Document Ref: 6.2.6
PINS Ref: EN010082

Tees CCPP Project

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

Volume 1 - Chapter 6

Regulations – 6(1)(b) and 8(1)

Applicant: Sembcorp Utilities UK
Date: November 2017

CONTENTS

6 CONTAMINATED LAND, WATER RESOURCES AND FLOOD RISK

6.1 INTRODUCTION

6.1.1 Terms of Reference for this Chapter

6.1 This chapter presents an assessment of the likely significant effects on geology, hydrogeology, land and water quality, including groundwater and surface water resources, arising from construction, operation and decommissioning of the Project. This chapter also references the re-use of materials such as soils and crushed concrete through the development of suitable controls such as a Site Waste Management Plan (SWMP) and Materials Management Plan (MMP).

6.2 The potential for the Project to have an impact on flooding is summarised, with the detailed Flood Risk Assessment (FRA) presented as (*Annex C*. The baseline characteristics of the Project Site are described, potential effects identified, proposed mitigation measures listed and an assessment of the significance of residual effects is presented.

6.3 The spatial scope of the assessment focuses on the Project Site, as well as on receiving watercourses, water resources and adjacent land that may be affected by the Project's activities.

6.1.2 Basis for the Assessment including the Worst Case Scenario

6.4 Potential effects of the Project on geology, hydrogeology, land and water quality including groundwater and surface water resources relate mostly to the construction phase, and consist mainly of:

- disturbance and / or removal of the ground and ground water which could potentially remove, relocate or mobilise potential contaminants;
- use of plant and equipment during construction which could accidentally leak fuels and oils, introducing contaminants to the ground;
- storage and use of materials and substances with polluting potential (e.g. concretes, fuel, oils and soils) which could be mobilised to ground or controlled waters;
- exposure of construction workers to potentially contaminated dust during soil removal and transportation activities;
- surface water quantity and quality changes during construction (and decommissioning) and potential effects on surface water supplies;
- surface water run-off and drainage quantity and quality; and

- potential mobilisation of contamination into groundwater during construction (and decommissioning) and potential effects on groundwater abstractions from aquifers.

6.5 During the operational phase of the Project, issues in regards to geology, hydrogeology, surface waters and contamination are more likely to involve site activities associated with the storage of wastes and oils. There will also be potential effects from discharges of effluent during operation as well as effects from water demand.

6.6 The main potential effects associated with flood risk are those associated with the potential introduction of hardstanding / impermeable surfaces and an engineered drainage system increasing the potential for surface water flooding of adjacent land. However, as the change in the quantity of hardstanding proposed for the Project is negligible, the risk associated with this effect is also anticipated to be negligible.

6.7 In regard to a potentially phased development, construction of Scenario 2 can be regarded as the worst case and forms the basis of the assessment contained within this chapter.

6.1.3 Consultation

6.8 Sembcorp has carried out various formal and informal consultation activities as part of the DCO application process. The formal Scoping Opinion is set out in *Annex B*. As part of the process, consultation responses relevant to geology, hydrogeology, and surface waters were received from the UK Environment Agency (EA), Public Health England (PHE) and Redcar and Cleveland Borough Council (RCBC); these are reproduced in *Table 6.1*.

Table 6.1 Consultation Responses

Source	Consultee Comment	Response
Environment Agency	Section 3.3.4 of the submitted scoping report discusses three available methods for cooling water. The Once Through Cooling Systems method indicates that, due to the high volume of water required to operate the system, water will need to be abstracted from and returned to the River Tees (as opposed to utilising the Teesside Industrial raw supply and Wilton Site drains). The discharge of this water should be covered by the required Environmental Permit. However, the abstraction of the water will require a separate Abstraction Licence.	Mitigation measures relevant to water use / discharge during the construction, operational and decommissioning phases are covered in *Section 6.4. Note, as stated in Chapter 5 Once Through Cooling is not being proposed, nor is there a need to abstract water as all water will be delivered through the Northumbrian Water mains which already serve the Wilton International site.*
Public Health England	The ES should clearly identify the development's location and the location and distance from the development of off-site human receptors that may be affected by emissions from, or activities at, the development. Off-site human receptors may include people living in residential premises; people working in commercial, and industrial premises and people using transport infrastructure (such as roads and railways), recreational areas, and publicly-accessible land. Consideration should also be given to environmental receptors such as the surrounding land, watercourses, surface and groundwater, and drinking water supplies such as wells, boreholes and water abstraction points.	Information provided in *Section 6.3.*
	Impacts arising from construction and decommissioning - Any assessment of impacts arising from emissions due to construction and decommissioning should consider potential impacts on all receptors and describe monitoring and mitigation during these phases. Construction and decommissioning will be associated with vehicle movements and cumulative impacts should be accounted for.	Information provided in *Section 6.4.*
	Land quality - We would expect the promoter to provide details of any hazardous contamination present on site (including ground gas) as part of the site condition report. Emissions to and from the ground should be considered in terms of the previous history of the site and the potential of the site, once operational, to give rise to issues.	The site history and the known contaminants on site are provided in *Section 6.3*.
	Within the EIA, PHE would expect to see information about how the promoter would respond to accidents with potential off-site emissions e.g. flooding or fires, spills, leaks or releases off-site.	Information provided in *Section 6.3 and the separate Flood Risk Assessment presented in Annex C.*

Source	Consultee Comment	Response
Redcar and Cleveland Borough Council (R&CBC) Environmental Protection (Contamination)	'With reference to the above planning application, I would confirm that I have assessed the following environmental impacts which are relevant to the development and would comment as follows: I note a scoping report has been submitted in support of this application to provide information and details on the Project, which will enable the Planning Inspectorate to respond to the accompanying request for an EIA. This Scoping Report provides consultees with relevant information including on the project that will enable them to identify the key environmental issues and baseline data to be acquired and the assessment methodologies to be adopted for assessing the likely significant effects of the Project. Further information will be provided through discussions with the applicant and consultants to discuss the contents of the EIA I therefore have no adverse comments at this stage.'	n/a
R&CBC	The following policies are relevant when considering the Project: Development Policies DPD: DP6 Pollution Control P7 Potentially Contaminated and Unstable Land Emerging Development Plan, Publication Local Plan (2016): SD7 Flood and Water Management	Noted.
R&CBC PEIR Response	Contaminated Land: 'It is acknowledged that the developer will be using as a baseline land condition report a previous report submitted as part of the permit surrender for the previous power station. The Team are happy to accept this report as a baseline study. It is stated in the PEIR that any potential impacts during the construction phase will be managed through standard construction practices and this will be in the form of a CEMP submitted with the DCO. The CEMP is also envisaged to include details of waste management and a sediment control plan to control dust during excavation. The Team will review the content of the CEMP upon submission. The Team would also encourage the use of an unexpected contamination condition to be included within any submission. On an additional note a spelling error may have been included within 6.152 as reference is made to the Walton International rather than Wilton International'.	Noted and actioned.
Secretary of State	It is proposed to scope out cumulative geology and land contamination impacts on the basis that all ground condition and contamination impacts would be confined to the Proposed Development site and there would be no significant requirement for off-site soil disposal. However, Section 6.3.5 of the Scoping Report also states that if contamination is found on the site mitigation measures will be incorporated into the construction programme, which suggests that there is still potential for significant effects. Therefore the SoS does not agree that this matter can be scoped out as the information that has been provided at this stage to justify this approach is insufficient.	The most recent (2015) site investigation indicates that remediation of the site is not required as a function of soil contamination. The density of the boreholes was good however even with the most thorough investigation there is still a chance that small

Source	Consultee Comment	Response
		amounts of contamination may be present that will not be identified until the slabs and foundations of the former power station are removed. This is not believed to be a significant effect or likely to contribute to any overall cumulative effects. Information provided in *Section 6.3.7* addresses this further.

