be of height no greater than 12 m above ground level.

5.3.64 Further details of the Electrical Connection are contained in the Electricity Grid Connection Statement (Document Ref. 5.5) and associated drawings.

Construction of CO_2 Gathering Network

5.3.65 The CO_2 Gathering Network (Work No. 6) will be mostly an above ground pipeline installed utilising existing support infrastructure (i.e. existing pipe racks, sleeper tracks, culverts and pipe bridges) and existing crossings of other infrastructure, where feasible. In the event that a pipe rack or bridge is at capacity, the pipe rack will either be extended to accommodate the additional line, or a new rack will be installed parallel to the existing one.

5.3.66 The proposed routeing for the CO_2 Gathering Network pipelines are shown on Figure 3-2E (ES Volume II, Document Ref. 6.3) and on the Indicative CO_2 Gathering Network Plans (Document Ref. 4.11).

Construction activities

5.3.67 Activities within the corridor will include the following:

- survey of proposed new pipeline route, including dilapidation surveys for existing infrastructure;

- undertaking of ground surveys i.e. topographical, and geotechnical etc;
- obtain associated access permits and clearance certification from landowners or third party operators of neighbouring infrastructure;
- ground preparation and management of any associated excavation works;
- installation of new pipeline sections and welding of sections;
- modification of existing pipe bridges, or installation of new ones depending on capacity of existing to accept new pipe;
- management of lifting operations for the positioning and installation of steelwork, piping sections, valves, materials and concrete supports etc;
- installation of temporary pig launching / receiving facilities;
- non-destructive testing of pipe work by radiography, magnetic particle inspection and ultrasonic means;
- hydrostatic piping testing with associated dewatering and drying of new pipe;
- corrosion protection preparation and coating (including structural steel work supports) and installation of cathodic protection;
- electrical, control and instrumentation works;
- commissioning;
- reinstatement of fence lines, railing, supports, walkways and any other obstacles temporarily removed or modified by prior agreement to allow for construction and safe works access; and
- site clean-up.

5.3.68 The CO_2 Gathering Network pipeline (and associated fibre-optic control cable) will need to cross the River Tees using trenchless technologies (see Box 5-1) using either:

- the micro-bored tunnel from Navigator Terminals to the Teesworks site shared with the Natural Gas Connection for both the CO_2 Gathering Network Pipeline and associated fibre-optic cable (see above); or
- a direct crossing from Navigator Terminals to the northern bank of the Dabholm Gut constructed using HDD techniques, with the fibre-optic control cable installed using an existing utilities tunnel under the Tees.

5.3.69 For the direct crossing to the northern bank of the Dabholm Gut, the section of the CO_2 Gathering Network running north from the end of Dabholm Gut to the PCC site to the east of Bran Sands will either be above ground or alternatively installed underground using open-cut techniques (as the route is not an existing managed utility corridor).

5.3.70 A list of the special crossings on the CO_2 Gathering Network is set out in Table 5-8. These are shown on the Indicative CO_2 Gathering Network Plans (Document Ref. 4.11).

