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Tees CCPP Project

The Tees Combined Cycle Power Plant Project
Land at the Wilton International Site, Teesside

Volume 1 - Chapter 5

Regulations – 6(1)(b) and 8(1)

Applicant: Sembcorp Utilities UK
Date: May 2018

CONTENTS

5 PROJECT DESCRIPTION AND ALTERNATIVES

5.1 PURPOSE OF THIS CHAPTER

5.1 This chapter provides an overview description of the Project to provide general context for the ES. It includes details on the site preparation measures, the technology to be employed, the main components of the plant, the construction programme and the operational regime.

5.2 It should also be noted that additional pertinent information about the Project is contained in the technical assessments (*Chapters 6* to *15*) to provide a basis for the impact assessment including 'realistic worst case scenarios'. Typically this includes information on such matters as the height, mass and layout of structures (for the visual impact assessment), design and layout of structures (for the noise assessment) and the nature (chemical composition, concentrations) of emissions to atmosphere (for the air quality assessment).

5.2 PROJECT JUSTIFICATION AND NEED

5.3 The Climate Change Act 2008 sets an ambitious and binding target of at least an 80% reduction in greenhouse gas emissions by 2050 relative to the 1990 level, including an interim 'budget' of 26% by 2020. This has led to, and will continue to lead to, a substantial array of government legislation (such as the Energy Acts 2004, 2008 and 2011) and policy that requires the development of energy sources with reduced carbon emissions.

5.4 The Planning Act 2008 (the 'Act') fundamentally reformed the planning system for nationally significant infrastructure, seeking to create a more efficient, transparent and accessible approach. The Act states that decisions on Nationally Significant Infrastructure Projects (NSIPs) must be taken in accordance with the relevant National Policy Statement (NPS) (where published), and noting what else the Secretary of State (SoS) must take into account. The NPSs set out types of infrastructure that are needed and the criteria by which proposals to develop them should be assessed.

5.5 The first National Policy Statements published were those for energy infrastructure, given the need to replace around a third of our electricity generating capacity over the next twenty years to maintain a resilient and secure supply. NPS EN-1 (Overarching National Policy Statement for Energy) and EN-2 (Fossil Fuel Electricity Generating Infrastructure) are relevant to this Project and were designated on 19 July 2011.

5.6 NPS EN -1 confirms the national need and acceptability of new gas fired plants such as the Project. The policy states: "*gas will continue to play an important role in the electricity sector – providing vital flexibility to support an increasing amount of low-carbon generation and to maintain security of supply. The UK gas market has diversified its sources of supply of gas in recent years, so that as* *the UK becomes more import dependent, companies supplying the market are not reliant on one source of supply. This protects the UK market from disruptions to supply*" and acknowledges that gas fired plant are preferable to coal fired in terms of their CO_2 emissions "*the use of fossil fuels to generate electricity produces atmospheric emissions of carbon dioxide. The amount of carbon dioxide produced depends, amongst other things, on the type of fuel and the design and age of the power station. At present coal typically produces about twice as much carbon dioxide as gas, per unit of electricity generated*".

5.7 The need for such development as the Project is proven by virtue of it falling within the categories of development set out in the Planning Act 2008, and given the very clear statements of need in the NPSs.

5.8 The Act also requires that decisions on NSIPs for energy infrastructure must be taken in accordance with the relevant NPSs except to the extent that the SoS is satisfied that to do so would:

- lead to the UK being in breach of its international obligations;
- be in breach of any statutory duty that applies to the examining or decision-making bodies;
- be unlawful;
- result in adverse impacts from the Project outweighing the benefits; or
- be contrary to regulations about how its decisions are to be taken.

5.9 EN-1 states that the decision-maker "*should start with a presumption in favour of granting consent to applications for energy NSIPs*" (paragraph 4.1.2).

5.10 The policy context for the Project is discussed in more detail in *Chapter 2*.

5.3 SITE SUITABILITY AND REVIEW OF ALTERNATIVES

Overview

5.11 Historically the Project site at Wilton International, Teesside, housed a 1,875 MWe CCGT power station with the ability to generate steam for utilisation within the wider Wilton site. More recent technology, however, has seen newer, more efficient plants take more market share.

5.12 In 2008 the then site operator, GDF, secured approval from Redcar and Cleveland Borough Council for modernisation of the CCGT chiefly via the upgrading of the gas and steam turbines. Subsequently in 2010 the then site operator made an application to extend the life of the 2008 application from the original expiry date of 19th of March 2011 for five years until 19th of March 2016. The plant was, however, mothballed in 2011 and, because of its inability to compete with more efficient power stations it was subsequently decommissioned and demolished between 2013 and 2015. Thus an 'upgrade' to this power station is not possible and an entirely new plant needs to be consented / built.

5.13 Sembcorp has identified the Project site, based on this historical land use, the need for a natural gas supply connection and electricity export connections and the availability of utilities as a suitable site for the Project.

5.14 More broadly the Project site is regarded as resilient to the effects of climate change. For the UK, projections of future climate change indicate that more frequent short-duration high-intensity rainfall events and more frequent periods of long-duration rainfall could be expected. As set out in the Flood Risk Assessment (*Annex C*), in terms of fluvial flood risk (tidal flood risk is not a risk at this location), this may increase the extent and frequency of flooding associated with main rivers and ordinary watercourses, although this is not predicted to increase flood risk to the Project Site. An increase in rainfall intensity could increase the frequency of surface water flooding (pluvial flooding) within parts of the Wilton International Site although existing drainage facilities are regarded as sufficient to manage existing plus new run off including an allowance for climate change. The Flood Risk Assessment (FRA) contained within *Annex C* analysed these risks in terms of the Project's effect on the environment and how the environment might affect the Project; no significant risks were identified. More broadly, no other risks to the Project or arising from the Project were identified in terms of future resilience to climate change.