6.1.4 Policy and Legislation Context

6.1.5 Overview

6.9 Policy and legislation relevant to the Project is set out in *Chapter 2* of this ES. *Table 6.2* below identifies those policies that are relevant to land and water, including flood risk.

Table 6.2 Relevant Policy

Topic	Geology, ground conditions, water
Overarching National Policy Statement for Energy(EN-1) July 2011	4.8 Climate change adaptation 4.10 Pollution control and other environmental regulatory regimes 5.7 Flood risk 5.10 Land use 5.15 Water quality resources
National Policy Statement for Fossil Fuel Electricity Generating Infrastructure (EN-2) July 2011	2.2.7-9 Water resources 2.3.13/14 Climate change adaptation 2.10 Water quality and resources
National Planning Policy Framework (NPPF) 2012	10 Climate change, flooding and coastal change
Planning Practice Guidance (PPG) 2014 – 2016	Climate change Flood risk and coastal change Land affected by contamination Water supply, wastewater and water quality
RCBC current and emerging policy	Development Policies DPD: DP6 Pollution Control and DP7 Potentially Contaminated and Unstable Land Emerging Development Plan, Publication Local Plan (2016): SD7 Flood and Water Management

National Policy Statements for Energy

6.10 The National Policy Statements (NPSs) for energy infrastructure EN-1(1) and EN-2(2) set out policy which it is relevant to take into account when determining the DCO.

6.11 Consequently, the assessment principles and generic policies relevant to the application address: climate change adaptation, flood risk, land use, water quality and resources.

(1) DECC 2011. Overarching National Policy Statement for Energy (EN-1). Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf
(2) DECC 2011. National Policy Statement for Fossil Fuel Electricity Generating Infrastructure (EN-2). Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/47855/1939-nps-for-fossil-fuel-en2.pdf

6.12 In regard to the consideration of climate change adaptation, EN-1 states that the ES should set out how the proposal will take account of the projected impacts of climate change. This information will be needed by PINS, whom should be satisfied that the potential impacts of climate change, taking account of the latest UK Climate Change Projections, have been considered in the assessment and used in the development of appropriate mitigation.

6.13 With regards to Flood Risk, EN-1 states that applications for energy projects of 1 hectare or greater in Flood Zone 1 in England (such as the Project) should be accompanied by a flood risk assessment (FRA). The minimum requirements for FRAs are that they should:

- be proportionate to the risk and appropriate to the scale, nature and location of the project;
- consider the risk of flooding arising from the project in addition to the risk of flooding to the project;
- take the impacts of climate change into account, clearly stating the development lifetime over which the assessment has been made;
- be undertaken by competent people, as early as possible in the process of preparing the proposal;
- consider both the potential adverse and beneficial effects of flood risk management infrastructure, including raised defences, flow channels, flood storage areas and other artificial features, together with the consequences of their failure;
- consider the vulnerability of those using the site, including arrangements for safe access;
- consider and quantify the different types of flooding (whether from natural and human sources and including joint and cumulative effects) and identify flood risk reduction measures, so that assessments are fit for the purpose of the decisions being made;
- consider the effects of a range of flooding events including extreme events on people, property, the natural and historic environment and river and coastal processes;
- include the assessment of the remaining (known as 'residual') risk after risk reduction measures have been taken into account and demonstrate that this is acceptable for the particular project;
- consider how the ability of water to soak into the ground may change with development, along with how the proposed layout of the project may affect drainage systems;

- consider if there is a need to be safe and remain operational during a worst case flood event over the development's lifetime; and

- be supported by appropriate data and information, including historical information on previous events.

6.14 With regards to land use, EN-1 states that the ES should:

- identify existing and proposed land uses near the project, any effects of replacing an existing development or use of the site with the proposed project or preventing a development or use on a neighbouring site from continuing;

- should seek to minimise impacts on the best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification) and preferably use land in areas of poorer quality (grades 3b, 4 and 5) except where this would be inconsistent with other sustainability considerations;

- identify any effects and seek to minimise impacts on soil quality taking into account any mitigation measures proposed;

- ensure that they have considered the risk posed by land contamination where projects are to be developed on previously developed land; and

- detail the safeguards put in place for any mineral resources on the proposed site as far as possible, taking into account the long-term potential of the land use after any future decommissioning has taken place.

6.15 In regard to the assessment of Water Quality and Resources, EN-1 states that the Environmental Statement should describe:

- the existing quality of waters affected by the proposed project and the impacts of the proposed project on water quality, noting any relevant existing discharges, proposed new discharges and proposed changes to discharges;

- existing water resources affected by the proposed project and the impacts of the proposed project on water resources, noting any relevant existing abstraction rates, proposed new abstraction rates and proposed changes to abstraction rates (including any impact on or use of mains supplies and reference to Catchment Abstraction Management Strategies);

- existing physical characteristics of the water environment (including quantity and dynamics of flow) affected by the proposed project and any impact of physical modifications to these characteristics; and

- any impacts of the proposed project on water bodies or protected areas under the Water Framework Directive and source protection zones (SPZs) around potable groundwater abstractions.

National Planning Policy Framework

6.16 The National Planning Policy Framework (NPPF) (1) addresses a range of topics of which those considered most relevant are discussed in section 10 described as "Meeting the challenge of climate change, flooding and coastal change" (paragraphs 93 – 108). Alongside the NPPF is Planning Practice Guidance (PPG) (2) covering a range of topics including climate change, land affected by contamination, flood risk and coastal change, water supply, waste water and water quality.

Local Policy

6.17 The Redcar & Cleveland Planning Strategy (Local Plan) sets out the strategic policy framework for Redcar and Cleveland area and is used to make decisions on planning applications. The following adopted Core Strategy (3) policies are relevant to this Chapter:

6.18 DP6 Pollution Control, highlights that where pollution is unavoidable, mitigation measures to reduce pollution levels will be required in order to meet acceptable limits.

6.19 DP7 Potentially Contaminated and Unstable Land, highlights that were development is on or near potentially contaminated or unstable land it will not be permitted unless effective measures are agreed to deal with any contamination or instability.

6.20 Relevant draft Publication Local Plan (November 2016) policies are as follows:

6.21 SD7 Flood and Water Management, highlights that flood risk will be taken into account at all stages in the planning process to avoid inappropriate development in areas at current or future risk.