Table 5-8. Special Crossings on the CO_2 Gathering Network

Crossing Name	Grid Reference	Description	Type	Existing/ Upgraded/ New
Shared Route				
CG1	447817, 522753	Rail (industrial)	Pipe bridge	Existing
CG2	447830, 522840	Rail (industrial)	Pipe bridge	Existing
CG3	447849, 522927	Road (Belasis Ave)	Culvert	Existing
CG4	448137, 523106	Road (Nelson Ave)	Culvert	Existing
CG5	448444, 523338	Road (Cowpen Bewley Rd)	Culvert	Existing
CG6	448947, 523545	Farm Track	Culvert	Existing
CG7	449578, 523559	Farm Track	Culvert	Existing
CG8	449935, 523567	Minor watercourse	Pipe bridge	Existing
CG9	450180, 523572	Farm Track	Culvert	Existing
CG10	450437, 523578	Farm Track	Culvert	Existing
CG11	450662, 523559	Minor Road (Seaton Carew Rd)	Culvert	Existing
CG12	451035, 523583	Minor Road (Seal Sands)	Culvert	Existing
CG13	451076, 523585	Minor Road (Seal Sands)	Pipe bridge	Existing
CG14	452475, 523589	Minor Road (Seal Sands)	Pipe bridge	Existing
CG15	453489, 523450	Minor Road (Seal Sands)	Pipe bridge	Existing
CG16	453597, 523627	Minor Road (Seal Sands)	Pipe bridge	Existing
CG17	453598, 523762	Minor Road (Seal Sands)	Pipe bridge	Existing
CG18	453681, 524208	Minor Road	Pipe bridge	Existing
CG19	453766, 524337	Minor Road	Pipe bridge	Existing
CG20	453886, 524519	Minor Road	Pipe bridge	Existing
CG21	453946, 524719	Minor Road (Navigator Terminals)	Pipe bridge	Existing
CG22	454329, 524754	Minor Road (Navigator Terminals)	Pipe bridge	New
Tees Crossing direct to PCC Site by Tunnel				
CG23	454692, 524775	River Tees	Tunnel	New
CG24	457137, 524667	Road	Pipe bridge	New
CG25	457318, 525063	Road	Pipe bridge	Existing
Tees Crossing via Dabholm Gut to PCC Site using HDD				
CG26	454691, 524815	River Tees	HDD	New
CG27	454979, 524816	Minor Road (Dabholm Gut)	Pipe bridge	New
CG28	455016, 524781	Minor Road (Dabholm Gut)	Pipe bridge	Existing
CG29	455194, 524650	Minor Road (Dabholm Gut)	Pipe bridge	Existing
CG30	455378, 524546	Minor Road (Dabholm Gut)	Pipe bridge	Existing
CG31	455559, 524441	Minor Road (Dabholm Gut)	Pipe bridge	Existing

Crossing Name	Grid Reference	Description	Type	Existing/ Upgraded/ New
CG32	455797, 524296	Minor Road (Dabholm Gut)	Pipe bridge	Existing
CG33	455882, 524234	Minor Road (Dabholm Gut)	Pipe bridge	Existing
CG34	456189, 524111	Minor Road (Dabholm Gut)	Pipe bridge	Existing
CG35	456536, 523830	Minor Road (Dabholm Gut)	Under road bridge	Existing
CG36	456695, 523763	Minor Road (Dabholm Gut)	Pipe bridge	Existing
CG37	457016, 524316	Rail (x2) (Industrial)	Pipe bridge	Existing
CG38	457126, 524494	Minor Road (Teesworks)	Under road bridge	Existing

Spoil Management

5.3.71 Spoil management will be required during site preparation and remedial works. Spoil will primarily arise from the construction of tunnels (and associated shafts) and bores associated with the Natural Gas Connection, Water Discharge Connection (outfall), CO_2 Export Pipeline and CO_2 Gathering Network (see above).

5.3.72 For the management of spoil and site won materials, the ISBL and OBSL Contractors will take all reasonable measures to apply the waste hierarchy which is, in priority order, as follows:

- prevention;
- reuse;
- recycling or recovery; and
- disposal.

5.3.73 During enabling works and construction, spoil arising will be temporarily stockpiled within the Site boundary before either beneficial re-use on site for use in development platform construction or being taken off-site by HGV either for treatment at Teesworks' proposed soil treatment hub, or for off-site treatment/or disposal at another local permitted facility. It is envisaged that the bulk of spoil generated will be beneficially used within the Site. However, there are a number of spoil treatment and handling facilities in the local area, which can accept clean and contaminated spoil and facilitate its treatment (if required) for reuse in other development sites in the area.