5.15 In summary the benefits of the Project site include:

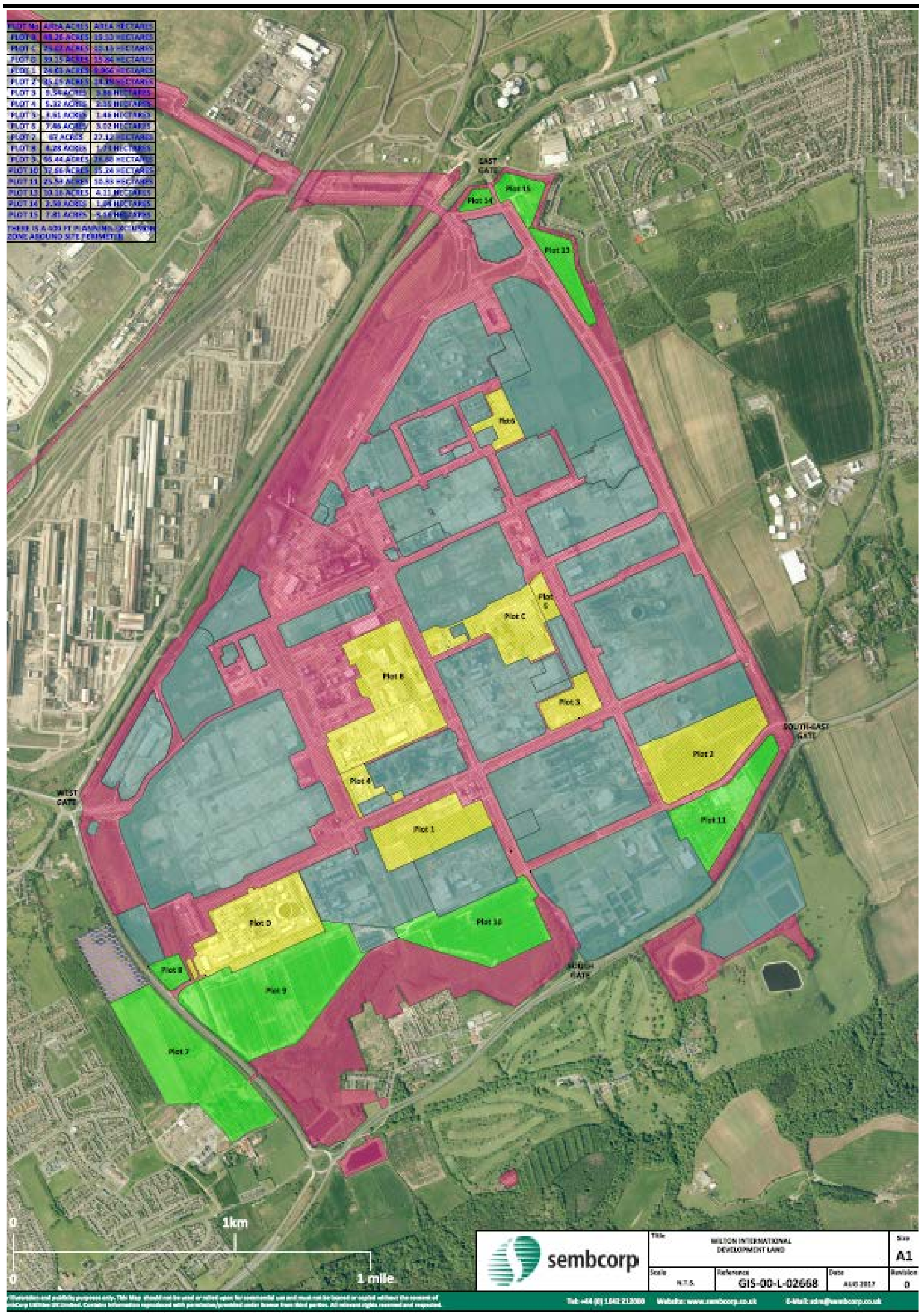
- Sembcorp owns the freehold to the Project land;
- existing internal access roads connecting to a robust public road network;
- on-site electrical connection, utilising existing National Grid infrastructure;
- on-site gas connection, supplied from existing National Grid infrastructure;
- availability of a cooling water supply using an existing contracted supply (from the Wilton Site mains) and existing permitted discharge consent for effluent to the site drainage system;
- screening provided by an existing southern noise control wall, approximately 6 m in height (see *Figure 5.2* below);
- existing services, including drainage; and
- a site with a history of previous industrial use rather than a greenfield site.

5.16 The Wilton Site is a 800 ha (2,000 acre) industrial site with several developable plots for industrial uses. Specifically for the development of gas fired power station the optimal plot was the former power station where suitable infrastructure already exists, eg natural gas supply and electricity export connections. However as part of the Project development Sembcorp did evaluate alternative plots of land, as tabulated below. These plots are shown in *Table 5.1* and on *Figure 5.1*.

Table 5.1 Other Plots of Land within the Wilton International Site

Plot	Plot Description	Plot Suitability
Plot North of Project Site	Circa 130 acre plot owned by Homes and Community Agency with the whole plot assigned for three separate industrial process projects	Land not owned by Sembcorp and potentially designated for other industrial developments therefore unlikely to be available for the Project.
Plots 7,8,9,10,11,13,14,15	Deemed for "Light Industrial" use.	Power Station development is not considered light industrial therefore land is not suitable
Plots 1,3,4,5,6,B,C	Sembcorp owned plots.	All plots are insufficient in size for the Project.
Plot 2	Sembcorp owned plot, circa 32 acres	In the absence a of natural gas supply a high pressure underground gas main would have to be installed with disruption to site roads and services. In the absence of electrical substations towers with overhead 275kV cables would have be installed connecting Plot 2 to the existing National Grid substations. For these reasons Plot 2 is deemed less preferable for the development of the Project compared to the Project Site.

Figure 5.1 Sembcorp Plot on the Wilton International Site



5.17 The development of the Project Site will be in keeping with the character and nature of the area's immediate surroundings. The main characteristics of the site are described further below in the remainder of this chapter.

Figure 5.2 Existing Southern Noise Control Wall

5.4 SITE PREPARATION

5.4.1 *Overview*

When the previous power station was decommissioned, structures were demolished to ground level and all utilities etc made safe. As such the application site is largely ready for construction to commence subject to some limited actions to allow ground works to commence. The main activity on commencement of construction will be site establishment and the subsequent breakout of surface concrete remaining from the previous plant and its processing to allow it to be reused on site as an aggregate. Existing piles will not be removed and new piles will be installed in the voids between the existing piles. In summary site preparation will consist of the following key activities:

- site clearance;
- concrete break out and crushing of materials to also create a pile mat should one be required;
- establish of a development platform (a level base) at circa 16.5 AOD.;
- surfacing and preparation works for laydown areas which include areas for car parking, temporary administration buildings and construction welfare/accommodation;
- access roads and security arrangements onto/on the site;
- boundary construction fencing;
- installation of services and tie in to existing connections; and
- connection of a site drain to the existing Wilton International system.

5.5 *KEY FEATURES OF THE PROJECT DESIGN AND OPERATION*

5.5.1 *Overview, Potential Phasing and Schedule*

Overall the Project proposes the construction and operation of up to 1,700 MWe of new CCGT electrical generation plant. Dependent on market conditions at the time of the final investment decision (following an approved DCO) the construction of the Project could proceed under two scenarios, based on Sembcorp's financial modelling, as follows.

- 'Scenario One': two CCGT 'trains' of 850 MWe are built in a single phase of construction to give a total capacity of 1,700 MWe.
- 'Scenario Two': one CCGT train of 850 MWe is built and commissioned. Within an estimated five years of its commercial operation the construction of a further 850 MWe commences.