Summary of Legislation

6.22 *Table 6.3* summarises key legislation in relation to geology, hydrogeology, hydrology and flood risk that are relevant to the Project.

(1) Department for Communities and Local Government 2012. National Planning Policy Framework. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf
(2) Planning Practice Guidance, available at: http://planningguidance.communities.gov.uk/
(3) Redcar & Cleveland Borough Council.2007. Core Strategy DPD, Adopted - 2007

Table 6.3 Summary of Relevant Legislation

=Topic	Legislation	Description
Water Quality	EU Directive 2000/60/EC (the Water Framework Directive)	Commits European Union member states to achieve good qualitative and quantitative status of all water bodies by 2015.
	The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003	Transposes the Water Framework Directive into UK law.
	EU Directive 2008/105/EC (the Priority Substances Directive)	Aims to phase out of discharges, emissions and losses of hazardous substances listed in the Directive.
	EU Directive 2007/60/EC on the Assessment and Management of Flood Risks (the Floods Directive)	Requires member states to assess the risk of water courses and coast lines within their territory, map the flood extent as well as assets and the population at risk within these areas, and to take adequate and coordinated measures to reduce this flood risk.
	Water Act 2014	Part 3 of the Water Act 2014 focuses on the environmental permitting regime relating to water abstraction and pollution prevention and control, enabling operators to apply for a single rather than multiple permits.
	Environmental Permitting (England and Wales) Regulations 2010	Permitting regime for discharges to controlled waters. There is a 2013 draft amendment (Environmental Permitting (England and Wales) Regulations 2013) to these Regulations that has not yet been made as a UK Statutory Instrument that will is intended to transpose Directive 2010/75/EU on industrial emissions (integrated pollution prevention and control). Provision 12 of the act makes it is an offence, except where authorised by an environmental permit, to allow whether by accident or design a 'water discharge activity'. Schedule 21 describes 'water discharges activities' such as discharge or entry of poisonous, noxious or polluting material, into inland freshwaters, coastal waters or relevant territorial waters.
	Salmon and Freshwater Fisheries Act 1975 (as amended)	Makes it an offence to discharge effluent which damages fish, their food or their spawning ground, into water containing fish.
	British Standard Code of Practice for Earthworks BS 6031:2009	Detailed methods for controlling drainage from construction sites.
Geology, Hydrology and Contamination	EU Directive 2000/60/EC (the Water Framework Directive)	Commits European Union member states to achieve good qualitative and quantitative status of all water bodies including ground waters by 2015. The primary requirement is that groundwater is protected at least to the same level as that required by the Groundwater Directive (see below).
	Environmental Protection Act 1990: Part 2A	The Contaminated Land Statutory Guidance 2012 has replaced the previous statutory guidance issued under Part 2A of the

=Topic	Legislation	Description
	Contaminated Land Statutory Guidance	Environmental Protection Act 1990; however, the legislation remains unaltered. This statutory guidance ('this Guidance') is issued by the Secretary of State for Environment, Food and Rural Affairs in accordance with section 78YA of the Environmental Protection Act 1990 ('the 1990 Act'). Section 57 of the Environment Act 1995 created Part 2A of the Environmental Protection Act 1990 ('Part 2A') which establishes a legal framework for dealing with contaminated land in England. This Guidance applies only in England. This Guidance is intended to explain how local authorities should implement the regime, including how they should go about deciding whether land is contaminated land in the legal sense of the term.
	Environmental Permitting (England and Wales) Regulations 2010	If the regulator considers that the operation of a regulated facility under an environmental permit involves a risk of serious pollution, it may arrange for steps to be taken to remove that risk
	EU Directive 2006/118/EC (the Groundwater Daughter Directive, which superseded the previous Groundwater Directive 80/68/EEC)	Transposed into UK law through the Environmental Permitting (England and Wales) Regulations 2010; Section 161A WRA 1991 and Anti-Pollution Works Regulations 1999 (works notices); Section 93 WRA 1991 (Water Protection Zones); Part 2A EPA 1990 and associated regulations.
	EU Directive 2007/60/EC on the assessment and management of flood risks	Establishes flood risk management plans.

6.1.6 Supporting Information for this Chapter

6.23 Supporting documentation used in the preparation of this chapter is as follows:

- *Annex C*, Flood Risk Assessment, ERM, May 2017
- *Annex D1*, Phase I Assessment of the Project site, ERM, 2017;
- *Annex D2*, Envirocheck Report including Public Database Search ref. 111168878_1_1, 20th January 2017;
- *Annex D3*, Surrender Site Condition Report for Teesside Power Station, Environ, 2015;
- *Annex D4,* Framework Site Waste Management Plan (SWMP); and
- *Annex L*, Construction Environmental Management Plan (CEMP).

6.2 ASSESSMENT METHODOLOGY

6.2.1 General Assessment of Risk to Land and Water Resources

6.24 This chapter assesses the potential for historical contamination to be present on the Project Site and, subsequently, the risk associated with any likely disturbance of soils and water resources.

6.25 The process of contamination and water resources risk assessment for the EIA can be summarised as follows.

- Pollutant sources (hazards) are identified and a risk assessment undertaken to establish pathways and receptors linked to the pollutant sources. Both the source identification and risk assessment stages provide input to the development of a Conceptual Site Model ('CSM').

- Risk estimation is undertaken to predict the probability and degree (consequence or effect) of soil pollution, water pollution and flood incidents occurring. Risk estimation has two components:

    - firstly, likelihood assessment which relates to whether soil and water pollution will occur in the short and or long term; and
    - secondly, consequence assessment which is the magnitude of any soil and water pollution impact taking into account the sensitivity of the receptor.

- Risk evaluation is then undertaken to decide whether a risk is acceptable or not and entails the application of evaluation criteria. These evaluation criteria are set in relation to soil and water pollution risk to a specific receptor.

6.26 The impact assessment compares CSMs for the construction (and decommissioning) and operational phases with the current baseline CSM. This comparison allows the potential changes (the Project's impact) on land and water quality to be assessed as large, medium, small or negligible. Determination of significance consists of comparing the magnitude of the change in risk against the sensitivity of that receptor to change for each type of impact.

6.27 For planned operational discharges the assessment considers the nature of the discharge and the measures taken in design to reduce the potential for environmental pollution to as low as reasonably practicable ('ALARP'), taking into account the nature of the effluent and the environmental objectives for the receiving water bodies.

6.2.2 *Detailed Assessment of Effects on Soil and Land Resources*

General Considerations

6.28 Some soil resources may be lost temporarily and permanently to the site of the Project, although it should be noted that for this development, a former power station is essentially being replaced by a new one and this is considered further in this assessment. It should also be noted that Annex L; contains the draft CEMP and Annex D4; contains the Framework SWMP. The aim of these documents is to develop a strategy to re-use soils and materials won during the construction works and to limit the disposal of the materials to landfill

6.29 Topsoil is not present on site although some subsoil may be removed during construction. Effects on soil are considered by combining an assessment of, and the spatial and temporal extent and intensity (magnitude or scale) of, soil quality degradation due to the Project activities. These factors are further defined below.