5.3.74 Spoil will be stockpiled in areas at low risk of flooding (Flood Zone 1) within the Site boundary on the Teesworks site or on the laydown area at Seal Sands. The size of the stockpile(s) will be minimised where possible by excavation works being constructed in parallel with development platform construction that will utilise spoil arisings. In addition, there will be progressive off-site removal of geotechnically unsuitable or contaminated materials for re-use, treatment and/or disposal. Stockpile heights will therefore be low and there is sufficient area within the Site boundary to accommodate the volume of spoil expected to be generated. Dust generation from soil and spoil management has been considered within Chapter 8: Air Quality (ES Volume I, Document

Ref. 6.2) and Appendix 8A: Air Quality Construction Phase (ES Volume III, Document Ref. 6.4) and will be managed through the measures outlined in the Final CEMP.

5.3.75 Suitable measures will be put in place to prevent sediment being washed into watercourses, and the stockpiles will be visually monitored for wash away during and after periods of prolonged rainfall. Further details of the measures which would be implemented are included in the Framework CEMP in Appendix 5A (ES Volume III, Document Ref. 6.4).

5.3.76 Spoil will be sampled and any contaminated spoil identified will be managed in accordance with the Site Waste Management Plan (SWMP) and a Material Management Plan (MMP) which will be prepared and appended to the Final CEMP. A Framework Site Waste Management Plan (SWMP) has been developed as part of the Framework CEMP, which allows for waste streams to be estimated and monitored and goals set with regards to the waste produced. The Framework SWMP is included in Appendix 5A (ES Volume III, Document Ref. 6.4). The MMP will specify that any potentially contaminated soils will be managed in accordance with:

- Defra Construction Code of Practice for the Sustainable Use of Soil on Development Sites (Defra, 2009); and
- Definition of Waste: Development Industry Code of Practice (CL:AIRE, 2011).

5.3.77 Any suspected contaminated spoil will be placed on an impermeable membrane to prevent the leaching of any contaminants into the subsurface or watercourses. Site specific Screening Verification Criteria for the classification of soils for re-use or disposal will be derived by the Applicants in accordance with the MMP.

5.3.78 All spoil will be processed and managed in accordance with The Waste (England and Wales) Regulations 2011 (as amended).

5.3.79 Further details regarding spoil management and quantities during tunnelling activities are provided in Box 5-2 below.

5.3.80 Given the quantities outlined in Box 5-2 it is assumed that a worst case estimate of approximately 50,000 m^3 of spoil will be produced from drilling, boring and tunnelling activities. This will be less if no Tees crossing is required for the Gas Connection and use of an HDD for the Tees Crossing for the CO_2 Gathering Network is possible. More detailed assessment of the proportion of geotechnically unsuitable or contaminated materials requiring disposal and/or treatment will be estimated prior to works commencing. The removal of up to 10,000 m^3 of spoil per month from site for re-use, treatment or disposal has been allowed for in the HGV movements for construction identified in Appendix 16A: Transportation Assessment (ES Volume III, Document Ref. 6.4).

Box 5-2 Tunnelling Spoil Management and Quantities

Tees Crossing

Boring of the Micro-Bored Tunnel (MBT) for the Tees Crossing will require an area at the launch site to be prepared to allow excavation of a shaft to the required launch depth; it is anticipated that this shaft will be approximately 50 m deep. From this shaft, the MBT will be created with tunnel cuttings being returned back along an internal conveyor via slurry pumps to the launch location. At this point, gravity separation will be used to segregate solid material from liquids. Separated solid material will be re-used on site, where viable; this may require the temporary stockpiling of spoil within the Proposed Development Site (it is anticipated that this stockpiling will take place within the Proposed PCC Site).

Excavated contaminated spoil, if identified, will be placed on an impermeable membrane to prevent the leaching of any contaminants into the subsurface or watercourses. If necessary, suitable measures will be put in place to prevent sediment being washed off-site, and the stockpiles will be visually monitored for wash away during and after periods of prolonged rainfall. Further details of the measures which would be implemented are included in the Framework CEMP in Appendix 5A (ES Volume III, Document Ref. 6.4). Alternatively, if it is not possible to stockpile or re-use the material on-site, it will be removed by road for re-use or, as the least preferred option, disposal at a suitably permitted and licenced waste disposal facility locally.