5.18 To deal with the two scenarios within the EIA, the technical assessments (for instance traffic and air) all state within their respective 'basis of assessment' the assumptions they have made in terms of phasing to allow for the assessment of a reasonable worst case.

5.19 The assumptions implicit to all assessment in terms of the Project execution programme are provided below in *Table 5.2.*

Table 5.2 Overview of Programme for the two Development Scenarios

Date	Activity
Scenario One – 1,700 MWe CCGT – 39 month build and commissioning	
Q1 2019 – Q2 2020	Mobilisation and civils
Q2 2020 – Q1 2021	Major equipment installation
Q1 2021 – Q3 2021	Mechanical and electrical integration
Q3 2021 – Q1 2022	Commissioning
Q1 2022	Operation
Scenario Two – two phased 850 MWe CCGTs (two periods of constructions separated by approximately five years)	
Q1 2019 – Q2 2020	Mobilisation and civils of first unit / train
Q2 2020 – Q1 2021	Major equipment installation
Q1 2021 – Q3 2021	Mechanical and electrical integration
Q3 2021 – Q1 2022	Commissioning
Q1 2022	**Operation of first unit / train**
Q1 2027 – Q2 2028	Mobilisation and civils of second unit / train
Q2 2028 – Q1 2029	Major equipment installation
Q1 2029 – Q3 2029	Mechanical and electrical integration
Q3 2029 – Q1 2030	Commissioning
Q1 2030	Operation of second unit / train

5.20 Sembcorp has assessed the viability of phased construction (Scenario 2) and concluded this is possible if incorporated into the design and plot enabling works. Under Scenario 2 to facilitate the construction of the second train, a significant proportion of the civil enabling works will be undertaken during the construction of the first train to minimise, as far as possible, major work such as piling adjacent to an installed and operational CCGT.

5.21 Sembcorp has assessed that the key aspects of fuel supply and electricity evacuation are manageable with a phased build approach.

5.5.2 The Project - Main Structures and Layout

5.22 In total the Project will comprise a natural gas fired CCGT generating station with an output capacity of up to 1,700 MWe. The station will include up to two gas turbine units, two steam turbine units, ancillary plant and equipment located in the main power island in the western part of the Project site. The northern part of the site will include hybrid cooling towers and, in accordance with policy requirements for new generating infrastructure, an area of land for possible future carbon capture equipment has been set aside in the eastern part of the site; this area of land is sufficient for the aggregate total capacity that may be deployed in both scenarios.

5.23 The Project site also includes land provision for connections to gas transmission infrastructure and connections to the national grid.

5.24 The dimensions for the main components are list in *Table 5.3*.

Table 5.3 Approximate Dimensions for the Main Structures of the Project

Item	Length	Width	Height
Gas turbine building	73 m	30 m	32 m
Heat recovery steam generator building (to top of vents)	47 m	30 m	45 m
Stacks	-	10 m Ø	75 m
Cooling towers	150 m x 2	18m	25 m
Control and office building	50 m	25 m	9 m
Workshop	40 m	30 m	12 m

5.25 As each power train is a standalone development the sizes detailed in *Table 5.3* for the gas turbine building, heat recovery steam generator building, the stack (s) and cooling tower will be replicated for the second train (irrespective of the build programme). The control and office building and the workshop will be built during the construction of the first train (if Scenario 2 is progressed) to meet the requirements of having two operational trains, irrespective of the build programme.

5.26 In recognition that the final construction contractor is yet to be appointed the topic assessments within the EIA adopt a reasonable worst case scenario in terms of their models / assessments in terms of dimensions / emissions / operating scenarios.

5.27 The proposed layout of the Project under Scenario 1 and 2 is shown in *Figures 5.3 and 5.4*.

Figure 5.3 Layout of the Main Structures (Scenario One)

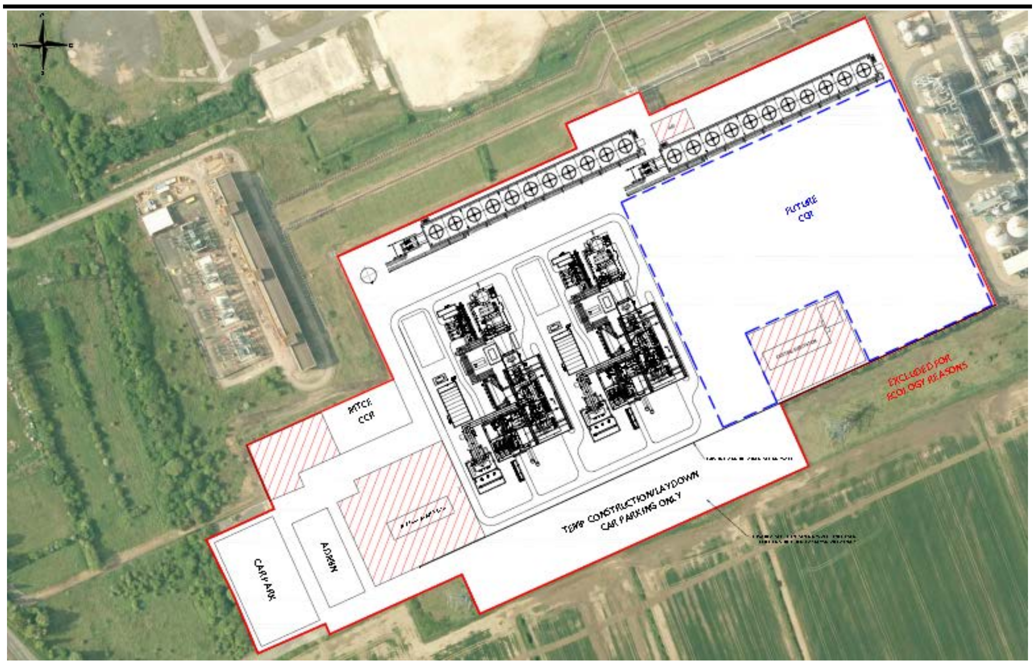
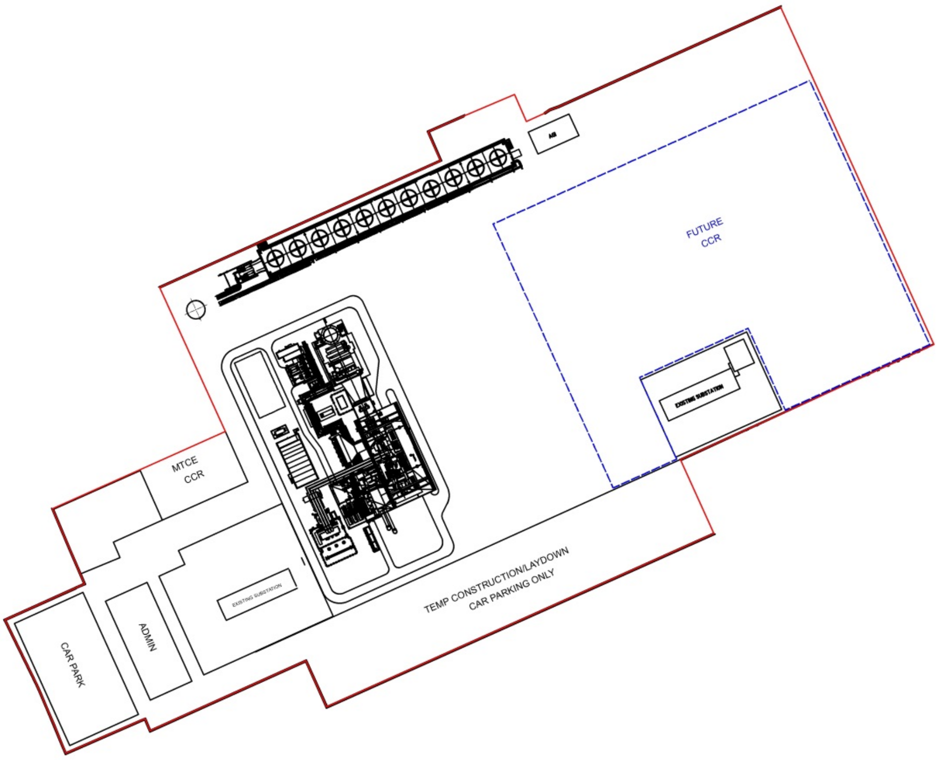