Value or Importance of Soils

6.30 In the context of the soils assessed, four criteria are considered as contributing to the overall designation of importance.

- Soil quality, structure and sensitivity: whether it is has intrinsic agricultural fertility, presence of historical or natural contaminants, degree of anthropogenic disturbance, e.g. compaction.

- Ecosystem function, supporting service, flora and fauna: e.g. whether specific soils, such as acidic loamy soil required for flora species, are recognised as important.

- Ecosystem function, regulating service, water regulation: whether the soil helps partition rainfall into surface water run-off, vertical percolation into groundwater and / or the atmosphere via evapotranspiration.

- Resource importance in terms of 'provisioning': e.g. the extent to which the soil is currently used as an agricultural resource.

6.31 For any soil contaminants that may be encountered during pre-construction investigations or during the construction phase, the significance of potential effects on soil is determined through reference to specific criteria developed using methodologies defined by the Environment Agency in Contaminated Land Report 11 (CLR11) Model Procedures for the Management of Land Contamination (2004) - http://webarchive.nationalarchives.gov.uk/20140328084622/http://cdn.environment-agency.gov.uk/scho0804bibr-e-e.pdf.
This is further reinforced in the Draft CEMP and the Framework SWMP.

6.32 The definitions applied to assigning value (combining use, importance, sensitivity and vulnerability) criteria to soils are shown in *Table 6.4*.

Table 6.4 Value Criteria for Soils

Value	Definitions/Examples
Low	Low soil fertility not used for agriculture, contaminated made-ground soils at brownfield sites, soils not supporting any particularly sensitive or important habitats.
Medium	Typical agricultural land, soils supporting specific habitats (e.g. forests), soils on residential sites.
High	Intensively farmed, highly fertile soils, wetland soils, soils which host shallow aquifers relied upon for abstraction or essential for river base flow, soils of specific characteristics (e.g. pH, carbon content, mineralogy) that support specific significant or high-value flora or faunal habitats.

Magnitude of Impacts on Soils

6.33 The magnitude of impacts on soils is determined by considering the intensity (or scale), spatial coverage and longevity of an impact as described in *Table 6.5*.

Table 6.5 Spatial and Temporal Extent of Soil Impact

Magnitude	Definitions/Examples
Large	Change is likely to cause a direct adverse permanent or long-term (more than 10 years) effect on the quality/value of the soil over a large area (100s ha)
Medium	Change over a moderate to large area, likely to adversely affect the quality/value of the soil but recovery is predicted in the medium term (5-10 years) and there is predicted to be no permanent impact on its integrity. Conversely, change over a small area (<1 ha) with direct adverse permanent or long-term effects.
Small	Change likely to adversely affect the quality/value of the soil but recovery is expected in the short term (1- 4 years) or is within the bounds of likely natural variation. Changes are over a small (e.g. <1 ha) to moderate area (e.g. 10's ha), with changes on a large area to be classified as Medium.
Negligible	A change well within the bounds of normal natural variation. No effect detectable or recovery within a very short timescale (<1 year). Could occur over any size of area.

6.34 The magnitude assigned also uses professional judgement to take into consideration the application of statutory standards, such as:

- CLR11 - Model Procedures for the Management of Land Contamination, Environment Agency 2004;
- GPLC2 – FAQs, technical information, detailed advice and references as published by the Environment Agency;
- Contaminated Land Assessment Exposure model, Environment Agency 2014;
- Human health toxicological assessment of contaminants in soil, Environment Agency, January 2009;
- Using Soil Guideline Values, Environment Agency, March 2009; and

- Groundwater Pollution Prevention Principles (GP3), Environment Agency, March 2017.

6.2.3 Detailed Assessment of Effects on Groundwater Resources

6.35 Impacts on groundwater resources are considered by combining an assessment of:

- the baseline value of groundwater, either as potable resource or in its ecological function in providing base flow, as well as how vulnerable the resource is to the predicted impacts from the Project, both on the surface and in the sub-surface; and

- the predicted spatial and temporal extent and intensity (magnitude or scale) of groundwater quality degradation due to the Project activities, combined to determine the overall magnitude of impact.

6.36 In the context of the groundwater underlying the Project Site, two criteria have been considered as contributing to the overall designation of importance:

- the extent to which the groundwater resource provides, or could provide, a use (drinking water, commercial, agricultural or industrial) locally, and its aquifer status, as designated by the EA; and

- the extent to which the groundwater resource plays an ecosystem or amenity role in terms of supporting biodiversity (e.g. through groundwater base flow contribution, maintaining soil structure, regulating the hydrologic cycle), particularly with respect to the drains and main rivers adjacent to the Project.

6.37 For groundwater quality, both from anthropogenic pollutants and naturally occurring processes, the significance of potential effects on groundwater are assessed by comparison with Environmental Quality Standards (EQS). The definitions applied to assigning value (combining use, importance, sensitivity and vulnerability) criteria to groundwater are shown in *Table 6.6*

Table 6.6 Value Criteria for Groundwater

Value	Definitions/Examples
Low	Groundwater in deep aquifers, of poor chemical quality (saline, contaminated or otherwise not potable), not locally or regionally abstracted or not significantly contributing baseflow to any surface waters
Medium	Groundwater of moderate quality (e.g. marginally potable) not locally abstracted, or only abstracted for industrial or irrigation purposes (not domestic), groundwater only distantly contributing to surface water base flow
High	High quality potable water resource easily accessible and abstracted locally for drinking, domestic and other purposes. Groundwater hydraulically connected to surface waters or wetlands, especially if these are habitats of high value in supporting important flora and fauna.

6.38 The magnitude of impacts on groundwater is determined by considering the intensity (or scale), spatial coverage and longevity of an impact as set out in *Table 6.7*.

Table 6.7 Spatial and Temporal Extent of Groundwater Impact

Magnitude of Impact	Definitions/Examples
Large	Change is likely to cause permanent effects over a moderate to large area to one or more of the following criteria: • raise several pollutants above quality assessment criteria; • significantly reduce resources available to adjacent or downstream users; • deplete base flow contribution to surface water to less than minimum environmental flow; or • material alteration to regional hydrogeology that may affect surface water drainage regime, increases flood risk or the desiccation of wetlands or otherwise affects dependent ecologies.
Medium	Change over a moderate to large area, likely to adversely affect the groundwater criteria listed above, but recovery is predicted in the medium term (5-10 years) and there is predicted to be no permanent impact. Conversely, change over a small area (<1 ha) with direct adverse permanent or long-term effects of the type described above.
Small	Change likely to adversely affect the quality/value of the groundwater criteria listed above but recovery is expected in the short term (1- 4 years) or is within the bounds of likely natural variation. Changes are over a small (e.g. <1 ha) to moderate area (e.g. 10's ha), with changes on a large area to be classified as Medium.
Negligible	A change within the bounds of natural variation and below assessment criteria for groundwater pollutants. No effect detectable or recovery within a very short timescale (<1 year). Could occur over any size of area.