Liquid wastes unsuitable for on-site storage or re-use (including waste drilling mud) will be removed by tanker and disposed of at a suitability permitted facility. HGV movements associated with the removal process for wastes are considered in full within the Transport Assessment provided within Appendix 16A: Transportation Assessment (ES Volume III, Document Ref. 6.4).

It is currently predicted that the excavation of the launch shafts will lead to a volume of approximately 16,000 m^3 of spoil whilst the crossing itself is expected to create approximately 20,000 m^3 of spoil. This results in a total estimate of 36,000 m^3 of spoil from the Tees Crossing.

Outfall

Boring of the MBT for the Outfall is anticipated to follow a similar process to that which is described above for the Tees Crossing. Preliminary estimates of the volume of spoil arising from this process have been completed; it is predicted that the excavation of the outfall tunnel itself is expected to create approximately 10,000 m^3 of spoil.

CO_2 Export Pipeline

The direction of construction of the CO_2 export pipeline is yet to be determined, with options being HDD drilling from offshore to the PCC Site, or vice versa. Whichever direction the HDD bores are drilled, temporary construction sites will be established onshore at the PCC site and offshore (on a lay barge(s)) where diesel-powered HDD drill rigs will be located (together with supporting systems).

For offshore to onshore drilling, HDD drill cuttings will be recovered within the drilling fluids and separated in a unit which will be located near the HDD drill rig. Following this process, they will be loaded into a service barge and brought back to shore for re-use, storage or (the least preferred option), disposal. For onshore to offshore drilling, a similar spoil waste management process to that described above for the Tees Crossing will be adopted adjacent to the HDD launch site.

Preliminary estimates of the volume of spoil arising from this process have been completed. The drilling of the CO^2 export pipeline bore itself is expected to create approximately 2,500 m^3 of spoil.

Total Spoil Estimate: 48,500 m^3

5.3.81 The risk of flooding as a result of the Proposed Development is considered in the Flood Risk Assessment (Appendix 9A, ES Volume III, Document Ref. 6.4). The overall risk is considered to be low because the PCC Site and tunnel/HDD launch sites will be located in Flood Zone 1. The receiver pit location for the HDD Tees crossing option for the CO_2 Gathering Network may be located in Flood Zone 2 and the Final CEMP will incorporate measures to prevent an increase in flood risk or pollution risk during the construction works, following the approach set out in the Framework CEMP. For example, topsoil and other construction materials will be stockpiled outside of the 1 in 100 year floodplain extent where possible and only be moved to temporary works areas in locations of higher flood risk (if required) immediately prior to use (see Appendix 9A: Flood Risk Assessment, ES Volume III, Document Ref. 6.4).

Construction Staff

5.3.82 It is estimated that there will be around 1,750 personnel contracted to work on the PCC Site at the peak of construction. An additional number (approximately 120) of construction staff will be needed for works on the north bank of the Tees for the construction of the CO_2 Gathering Network and, potentially, the Natural Gas Connection.

5.3.83 Construction staff are anticipated to travel to the PCC Site or to laydown areas on the north bank of the Tees via the existing trunk road and local networks (see Figure 5-1, ES Volume II, Document Ref. 6.3). Construction staff arriving by car will use on-site parking. Construction workers working along the section of the CO_2 Gathering Network along northern bank of the Dabholm Gut will be taken to site using a minibus from the PCC Site and will need to access this area through the Wilton International site.

5.3.84 The Applicants will also seek to maximise sustainable transport options such as public transport (including rail), cycling and car sharing in accordance with policy as outlined in ES Appendix 16B: Framework Construction Workers Travel Plan (ES Volume III, Document Ref. 6.4) and secured through a Requirement in the draft DCO.