Figure 5.4 Layout of the Main Structures (Scenario Two)



5.5.3 CCGT Technology

Overview

5.28 In a CCGT, natural gas fuel is fired in the combustion system to drive the gas turbine, which is connected to a generator producing electricity. An amount of heat remains in the gas turbine exhaust, and this is passed into a Heat Recovery Steam Generator (HRSG), a type of boiler, to make steam to generate additional electricity via a steam turbine. The exhaust steam from the steam turbine is condensed back into water which is returned to the HRSG to continue the process.

5.29 The electrical efficiency of a modern CCGT is in the range of about 58-62% (gross) which is considerably higher than that for an open cycle gas turbine or a conventional coal, oil or gas fired boiler with steam turbine generating plant.

5.30 The fuel source for the turbines will be natural gas supplied from the National Grid via an existing gas pipeline as further discussed below.

Power Generation Process

5.31 The Project will consist of up to two main gas generating modules, two steam turbines, and two electrical generators (each rated at 850 MWe) with a total output of up to 1,700 MWe. The final total is dependent on the selection of the turbine manufacturer prior to construction of the plant.

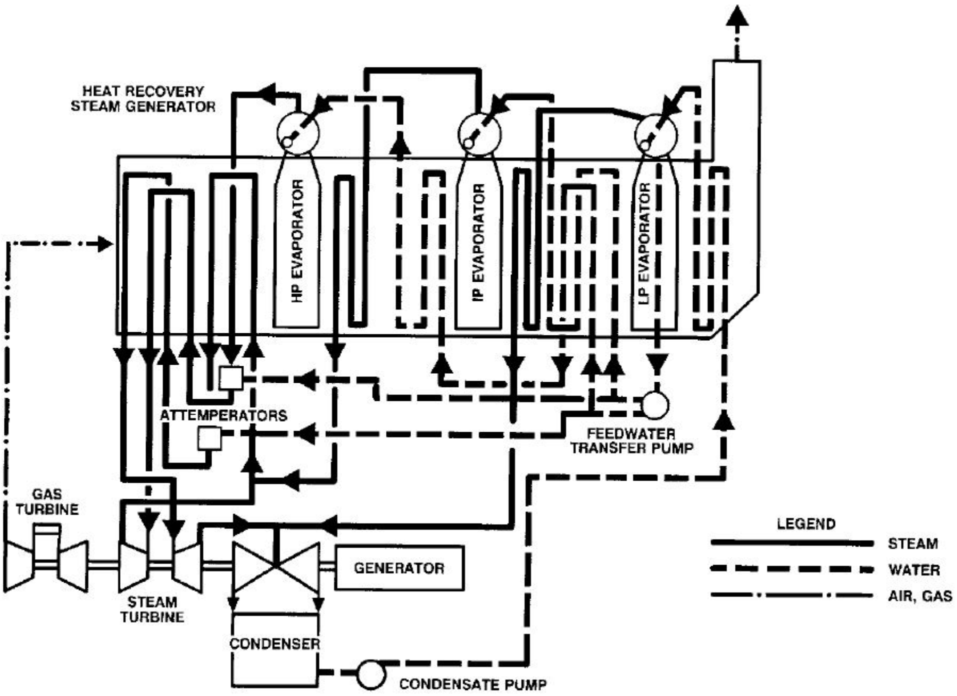
5.32 In the gas turbine, gas will be mixed and combusted with compressed air and the hot combustion gases will expand, rotating the turbine blades at high speed. This will drive the generators to produce electricity for export to the national transmission system.

5.33 The hot exhaust gases from the gas turbine will then be passed through the HRSG to produce high pressure steam. This will in turn be used to drive a steam turbine connected to the same generator; thereby maximising electricity generation from the fuel being combusted. The exhaust gases from the HRSG will be released into the atmosphere via an exhaust stack.

5.34 Each generating module may have an individual stack (ie a maximum of two stacks overall for the Project (both potential scenarios)).