6.2.4 Detailed Assessment of Effects on Surface Water Resources

6.39 Effects on surface waters have been considered by combining an assessment of:

- the baseline *value* of surface water, either in its physical regulation service in the hydrologic cycle (drainage, flood protection, assimilation of pollutants, etc.), its ecological function in supporting biodiversity, and as potable or industrial resource, as well as how vulnerable the surface water body is to the predicted impacts from the Project; and

- the predicted spatial and temporal extent and intensity (or scale) of surface water quality degradation due to Project activities, combined to determine the overall *magnitude of impact*.

These factors are discussed in the sub-section below.

Value or Importance of Surface Water

6.40 In the context of the surface water in the study area, defined as the area that is in hydraulic connectivity with the Project Site, three criteria have been considered as contributing to the overall designation of importance:

- the extent to which the surface water resource provides a physical regulating service in the hydrologic cycle e.g. in terms of flood protection (via drainage, flood plains or flood storage), agriculture, navigation, or assimilation of pollution;

- the extent to which the surface water resource plays an ecosystem role in terms of supporting biodiversity, including its role as a migration route or in supporting a lifecycle stage; and

- the extent to which the surface water resource provides a use (drinking water and other domestic or industrial) to the local communities and businesses, or is important in terms of national resource protection objectives, targets and legislation.

6.41 For surface water quality, both from anthropogenic pollutants and naturally occurring processes, such as siltation from runoff, the significance of potential effects is rated against specific criteria developed for individual compounds in the freshwater Environmental Quality Standards (EQS) developed by the EA.

6.42 The definitions applied to assigning value (combining use, importance, sensitivity and vulnerability) criteria to surface water are shown in *Table 6.8*.

Table 6.8 Value Criteria for Surface Water

Value	Definition
Low	• does not support diverse aquatic habitat or populations, or supports aquatic habitat or population that is of low quality • little or no role in terms of provisioning or sanitary services for the local community • little or no role as a physical regulating service in the hydrologic cycle, and/or the role is highly localised
Medium	• supports diverse populations of flora and / or fauna • local importance in terms of provisioning services but there is ample capacity and / or adequate opportunity for alternative sources of comparable quality • plays a local or sub-regional regulating role in the hydrologic cycle in terms of storage, flows and flood alleviation
High	• supports economically important or biologically unique aquatic species or provides essential habitat for such species • provisioning service is wholly relied upon locally, with no suitable technically or economically feasible alternatives, or is important at a regional watershed level for provisioning services • plays a regional regulating role in the hydrologic cycle in terms of storage, flows and flood alleviation

Magnitude of Surface Water Impacts

6.43 The magnitude of impacts on surface water is determined by considering the intensity (or scale), spatial coverage and longevity of an impact on the following basis, shown in *Table 6.9*.

Table 6.9 Spatial and Temporal Extent of Surface Water Impact

Magnitude	Definition
Large	Adverse impacts likely to cause permanent effects over a moderate to large area for one or more of the following criteria: • raising of several pollutants routinely above EQS and/or give rise to secondary ecological and/or socio-economic impacts; • depletion of surface water to less than minimum environmental flow or such that water users within the catchment and their supplies are likely to be compromised by the Project at most times; • large scale alteration of existing drainage regimes and patterns (e.g. floodplain embankments, cross drainage structures, canalisation etc.) increasing flood frequency; or • restriction of existing navigation arrangements.
Medium	Adverse impacts over a moderate to large area for the criteria listed above, but only over time-limited seasonal, low flow or unusual discharge conditions, with no predicted permanent impacts. Conversely, change over only a small area (<1 ha) with direct adverse permanent or long-term effects within the criteria described above.
Small	Adverse impacts within the criteria listed above but these being short-term localised effects which are likely to return to equilibrium conditions within a short timeframe (e.g. hours or days at most) *or* is within the bounds of likely natural variation. Changes are over a small (e.g. <1 ha) to moderate area (e.g. 10's ha), with changes on a large area to be classified as *Medium*.
Negligible	A change within the bounds of natural variation and below Freshwater EQS, no net water consumption, no alterations to drainage regimes and no change in stream flows and flood levels. Could occur over any size of area.

6.44 The magnitude assigned also uses professional judgement to take into consideration the application of statutory standards and non-statutory standards and policy (see *Section 6.1.4*). Likelihood of occurrence is also considered as part of the magnitude for accidental events.

6.2.5 Evaluation of Significance of Effects

6.45 Once magnitude of impact and value (sensitivity / vulnerability / importance) have been characterised, significance is then assigned for each effect using the matrix shown in *Table 6.10*

Table 6.10 Evaluation of Significance

		Sensitivity/ Vulnerability/ Importance of Resource / Receptor		
		Low	**Medium**	**High**
Magnitude of Impact	**Small**	Not Significant	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

6.46 Impacts of negligible magnitude always lead to an effect which is not significant.

6.2.6 Assessment of Flood Risk

6.47 A site-specific Flood Risk Assessment has been undertaken as part of the EIA process and is presented in *Annex C*. The FRA summarises the existing and potential future flood risk at the site and concludes that, given that the Project will be constructed on existing brown field land which is served by an existing and extensive surface water drainage system, and there will be no change in the quantum of impermeable surfaces at the Project Site, the risk of flooding to the site, and potential increase risk of flooding from the Project is negligible.

6.48 As the flood risk at the site has been assessed as negligible, no further mitigation measures have been considered necessary, beyond the standard best practice construction techniques outlined in the draft Construction Environmental Management Plan (CEMP); *Annex L*.

6.3 BASELINE CONDITIONS

6.3.1 Introduction

6.49 This section provides a description of the existing baseline environments regarding soils and geology, land quality, hydrogeology (groundwater), and hydrology (surface water resources and flood risk).

6.3.2 Soils, Geology and Hydrogeology Data Sources

6.50 The baseline site conditions have been determined using maps for historical, topographical and geological information as well as a site visit conducted by ERM in January 2017. Information regarding the background to the site has been collated from the Envirocheck Report (ref. 111168878_1_1 20/01/2017) (*Annex D2*).

6.51 In addition to this, a key source is a report relating to a previous / recent intrusive investigation undertaken at the site as part of a former installation's IPC permit surrender site condition report (GDF Suez Power Station): Surrender Site Condition Report for Teesside Power Station, Environ, 2015 (*Annex D3*).

6.3.3 Hydrology Data Sources (Surface Water Resources)

- Ordnance Survey Mapping; and
- Envirocheck Report (ref. 111168878_1_1 20/01/2017) (*Annex D2*).

6.3.4 Overview of Site and Surrounds

The Site and Surrounding Land Use Description

6.52 The Project Site occupies a total area of approximately 15.5 ha and is located approximately 6.5 km to the east of Middlesbrough town centre in the northeast of the United Kingdom (UK). The Project Site comprises brownfield / former industrial land; however, all above ground structures previously present within the Project Site boundaries were cleared to ground level between 2013 and 2015. As such, the Project Site currently comprises open ground, surfaced with a mixture of concrete slab (c.60%, equivalent to the footprint of the previous buildings / structures), gravel (c.35%, equivalent to areas where voids have been backfilled with site won demolition crush, or where gravel existed previously) and soft landscaping (<5%, limited to site periphery). The 2015 Site Condition Report (SCR) indicates that there are two electricity sub-stations remaining at the Project Site, located in the southeastern and southwestern areas of the Project Site (referred to as Greystone A and Greystone B respectively). These sub-stations are owned and maintained by National Grid, with the land upon which they are located being leased from Sembcorp.