5.3.85 Options for the reopening and re-use of the closed Redcar British Steel railway station will be discussed with both Teesworks and Network Rail but do not form part of the DCO application. If reopened, the railway station will allow sustainable travel to the site by both construction workers and operational staff. The railway station would be linked to the site compounds by shuttle minibuses.

5.3.86 Further detail is presented in the Framework Construction Worker Travel Plan and the Framework Construction Traffic Management Plan presented within Appendices 16B and 16C respectively (ES Volume III, Document Ref. 6.4).

Construction Traffic and Site Access

Heavy Goods Vehicle Construction Traffic

5.3.87 HGV construction traffic will access/depart the PCC Site via an entrance on the A1053 Tees Dock Road and then using site roads north of Lackenby Steelworks to the PCC Site (see Figure 5-1, ES Volume II, Document Ref. 6.3). The same access will be used for construction traffic for the HP Compressor Station, CO_2 Export Pipeline and Water Connections. It is

anticipated that the bulk of HGV traffic will access Tees Dock Road, via A19 and A66 or A174. However, some local HGV traffic may access the Tees Dock Road from the north-east via the A1085 Trunk Road.

5.3.88 During site preparation and remedial works there will be an estimated peak of not more than 175 Heavy Goods Vehicles (HGV) one-way movements per day to the PCC Site (i.e. 175 vehicles into and leaving the PCC Site per day). Construction traffic movements during construction of the PCC and connections will be no more than 40 one-way HGV movements per day. These vehicle movements are considered and assessed in Chapter 16: Traffic and Transportation (ES Volume I, Document Ref. 6.2).

5.3.89 Access to the CO_2 Gathering Network and Natural Gas Connection Corridor north of the Tees will be via the A1185, A1046, A178, B1725, Cowpen Bewley Road, Nelson Road and Seaton Carew Road for both construction staff and HGVs (see Figure 5-1, ES Volume II, Document Ref. 6.3). There will be an estimated peak of not more than 10 one-way HGV movements per day during these works.

5.3.90 To support the trenchless pipeline routes from the PCC Site across the dunes within the working corridor to the near shore, a temporary construction gate will be created onto South Gare Road from the Site, to allow construction personnel to transit to/from the pipeline work area from the PCC Site. This may require temporary traffic controls on the private South Gare Road to minimise risk of collisions. The temporary gate will be security access controlled.

5.3.91 Based on the anticipated peak construction workforce there will be an estimated peak of around 1,765 passenger vehicle one-way movements per day to the Proposed Development.

Abnormal Indivisible Loads

5.3.92 It is proposed to import the majority of the large modular plant and AIL components for the Low-Carbon Electricity Generating Station using the existing ship offloading facilities at the Redcar Bulk Terminal (RBT). These Abnormal Indivisible Loads (AILs) will be delivered by sea then moved from the RBT wharf to the PCC Site using the existing internal Teesworks roads.

5.3.93 For smaller containerised loads and AILs weighing less than 100 tonnes delivered by ship, the facilities at Teesport located to the south-west of the PCC Site could be used, with the agreement of the operator and PD Ports. HGV traffic from Teesport will access the site via Tees Dock Road and the Teesworks roads north of Lackenby Steelworks (Work No. 10). No AILs are proposed to be delivered using the public highway other than the short section of Tees Dock Road from Teesport to the site access on Tees Dock Road north of Lackenby Steelworks.

5.3.94 The import of AILs through RBT will result in approximately 40 ship movements over a period of 2 years. It is assumed that PD Ports, as the Port Authority could adopt Ships Agency and take responsibility for the transport and delivery of such loads (including navigational risk) through existing port procedures. Discussions with RBT have confirmed that the estimate of up to 40 ship movements required for the import of AILs is well within RBT's permitted operating capacity. The impact of these ship movements is

assessed in the Navigational Risk Assessment (Appendix 20B, ES Volume III, Document Ref. 6.4)

5.3.95 At this stage it is proposed that all AILs will arrive at RBT during daytime hours. Should night-time unloading be required this would only be with prior agreement from PD Ports as the Port Authority.