5.35 A schematic of the power generation process associated with the Project is provided below in *Figure 5.5*.

Figure 5.5 Schematic of Power Generation Process



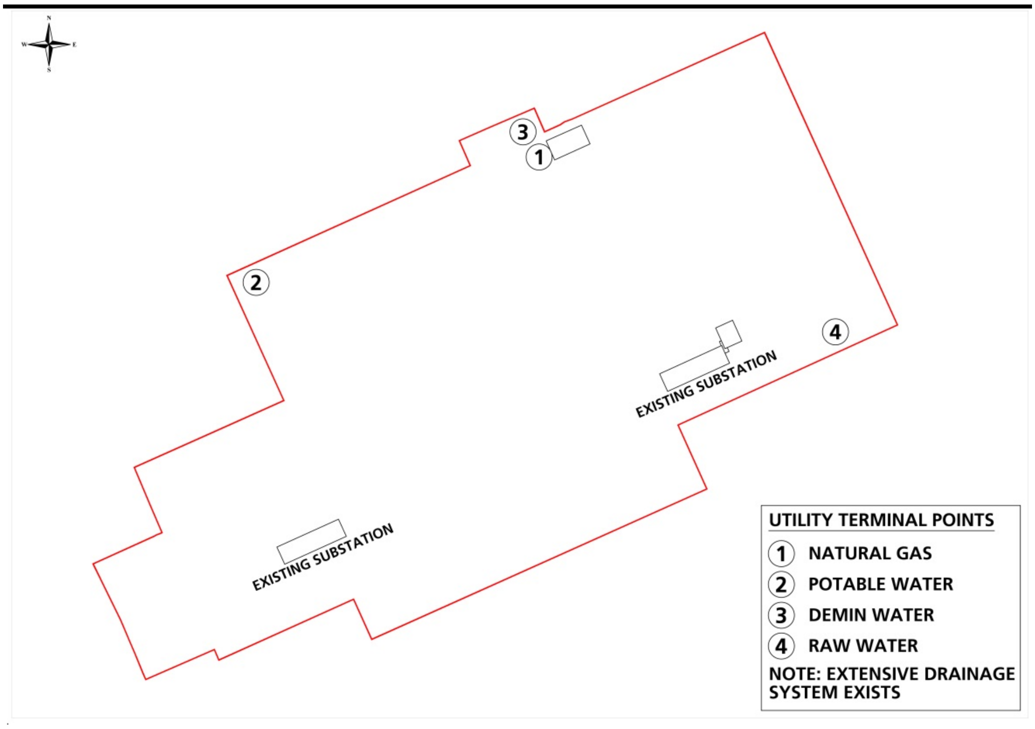
5.5.4 *Connections and Utilities*

Connection to Gas Transmission System

5.36 There are two existing gas pipelines which supplied the former power station: a 20 cm line and a 60 cm line. The 60 cm line connects to the national transmission system via an above ground installation (AGI) at Billingham, and connects within the red line plan as shown on *Figure 5.6.* This will become the primary supply route to the Project. The 20 cm pipeline may optionally be used as a back-up connection to receive gas from an on-shore gas processing plant at Seal Sands, Teesside. Sembcorp will soon apply to National Grid under a Uniform Network Code for a Direct Exit Facility Connection to the National Transmission System. Conceptual design and feasibility studies will then be undertaken by National Grid; however it is not expected that any upgrades will be required to deliver the necessary gas supply to the Project.

5.37 The gas will be delivered to an existing above ground installation (AGI) and associated downstream arrangements will be no different under either Scenario 1 or Scenario 2, with the one slight difference that the gas pipe branch that runs to the second train would be installed at a later date if Scenario 2 was progressed.

Figure 5.6 Connections to Utilities



Connection to National Grid Electricity Transmission System

5.38 There are two existing substations within the Project site. These substations are capable of exporting 1,700 MWe and are currently in operation supporting the broader Wilton complex. The substations are shown on *Figure 5.6* above. In terms of electricity evacuation from the Project the arrangements will be no different under either Scenario 1 or Scenario 2; the only slight difference is that the high voltage connections that run from the second train to the second National Grid substation would be installed at a later date.

5.39 An electricity connection application to National Grid will be undertaken in due course.

5.5.5 Cooling Water System

Overview

5.40 There is a requirement for a cooling system to condense the steam used in the power generation process once it has been exhausted through the steam turbine, and before it is returned to the HRSG. This cooling process involves the transfer of all of the rejected heat in the steam turbine condenser to a large mass of cooling water and three methods of cooling are available (natural draft is discounted from this list):

- once-through cooling systems;
- closed circuit evaporative cooling (hybrid cooling towers); and
- direct air cooled condensers.

5.41 Both once-through cooling systems and hybrid cooling towers require a cooling water supply.

Once-Through Cooling Systems

5.42 Once-through, or direct, cooling systems pump water directly through the condenser and fully discharge it to an outfall. Typically abstraction is from the sea or a suitable river abstraction and the cooling water is returned to source. For the Project, this would necessitate abstraction from the Tees Estuary and return downriver of Teesport in the proximity of Dabholm Gut. Extensive piping and pumping infrastructure would be required to be installed, part of which would not be in existing industrial service corridors and would be within the Teesmouth and Cleveland Coast SPA. The return temperature of water would be approximately 9ºC higher than the ambient river temperature.

5.43 The potential of utilising the Teesside Industrial raw supply and Wilton Site drains as an alternative for direct cooling can be discounted as the flow requirement (30,800 m^3 hr^{-1}) exceeds the Teesside Industrial Raw Supply capacity (18,000 m^3 hr^{-1}).

5.44 Once through cooling is therefore not being proposed for the Project.

Air Cooled Condenser (ACC)

5.45 Air can be used as the heat transfer medium for sites where cooling water is scarce, or the cost and / or practicability of pumping the large quantities of water required is considerable. Using air as the cooling medium eliminates the need for the construction of a water intake / outlet infrastructure or a tall cooling tower; therefore this represents the most simple infrastructure and environmental attractive option. However, it has the largest footprint and the most detrimental impact in term of visual and noise and reduces the overall plant efficiency.

5.46 ACCs are therefore not being proposed for the Project primarily given the noise and visual concerns that could affect nearby residential properties such as Lazenby and Lackenby.

Selected Cooling Technology: Closed Circuit Evaporative Cooling (hybrid cooling towers)

5.47 Hybrid water coolers are considered to represent best available technique (BAT) in this instance due to the relatively low level of water use (140 kg s^{-1} versus 8,560 kg s^{-1} for once through), lower noise emissions than ACCs and lower vapour emissions than natural draught systems. Water for the coolers will be sourced from an existing raw water connection which is currently in service providing water to the existing electrical substations. This water pipeline has sufficient capacity to supply the requirements of the Project without variation to existing agreements.

5.5.6 Other Utilities

5.48 All other utilities will be connected within the limits of the Project Site and in turn connect to the existing Sembcorp infrastructure.

5.5.7 Access

5.49 The Project requires good road access to accommodate road delivery of materials, equipment, personnel and removal of wastes during construction and decommissioning and, to a lesser extent, during operation.

5.50 The Project will be accessed from the public highway through an existing access point from the A1053 Greystones Road dual carriageway. Internal roads will provide construction access within and around the Project site. Appropriate emergency access routes and site security, including fencing, will be installed.