6.53 The Project site is situated at an elevation of approximately 19 m above Ordnance Datum (AOD) and is generally flat. Land in the vicinity of the Project Site generally declines to the north and north east, towards the River Tees. In the wider area (>2.0 km), land declines to the east, towards the Tees Estuary and the North Sea coastline.

6.54 The Project Site is located in the southwestern section of Wilton International industrial park, this being a multi-occupancy chemical manufacturing site. Land use to the north and east of the Project Site is industrial (Wilton International) however, agricultural land is present to the immediate south and residential properties are present at minimum distance of 550 m to the western boundary. Land use in the area immediately surrounding the Project Site is further summarised below.

- *North*: commercial / industrial properties extending to in excess of 1.0km (Wilton International).
- *East*: commercial / industrial properties extending to in excess of 1.0 km (Wilton International).
- *South*: agricultural land adjacent, beyond which is a residential area (Lazenby c.700 m southeast) and Greystone Road (c.600 m south).
- *West*: agricultural land adjacent, beyond which is Greystone Road (c.150 m west) and residential areas (minimum distance c.550 m west).

Historic Use of the Project Site

6.55 The history of the Project Site has primarily been determined by reference to historical mapping dating from c.1850 to 2016. These maps were obtained by

ERM as part of a Landmark Envirocheck report (ref. 111168878_1_1 20/01/2017*; Annex D2*), which was procured for the specific purposes of this assessment. Where available, other sources (such as the UK EA public registers, other publicly available records and previous site investigation reports) have also been reviewed.

6.56 In summary, the above sources indicate that the Project Site comprised undeveloped / agricultural land until c.1990, at which point it was developed into a CCGT power station. This installation ceased operations in 2013 and was demolished to slab level between the dates of 2013 and 2015.

6.57 The history of the Project Site and that of the surrounding area (up to 1 km), as determined by reference to the historical maps and other sources where available is further summarised in *Table 6.11*.

Table 6.11 Site and Surrounding Area History

Date	On site	Offsite (up to 1km)	Source(s)
1856 - 95	• The Project Site is depicted as undeveloped / agricultural land • *Ratten Lane* is visible intersecting the central / western section of the Project Site, orientated SE-NW. • Two minor streams / drainage channels are shown running in a S–N direction through the central western and central eastern sections of the Project Site.	• Predominantly undeveloped / agricultural land. • Two roads are identifiable c.200 m east and 250 m west of the Project Site, labelled *Pasture Road* and *Lackenby Lane* respectively. • Low density residential areas are present c.600 m south and 500 m SE of the Project Site, labelled *Lackenby* and *Lazenby* respectively. • *Kettle Beck* is identifiable running in a SE - NW direction, adjacent to the western site boundary.	Yorkshire 1856-57; Yorkshire 1895
1919	• No significant changes.	• Area remains predominantly undeveloped / agricultural. • A *Saw Mill* with associated *Tank* is present c.500 m SE. • Three small features labelled *Gravel Pit* or *Old Gravel Pit* are present c.750 m south of the Project Site. • A new road labelled *Union & U.D. Bypass* is identifiable c.550 m W.	Yorkshire 1919
1953	• No significant changes.	• A small feature labelled *Filter Beds* is present c.400 m SE of the Project Site. • Significant medium density residential development is now present c.550 m W, labelled *Grangetown*. • Unlabelled commercial / Industrial type development is identifiable c.750 m NE.	OS 1953

Date	On site	Offsite (up to 1km)	Source(s)
1967-1969	• No significant changes.	• Significant industrial development is present c.75 m north of the Project Site, included within which are two *Cooling Towers*, fourteen features labelled *Tanks* and numerous small, unlabelled circular structures (likely tanks or stacks). The 2015 SCR (Environ) indicates that this facility was in fact present since the late 1950s; however, this is not evident from the available mapping. This report (2015 SCR) indicates that the facility was (at that time) operated as a 'Nylon Works' by Imperial Chemical Industries (ICI). • A new road is present c.200 m west of the Project Site. • *Allotment Gardens* are identifiable c.260 m SE.	OS 1967; OS 1969; Environ SCR 2015
1975 - 1976	• *Ratten Lane* and the two minor streams / drainage channels previously present at the Project Site are no longer identifiable. • A *Drain* is identified running through the eastern section of the Project Site, orientated SW-NE.	• Further commercial / industrial development is now identifiable in the area c.750 m NE of the Project Site. • The road c.200 m west is now labelled Greystone Road. • The *Grangetown* residential area has extended considerably in area to the south and appears to have increased in density. • A *Sports Ground* is identifiable c.300 m NW.	Russian Military 1975; OS 1976
1981-85	• No significant changes.	• A third *Cooling Tower* is now present c.50 m north associated with the ICI site in this area. • An electrical sub-station is now present c.15 m north of the Project Site. • Additional commercial / industrial development is identifiable c.500 m E. This includes six small circular features, collectively labelled as *Tanks*.	OS 1981-85

Date	On site	Offsite (up to 1km)	Source(s)
1993 - 2000	• The Project Site is now evidently developed for industrial use; the Enron / GDF Suez *Power Station* is identifiable. This comprises what appear to be eight turbines in the central / northern site area and an associated *Cooling Tower* in the central / eastern section. Two additional unlabelled circular features (likely tanks) are identifiable in the northern eastern area and two electrical substations are present in the south eastern and south western site areas respectively. The *Envirocheck* public database search confirms that an IPC permit was registered to the Project Site on 24th July 1992 for 'Combustion processes within the fuel and power industry'.	• No significant changes.	National Grid 1993; 10k Raster Mapping 2000; Envirocheck Public Database Search
2006-2017	• The 2015 SCR indicates that the Enron / GDF Suez installation ceased operations in 2013 and all buildings and other above ground infrastructure were cleared to slab level between 2013 and 2015. The available site mapping and contemporary aerial photography (Google Earth) do not yet reflect these changes.	• Land adjacent to the east of the Project Site has been developed for industrial use. A total of seven unlabelled circular structures are identifiable within this area (likely tanks or stacks). The 2015 SCR report indicates that this facility is an operational bioethanol plant, operated by *Ensus Ltd*. • The industrial installation c.500m east of the Project Site appears to have been partially demolished / reconfigured. • Environ's 2015 SCR indicates that the former ICI / Du Pont facility located to the north of the Project Site ceased operations in the 'late 2000s'.	10k Raster Mapping 2006; Vector Map 2016; Aerial Photography (Google Earth); Environ SCR 2015

6.3.5 Soil and Geology

Regional Geology

6.58 British Geological Survey (BGS) digital mapping indicates that (Made Ground notwithstanding) the Project Site is directly underlain by superficial deposits of till / glacial diamicton (terrigenous sediment that is unsorted / poorly sorted containing particles ranging in size from clay to boulders) across the

majority of the Project Site, and Glaciolacustrine Deposits (clay and silt) limited to the north / western areas. These (superficial) deposits are identified as being in the region of 11 m thickness in the local area (although thickness directly beneath the Project Site is not given).