5.3.96 It is considered that shipborne loads will be able to dock at RBT using the existing wharf without modifications. However, off-loading of modular plant may require installation and temporary use of a land-based heavy lift crane located on the RBT wharf. As a worst-case scenario, it has been assumed that preparatory works for crane installation will involve clearance of structures on part of the wharf together with potential minor land-based civil works (site levelling, compaction and addition of a temporary plate to spread loads).

5.3.97 Following any site clearance and improvements required, the temporary crane will be delivered to the RBT in sections by road using HGVs and erected on-site using separate vehicle mounted crane(s) on a suitable foundation.

5.3.98 The temporary crane setup and operation will require supporting ancillary activities such as welfare unit(s), generator(s), fencing and lighting. The final size and dimensions of the temporary wharf crane will be known at the detailed design stage but will be comparable to the existing RBT dock cranes. The crane will be self-powered by diesel engines situated within the crane car body. The temporary crane will be required for at around six months.

5.3.99 Unloading of ships may also take place directly using Self Propelled modular Transporters, thereby removing the need for a crane to unload.

5.3.100 The crane required for construction works at the PCC site will have the same heavy lift capacity as the crane at RBT and therefore require a similar number of vehicle loads for erection as well as a similar land area for assembly.

Construction Working Hours

5.3.101 Construction working hours will vary as the project develops but generally be Monday to Friday 07:00 to 19:00 and Saturday 07:00 to 13:00, however it is likely that some construction activities will be required to be 24 hours at certain times. This is principally for certain construction activities that cannot be stopped, such as concrete pouring and certain specialist crossing activities (e.g. HDD or MBT). Also 24-hour security at the Site will be required where works can be carried out without causing a noise nuisance. Or during specialist crossing activities.

5.3.102 Where on-site works are to be conducted outside the core working hours, they will comply with any restrictions agreed with the local planning authorities, in particular regarding control of noise and traffic. Therefore 24 hour working for certain activities has been assessed in Chapter 11: Noise and Vibration (ES Volume I, Document Ref. 6.2) assuming that less noisy activities occur at night and which do not exceed existing ambient noise levels at sensitive receptors. Chapter 11: Noise and Vibration sets out specific mitigation and control measures required to prevent disturbance from night-time construction activities. Requirements in the draft DCO secure the working hours and the approach to exceptions to the usual working hours.

5.3.103 A noise monitor will be installed at the boundary of the Site, with a day-time and night-time noise limit to be used during construction, as agreed with RCBC and Stockton-on-Tees Borough Council (STBC).

Storage of Construction Plant and Materials

5.3.104 There will be temporary laydown areas (see Table 5-2 and Figure 5-1, ES Volume II, Document Ref. 6.3) positioned close to access roads on the Site where any materials will be unloaded and then transported to the area of works. Some of these may need to be used for storage of equipment or materials for up to two years. At the end of the shift, unsecured mobile plant will be returned to a secure overnight plant storage area where drip trays will be utilised under the various types of plant, if required.

5.3.105 Laydown areas/construction compounds for construction materials for the CO_2 Gathering Network, Gas and Electrical Connections will be required. These will be located within the Connection Corridors. Separate laydown areas will be required for works to the north and south of the River Tees (see Figure 5-1 in ES Volume II, Document Ref. 6.3).

5.3.106 As described in the Framework CEMP (Appendix 5A, ES Volume III, Document Ref. 6.4) storage areas for flammable/toxic corrosive materials will be located in a separate, locked, bunded and fenced off area. Material data sheets will be available for all these materials and the COSHH (Control of Substances Hazardous to Health) assessments kept within the relevant risk assessment for the task, all subject to the Applicant's approval.