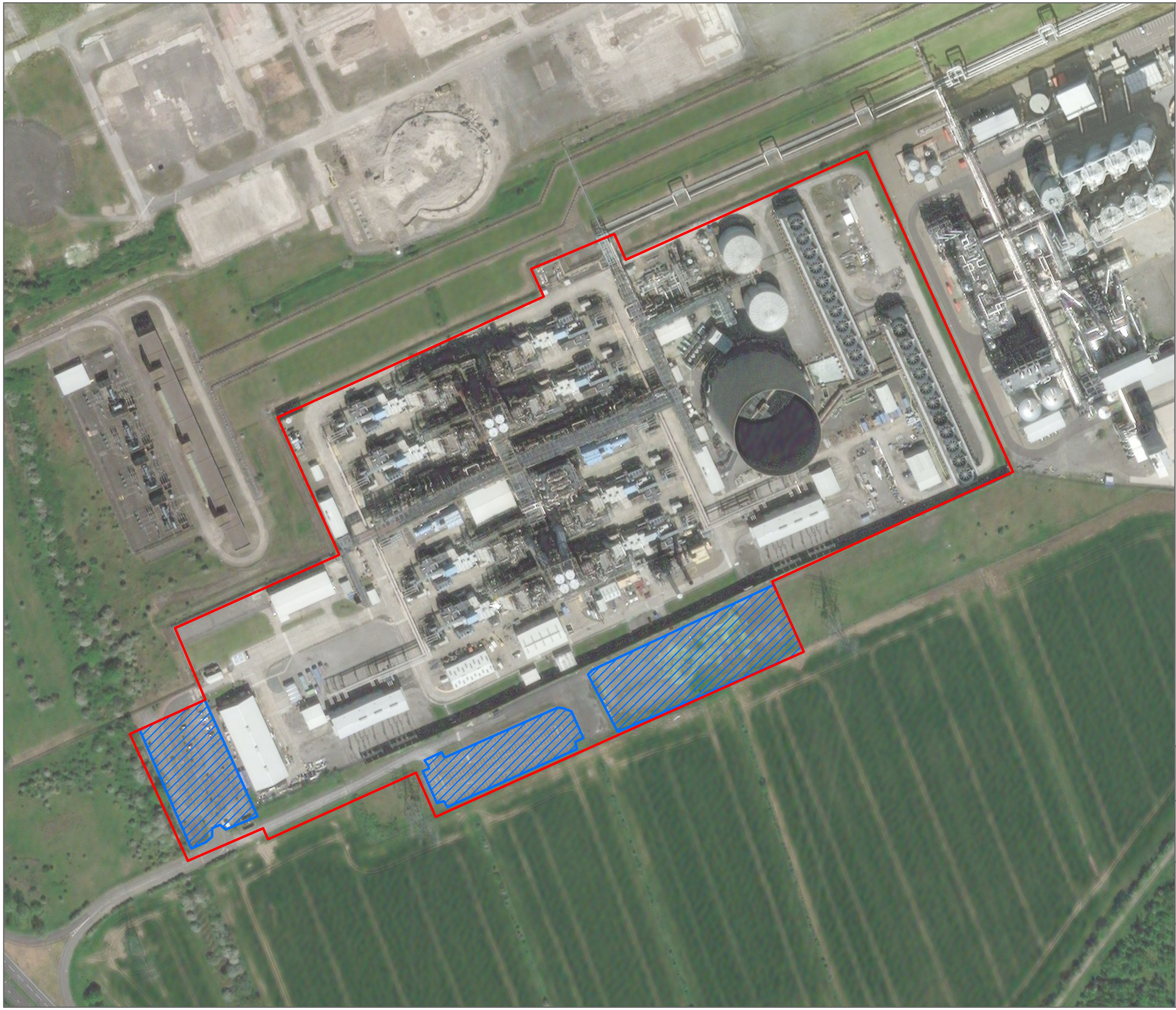
5.51 It is anticipated that the components will be manufactured abroad and shipped into a port located on the east coast of the UK. The most likely destination is the adjacent Teesport.

5.52 Any abnormal loads from Teesport will be transported primarily via the local Road Network, Teesdock Road and A1053. Contract requirements will include establishment of relevant procedures for scheduling arrival of abnormal loads to the site through discussions with the relevant local authorities, including identification of suitable routes, temporary protection to carriageway surfaces (if necessary), statutory undertakers' plant and equipment. The transport arrangements for the delivery of abnormal loads are already an established practise and will take place off peak and wherever possible overnight to minimise the disruption caused to general traffic.

5.53 Loads of between 20 and 40 tonnes will be restricted to outside the general peak periods as far as possible when using the Strategic and Local Road networks in the area. Specified routes using the main road network will be agreed with haulage firms servicing the Wilton site. The agreed routes will be written into contracts with contractual penalties issued for those using unspecified routes.

Construction and Operational Car Park

5.54 Construction Car Park will be predominantly on the area south of the existing Sound Wall as shown on *Figure 5.7*. Part of the area reserved for carbon capture plant could be utilised as a potential overflow car park if required. This will be managed during Construction as necessary.



SCALE: 1:2,500	VERSION: A01
SIZE: A3	DRAWN: WB
PROJECT: 0375193	CHECKED: GTS
DATE: 17/10/2017	APPROVED: RE

Figure 5.7
Construction Car Parking

ERM

sembcorp

PROJECTION: British National Grid

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Path: \\ukbrsdc02\data\Bristol\Confidential Projects\0375193 TLP2 DCO Support.RE\2. Working Folders\2. GIS\MAPS\PEIR\Fig05.02_0375193_ConstructionCarParking_A01.mxd

5.5.8 *Design and Appearance*

5.55 Design will have regard to appropriate guidance, including the Design Council (to include the Commission for Architecture and the Built Environment) guidelines. As well as intrinsic function, the architectural design will take into account the following themes:

- scale (including height and massing of buildings and other structures);
- visual appearance;
- sustainability;
- materials;
- access and infrastructure;
- noise; and
- landscaping and biodiversity.

5.56 A photomontage of the Project is shown below in *Figure 5.8* with further photomontages / wireframes provided within *Annex K*.

Figure 5.8 Provisional Photomontage of the Project

5.5.9 *Combined Heat and Power*

5.57 The Government's policy is that, from fuel efficiency and climate change perspectives, waste heat from large power stations should be utilised, where possible, for community heating and industrial uses. Guidance has been issued for developers to enable an assessment of such combined heat and power (CHP) opportunities.

5.58 In line with the requirements of NPS EN-1, EN-3 and the Environment Agency (EA) CHP Ready Guidance (2013), a CHP Assessment has been prepared to support the DCO application (DCO document reference 5.7).

5.59 As a major industrial energy, utilities and services provider to process industry based companies Sembcorp has a strong belief in and track record of adopting CHP where viable. The construction of Tees CCPP with CHP/Co-generation capabilities would enable Sembcorp to attract new energy intensive manufacturing customers to the Wilton International Site (if identified in the future as viable).

5.60 Heat supplies of up to 750MWth in the form of steam extracted from Tees CCPP is theoretically possible (subject to the final scale of the final project (scenario one v scenario two) and detailed design of the steam turbines).

5.61 While new steam pipelines may be advantageous or for technical reasons be required to be installed between the Project Site and Wilton International Site, it should be noted that there is an existing intermediate pressure (IP) steam pipeline and corridor in place as a legacy of the previously demolished power station.

5.62 Demand on the Wilton International Site can be extremely variable due to customer process requirements where the total heat load is made up of four different grades of steam which are used within the existing plants.

5.63 Based on current heat load demands on Wilton International Site and future expectations, the most likely grade of steam needed by a new customer would be IP steam.