6.59 The underlying bedrock is mapped as Redcar Mudstone Formation, described as "*Grey, fossiliferous, fissile mudstones and siltstones with subordinate thin beds of limestone in lower part, and fine-grained carbonate cemented sandstone in upper part*". These (bedrock) deposits are listed as being up to c.280 m depth in this area.

Observed Soils and Geology

6.60 As referenced in *Section 6.3.2*, ERM has reviewed a previous ground investigation report relating to the Project Site, undertaken by Environ in support of the previous installation's (GDF Suez) IPPC permit surrender (Environ, 2015, Surrender Site Condition Report for Teesside Power Station) (*Annex D3*).

6.61 In summary, the above report indicates that the Project Site is surfaced with concrete, gravel or grass, immediately underlain by Made Ground generally characterised as sandy gravel or reworked clay, with varying proportions of ash, slag, brick, concrete, coal, limestone, mudstone and sandstone. This (Made Ground) layer was encountered at depths of between 0.3 m and 2.2 m and was underlain by superficial deposits of slightly sandy, slightly gravelly clay, occasionally containing sand bands of up to 1.0 m thickness (considered representative of till (glacial diamicton)). The above (superficial) deposits were recorded to a depth of 5.0 m; however, the base of this unit was not proven. Solid / bedrock geology was not encountered at any location during the course of the 2015 investigation.

6.62 *Table 6.12* provides a further summary of the geology encountered at the Project Site.

Table 6.12 Observed Geology (2015)

Layer	Description	Depths	No. of Locations Encountered
Surface	Concrete.	0.12-0.4m	14 of 19
	Sandy gravel with varying proportions of ash, slag, concrete, limestone and brick.	0.3-0.7m	4 of 19
	Grass underlain by clay.	0.3m	1 of 19
Made Ground	Sandy gravel with varying proportions of ash, slag, brick and concrete.	0.4-2.0m	19 of 19
	Reworked clay with fragments of brick, coal, ash, slag, mudstone, limestone and sandstone	0.3-2.0m	16 of 19
	Greenish brown silt, possible relict topsoil.	1.15-2.2m	3 of 19
Superficial Deposits	Slightly sandy, slightly gravelly clay. Containing sand bands of up to 1.0m thickness in two locations.	0.4-5.0m (base not proven)	15 of 19

6.3.6 Land Quality – Potential Soil Sources of Contamination

General Considerations

6.63 The Project Site is located within Wilton International Site. As such, numerous permitted activities are registered within the vicinity of the Project Site, as are summarised below.

IPPC Permits

6.64 Nine IPPC permits / permit variations are registered to the Project Site as follows.

- Four entries appear registered to *GDF Suez Teesside Ltd* for 'Combustion; any fuel greater or equal to 50Mw', of which one is listed as 'Effective', dated April 2014, although this permit has been surrendered.

- Three entries appear registered to *Px Ltd* for 'Combustion; Any fuel greater or equal to 50MW'. These are dated between December 2006 and November 2007. These permits are not considered to be live since they related to the former power station.

- One entry appears registered to *Ensus UK Ltd* for 'Organic Chemicals; Oxygen containing compounds'. This permit is understood to in fact be associated with the neighbouring Ensus bioethanol plant (see below), however, is listed in the Envirocheck as 'onsite' due to inaccuracies in the IPPC registration system.

6.65 A further three IPPC permits / permit variations are reported within 500 m of the Project Site, all of which are registered to *Ensus UK Ltd* for 'Organic

Chemicals; Oxygen containing compounds'. Of these, one entry is listed as 'Effective', located 170 m northeast of the Project Site, dated April 2011.

6.66 A further 15 IPPC permits / variations are reported at a distance of 500 m to 1 km from the Project Site. Full details of these permits are provided in the Envirocheck report, *Annex D2, p.21–24*.

IPC Permits

6.67 Ten superseded IPC permits / permit variations are registered to the Project Site. These are dated between July 1992 and April 2001 and are all listed to *Px Ltd* for 'Combustion processes within the fuel and power industry'. These permits are all related to the demolished power station.

6.68 A further 25 superseded IPC permits / variations are registered within 500m of the Project Site, as below.

- Two additional entries appear registered to *Px Ltd* for 'Combustion processes within the fuel and power industry'. These are reported at distances of 160 m SW and 310 m NW from the Project Site; however, these are associated with the demolished power station. The reported distances are likely a result of inaccuracies in the IPC registration system.

- A total of 21 permits / variations are registered to *Invista Textiles UK Ltd* for 'Manufacture and use of organic chemicals within the chemical industry'. These are reported at distances of between 378 m and 462 m north of the Project Site, dated from February 1994 and April 2002. These permits are associated with the former ICI nylon works to the north of the Project Site. The 2015 SCR indicates that the Project Site was operated by DuPont following the breakup of ICI, with Invista (at that time) being a subsidiary of DuPont. This facility has been demolished.

- Two permits / variations are registered to *Basell Polypropylene Ltd* for 'Manufacture and use of organic chemicals within the chemical industry'. These are both reported at a distance of 194 m north of the Project Site, dated May 1997 and November 1998 and are understood to have been superseded following the demolition of the plant.

6.69 A further 22 IPC permits / variations are reported at a distance of 500 m to 1 km from the Project Site. Full details of these permits are provided in the Envirocheck report, *Annex D2, p.14–18*.

COMAH Sites

6.70 One active COMAH permit is registered within 1 km of the Project Site. This is an upper tier registration for *Ensus UK Ltd*, reported at a distance of 655 m east. This facility (Ensus bioethanol plant) is in fact located adjacent to the east of the Project Site and is considered in the Major Accident and Natural Disasters Chapter (Chapter 15).

6.71 The distance given in the Envirocheck report is a result of inaccuracies in the COMAH registration system.

Planning Hazardous Substance Consents

6.72 A total of seven Hazardous Substance Consents are reported within 500m of the Project Site, as below.

- One consent is reported as granted to *Ensus UK Ltd* for propylene oxide, dated April 2008. This entry is reported in the Envirocheck as being 'onsite', however, this facility (Ensus bioethanol plant) is in fact located adjacent to the east of the Project Site.

- Six consents are reported as granted to Dupont, located between 378m and 433m north of the Project Site. These are registered for flammable substances or ammonia (where this information is provided). Of these, two entries are dated January 1995, however, no application date is supplied in the remaining four entries. This facility is no longer present.

6.73 A further three Hazardous Substance Consents are reported at a distance of 500 m to 1 km from the Project Site. Full details of these permits are provided in the Envirocheck report, *Annex D2, p.47*.