5.3.107 Although options to utilise existing site power are also being explored, temporary generators are likely to be required during construction and mobile generators may be used along the construction corridors.

Lighting

5.3.108 Construction temporary site lighting is proposed to enable safe working on the construction site in hours of darkness. Construction temporary lighting will be arranged so that glare is minimised outside the construction site. The appointed contractors will be responsible for establishing the required approach to and levels of lighting, and a Lighting Strategy will be prepared for approval pursuant to a Requirement in the draft DCO as required. An Indicative Lighting Strategy (Document Ref. 5.11) is included in the Application.

5.3.109 Lighting will be designed so as not to cause a nuisance outside of the Site in relation to views from residential receptors or light disturbance to ecological receptors.

Wheel Wash Facilities

5.3.110 A self-contained wheel wash will be installed and will be used during ground works by vehicles prior to exiting the construction site and prior to joining the public highway. For loads unable to use the fixed wheel wash, a localised wheel washing facility will be set up to cater for these, to minimise effects to the highway.

Construction Environmental Management Plan (CEMP) and Site Waste Management Plan (SWMP)

5.3.111 The Applicants will require that the contractor produces and maintains a Final CEMP to control site activities and to minimise any impact on the environment. The CEMP will be secured by a Requirement in the draft DCO. The Final CEMP will include industry best practice measures, and specific measures set out in this ES in accordance with the Framework CEMP. A Framework CEMP is included in the ES (Appendix 5A, ES Volume III, Document Ref. 6.4).

5.3.112 The purpose of the CEMP is:

- to ensure nuisance levels as a result of construction activities are kept to a minimum;
- to comply with regulatory requirements and environmental commitments; and
- to ensure procedures are put into place to minimise environmental effects during construction.

5.3.113 In order to manage and monitor waste generated on the Site during construction, a Framework Site Waste Management Plan (SWMP) has also been developed as part of the Framework CEMP, which allows for waste streams to be estimated and monitored and goals set with regards to the waste produced. The Framework CEMP and SWMP are presented in ES Appendix 5A (ES Volume III, Document Ref. 6.4).

5.3.114 The SWMP will require that the contractor segregates waste streams on-site, prior to them being taken to a waste facility for recycling or disposal. All waste removal from the Site will be undertaken by licensed waste carriers and taken to permitted waste facilities.

Commissioning

5.3.115 Commissioning of the Proposed Development will include testing of the process equipment and will take approximately six to twelve months. A commissioning plan will be required to be agreed with the Environment Agency under the Environmental Permit, which will specify monitoring and control procedures to be used and set out a schedule of commissioning activities.

5.3.116 These activities will generally be carried out using inert materials such as air, water (including steam for the CCGT), natural gas and nitrogen. Hydrocarbons (excluding lubricants) will not be introduced during this phase. Diesel will be required onsite for power. Pre-commissioning will not require hydrocarbons.

5.3.117 Commissioning of the CO_2 Gathering Network will involve pressure testing using nitrogen. On completion, nitrogen may be vented to the atmosphere at appropriate height and rate for safe dispersion.

5.3.118 Construction best practice measures that will be adopted during the construction phase have been taken into account in the environmental assessments and are set out in Appendix 5A: Framework CEMP (ES Volume III, Document Ref. 6.4). Construction works will be undertaken in accordance with the environmental commitments identified in Chapters 8 to 24 (ES Volume I, Document Ref. 6.2) and having regard to relevant legislation as set out in

the Commitments Register (Appendix 25A, ES Volume III, Document Ref. 6.4).

5.4 References

CL:AIRE (2011). *Definition of Waste: Development Industry Code of Practice.*

Construction Design and Management Regulations (2015).

Defra (2009). *Construction Code of Practice for the Sustainable Use of Soils on Construction Sites*. London: Department for Environment, Food and Rural Affairs.

Environment Agency (2001) *Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention*. NC/99/73