5.64 Over the last three years there has been an average hourly heat supply of just under 150MWth from Sembcorp's existing power plant systems. While this can be met efficiently and satisfactorily by current assets, expansion of CHP capabilities is of significant interest to Sembcorp for a number of reasons. Additional capacity provides redundancy and resilience, reduction in package boiler use and growth opportunities.

5.65 In respect of the latter, Sembcorp is actively marketing the Wilton International Site and in the medium term will attract other companies to set up at Wilton.

5.66 There is also a proposed South Tees District Heating Scheme promoted by local councils: Redcar and Cleveland and Middlesbrough. This scheme is at an early stage and is currently completing its feasibility stage. To date Sembcorp have actively participated in the feasibility assessment along with other major industrials from the Tees Valley. Should the scheme progress, Sembcorp would welcome the opportunity to further discuss the scheme with the local councils.

5.67 The CHP assessment demonstrates that the Project will meet the BAT tests outlined in the EA CHP Guidance and that it will be designed and built as 'CHP Ready' to supply any identified viable heat load of up to 750 MWth to allow for the future implementation of CHP should the heat loads become economically viable.

5.5.10 Carbon Capture Readiness

5.68 Carbon capture and storage (CCS) technology and transport of CO_2 will not form part of the DCO application as the detailed implications of CCS are unquantifiable at this time. For the purposes of this DCO application and in accordance with UK requirements, CCS has been considered through preparation of a standalone supplementary report to the EIA (the Carbon Capture and Readiness Statement (DCO document reference 5.8)). This report addresses the government guidance on consents and planning applications for national energy infrastructure projects, which in turn refers to the DECC Carbon Capture Readiness (CCR) guidance published in November 2009.

5.69 The (then) Department for Energy and Climate Change (DECC) published a Guidance Note in November 2009 relating to the requirement to submit a Carbon Capture Readiness (CCR) report alongside Development Consent Order (DCO) application for power stations of greater than 300 MWe output. In accordance with UK CCR requirements, the Project has incorporated an area set aside for the potential future installation of carbon capture technology. It is recognised that technological progress and developments in the regulatory framework for the use of carbon capture technology are likely to occur within the lifetime of the Project. For the Project, the area set aside for carbon capture is based on Imperial College London's review of the relevant literature to provide an updated consensus view on the land requirements for carbon capture given the guidelines from DECC (as was) were challenged by industry.

5.70 The space set aside predominantly in the eastern part of the Project Site is approximately 4.5 ha and taking Imperial College London's reasonably conservative view of the land required for carbon capture, this is considered sufficient to accommodate post-combustion carbon capture for the project. It is recognised that technological progress and developments in the regulatory framework for the use of carbon capture technology could be viable within the lifetime of the Project. Therefore, the design of the Project will be developed with consideration for the possible future retrofitting of carbon capture technology in the future if viable.

5.71 The CCR requirement means that an applicant must demonstrate that CCS technology (of which there are three key types: pre-combustion capture, post-combustion capture and oxy-fuel combustion) has been considered as part of the application and that there is sufficient land available for the future retrofit of that technology in the event that it is commercially proven at some point in the future, ie that the Project is considered CCR.

5.72 CCR needs to be demonstrable for all new combustion generating stations with a generating capacity at or over 300 MWe (and of a type covered by the European Union Large Combustion Plant Directive as set out in Section 4.7 of the Overarching National Policy Statement for Energy (EN-1).

5.73 The CCR assessment undertaken shows the feasibility of future carbon capture for the Project, identifying the options for capturing and then transporting captured CO_2 offshore to suitable geological storage sites.

5.74 The CCR report identifies that the currently most suitable method of capturing carbon would likely be based on one of a number of post-combustion capture techniques. The proposed design of the Tees CCPP will accordingly assume the same or similar post-combustion CO_2 capture methodology advocated by numerous other power plant developers and operators incorporating design features that enable flue gas, process steam and power to be directed to the CO_2 capture plant in the best way possible (should carbon capture equipment need to be retrofitted in future).

5.75 In this respect, the CCR report has evaluated at high level the strategy and requirements for building the Project and later retro-fitting carbon capture equipment. The strategy will be to build an optimised CCGT with a capability to be subsequently modified for carbon capture at the appropriate time.

5.76 As the space requirement for post-combustion carbon capture equipment are greater than that of pre-combustion carbon capture, the Project will have sufficient space under all future technology scenarios.

5.77 Teesside has well publicised and documented plans for the implementation of a 15 million tonne per annum CCS network. The CCS network is proposed by Tees Valley Combined Authority (TVCA) and supported by Teesside Collective (TC) who are a cluster of multi-national companies which includes Sembcorp. The feasibility of a CCS network has been examined in relative detail by Amec Foster Wheeler (AFW) and various proposals for implementation have been outlined. The Wilton International Site location for the Project is well placed to connect with any of the proposed variants of the CCS network allowing captured CO_2 to be transported to the chosen off-shore storage site via pipeline. Sembcorp has a number of key pipeline corridors to both the north and south of the river Tees which would enable CO_2 from Tees CCPP to connect with Teesside's proposed CCS network. These corridors run mainly on industrial land at acceptable separation from residential locations. Current proposals favour a beach landing to the south of the Tees at a location that can easily be reached by corridors that include tunnels under the river Tees connecting the northern and southern industrial areas which could be used for the transport of CO_2 from the Project if the beach landing for the off-shore network was ultimately located to the north.

5.5.11 Land Ownership and Acquisition

5.78 All of the Project will be located on land owned by Sembcorp.

5.79 It will not be necessary to acquire Crown Land for the Project.

5.80 Sembcorp will ensure that it has all necessary land rights and permissions to carry out the Project.

5.6 CONSTRUCTION PHASE ACTIVITIES

5.6.1 Overview

5.81 The construction works will broadly fall into the following delineations. All are measured in months from notice to proceed (NTP).

- NTP + 1 to NTP + 14 – mobilisation and civil infrastructure;
- NTP + 15 to NTP + 26 – major equipment installation;
- NTP + 27 to NTP + 32 – mechanical and electrical integration; and
- NTP + 32 to NTP + 39 – commissioning.

5.82 How these activities are likely to occur under the two proposed development scenarios are shown chronologically in *Table 5.2.*

5.83 It is assumed that working hours will be 0700 to 1900 and that night time working will be minimised. During construction the CCS area will be used temporary as a construction laydown and for temporary administration buildings.

5.6.2 Construction and Contracting Philosophy

5.84 The Project will be constructed under a contract covering engineering, procurement, construction, and commissioning services. In addition to statutory obligations, the EPC contractor will be obliged to adopt the environmental working practices operated by Sembcorp.

5.85 The plant will be constructed by an experienced contractor with a proven track record of working on similar UK and international projects following best practice in respect of quality, health, safety and environmental procedures. Sembcorp will be responsible for the operation and maintenance of the plant following construction.

5.6.3 Health and Safety Management during Construction

General Considerations

5.86 The EPC contractor will prepare and maintain a health and safety policy, and manage the health and safety of employees and others affected by works within its site. The contractor, in accordance with Sembcorp requirements, will also develop an accident and incident reporting procedure.

5.87 Other health and safety considerations include the following.

- Sembcorp will ensure that the EPC contractor develops a project safety document for the application under the Construction (Design and Management) Regulations 2015 (CDM), within and outside of the site's operational boundaries.

- The EPC contractor will be required to prepare and maintain a site emergency plan.

- The performance of the EPC contractor will be monitored on a regular basis against the health and safety plans in order to highlight any deviations or exceptions, recovery plans and areas of concern.

- The EPC contractor will carry out HAZOP (1) studies of key plant systems.

HSE Management Plan

5.88 The EPC contractor will be required to implement a health, safety and environmental (HSE) management plan. This plan will identify the mitigation measures and management procedures to adequately control the health, safety and environmental impacts. Mitigation measures committed to in the ES, identified in the DCO and defined requirements will be included in the HSE management plan.

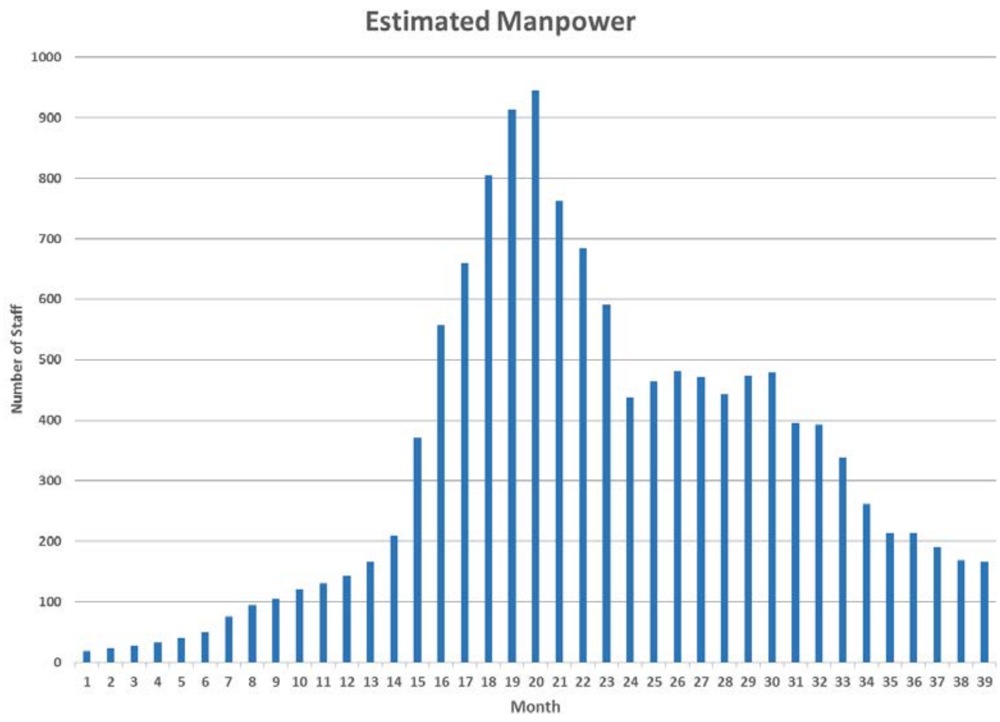
5.7 EMPLOYMENT

5.7.1 Scenario One – Single Phase of Development

5.89 Scenario One will involve the construction of both 'trains' in a single construction phase employing approximately 945 employees at its peak during the 39 month construction period (*Figure 5.9*). It is anticipated that there will be approximately 60 full-time jobs associated with the operational phase of the Project.

(1) Hazard and Operability Studies (HAZOP) are a structured and systematic examination of a planned or existing process or operation in order to identify and evaluate problems that may represent risks to personnel or equipment, or prevent efficient operation.

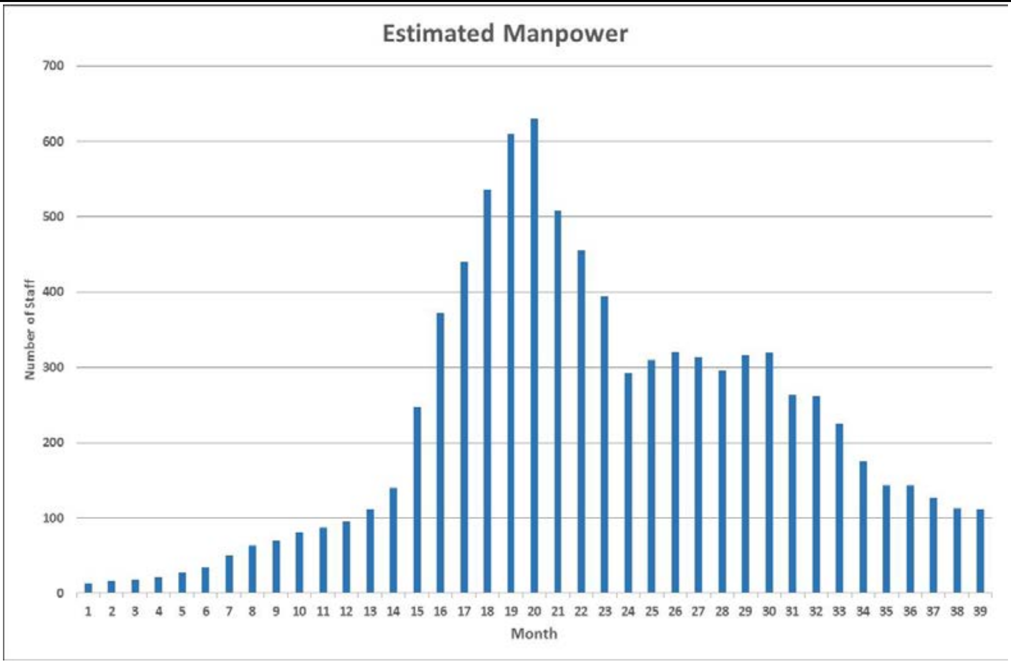
Figure 5.9 Estimated Construction Workforce Scenario One - Direct and Indirect Staff



5.7.2 Scenario Two – Two phases of Development

5.90 Under Scenario Two the construction period is divided into two periods separated by approximately five years. These construction periods will have a duration of circa 39 months and will require approximately 630 employees at each of their peaks. The construction staff profile for one period is shown graphically below in *Figure 5.10*.

Figure 5.10 Estimated Construction Workforce Scenario Two (construction of first 'train') - Direct and Indirect Staff



5.91 In terms of operational staff the first 850 MWe train will employ approximately 40 staff and when both trains are operational approximately 60 staff will be required.