Registered Radioactive Substances

6.74 Two Registered Radioactive Substance entries are reported associated with the Project Site, registered to *GDF Suez Teesside Ltd* for the 'keeping and use of radioactive materials', dated April 2008 and September 2009. A further two entries are registered to the Project Site / GDF Suez for the 'disposal of radioactive waste', dated April 2008 and September 2009. These permits should have been revoked since the Project Site is no longer operational.

6.75 A further seven Registered Radioactive Substance entries are reported within 500m of the Project Site, as below.

- Two entries are reported at a distance of 190m north of the Project Site, registered to *Teesside Power Ltd*, dated August 1996. These relate to the 'keeping and use of radioactive materials' and the 'disposal of radioactive waste'. These entries are Sembcorp registrations, and apply to the Project Site rather than the surrounding area. They are in the process of being surrendered.

- Four entries are reported at distances of between 378m and 472m north of the Project Site, registered to *Du Pont (UK) Ltd*, dated between March 1998 and May 2000. These relate to the 'keeping and use of radioactive materials' and the 'disposal of radioactive waste'. These permits should have been revoked since the Du Pont site is no longer operational.

- One entry is reported at a distance of 487m north of the Project Site, registered to Teesside Engineering Services Group, dated August 1989. This relates to the 'keeping and use of mobile radioactive sources'. It is understood that this is an old reference since Teesside Engineering Services Group is no longer trading. It is understood from Sembcorp that flow meters were historically used but have since been removed approximately 15 to 20 years ago. The flow meters were understood to contain limited radioactive sources.

6.76 A further 22 Registered Radioactive Substance entries are reported at a distance of 500 m to 1 km from the Project Site. Full details of these permits are provided in the Envirocheck report, *Annex D2, p.27-30*.

Landfilling and Waste Treatment

6.77 Five licensed landfills are reported within 500 m of the Project Site, of which two are located within a distance of 250 m (specifically, 86 m south and 160 m west). In all cases, these are recorded under the name 'Wilton, Perimeter Mounds' classified as Industrial Waste Landfills and registered to *ICI Chemicals and Polymers Ltd*. These licences were all issued in October 1978 and are now reported closed. No further detail is provided regarding operational dates or the types of waste deposited in these areas, although they are understood to be above ground and have been covered with a soil cap.

6.78 In addition to the above, one historical landfill site is reported under the name 'Perimeter Mounds', located 120 m west of the Project Site, licensed to ICI. No detail regarding operational dates or waste types is provided, although again it is understood to be above ground and has been covered with a soil cap.

6.79 Further to the above, two historical landfill sites, two licensed landfill sites and two registered landfill sites are reported at a distance of 500 m to 1 km from the Project Site. Full details of these sites are provided in the Envirocheck report, *Annex D2*, p.40-43.

6.80 The Envirocheck report identifies one area of potentially infilled land within the Project Site boundary, under the use 'Unknown Filled Ground (pond, marsh, river, stream, dock etc.)'. The relevant date of mapping is listed as 1953 and from reference to this historical map (OS 1953), it is likely that this refers to two minor stream / drainage channels previously present at the Project Site.

6.81 Three Registered Waste Treatment or Disposal Sites are reported within 500 m of the Project Site (specifically 62 m north, 234 m northeast and 236 m northeast). In all cases these are associated with the former ICI facility to the north of the Project Site and are dated between June 1990 and March 1993. The Project Site category for each of these records is given as 'Storage' and a range of authorised wastes are listed, including laboratory halogenated solvents, laboratory hydrocarbon solvents, methanol, miscellaneous inorganic waste, miscellaneous organic waste, other resins and polymer materials,

oxygen containing organic compounds, phenolic waste, adiponitriles, adiponitrile blowdown tar, mixed amines, waste aniline, waste hydrocarbon solvents.

6.3.7 Land Quality – Baseline Conditions

6.82 An intrusive ground investigation was carried out in 2015 by Environ as part of the IPPC permit surrender process for a previous installation (GDF Suez Power Station) at the Project Site. This report is provided in full as Annex C of the 2015 SCR (itself provided as *Annex D3* of this report).

6.83 A total of 27 soil samples were recovered as part of the 2015 site investigation and scheduled for chemical analysis. The results of this analysis are summarised below.

- Metals: One or more metals (including arsenic, beryllium, boron, chromium, copper, lead, nickel, vanadium and zinc) were detected in all of the samples recovered from across the Project Site. These concentrations are described as 'Low' and no exceedance of Environ's commercial land use GAC was recorded associated with these concentrations.

- Total Petroleum Hydrocarbons (TPH): Petroleum hydrocarbons were detected in 11 of 27 samples submitted for this analysis. These concentrations generally comprised heavier end (C12-C44) aliphatic and aromatic fractions. No exceedances of Environ's commercial land use GAC were recorded associated with these concentrations.

- Volatile Organic Compounds (VOCs): 17 of the 27 samples recovered from the Project Site were submitted for VOC analysis. No VOCs were detected above the laboratory method detection limit (MDL) at any location.

- Semi-Volatile Organic Compounds (SVOCs): Polycyclic Aromatic Hydrocarbons (PAH) were detected in 9 of 27 samples submitted for this analysis. A single additional SVOC detection (carbazole) was reported in one sample submitted for this analysis. No exceedances of Environ's commercial land use GAC were recorded associated with these concentrations.

- Poly-Chlorinated Biphenyls (PCB): Five of the 27 samples recovered from the Project Site were scheduled for PCB analysis. No PCBs were detected above the laboratory MDL at any location.

- Asbestos: Fourteen Made Ground samples were submitted for asbestos screening. Asbestos was not detected in any of these samples. No visual evidence of asbestos was recorded during the Project Site investigation field works.

6.84 No visual or olfactory evidence of impact on soils was observed by Environ's field engineers throughout the course of this investigation. Based on the

above, the risk to human health from soil contamination at the Project Site was assessed (by Environ) as being 'low'.

6.3.8 Land Quality – Potential Receptors

Human Health

6.85 Human health is considered in Chapter 14 of this ES. This section considers the potential risks to human health (to both site workers and the public) related to ground conditions (and contamination) during construction and operation.

6.86 Future site workforce: in the context of a commercial land use (i.e. operation of the Project), the primary human health receptor at the Project Site is likely to be an adult member of the regular site workforce. This is likely to include male and female workers between the ages of 18 and 65. The primary consideration relating to these workers is likely to be harmful effects caused by long term exposure to low contaminant concentrations (chronic effects).

6.87 Onsite temporary workers: in addition to the regular workforce, it is likely that construction /ground workers will be present onsite during the construction phase, undertaking works during which exposure to ground contamination is likely (i.e. earthworks). Given the temporary nature of this work, the primary consideration relating to these receptors is likely to be harmful effects caused by short term exposure to contaminants at higher concentrations (acute effects).

6.88 Other human receptors: given the Project Site's location, it is highly likely that numerous human health receptors will be present in the area surrounding the Project Site. This includes neighbouring workers (adjacent to the east) and the occupants of local residential properties (minimum distance c.550 m W).

Controlled Waters

6.89 For groundwater, EA digital mapping indicates that the superficial till deposits (present across the majority of the Project Site) and the bedrock formation (Redcar Mudstone) are designated as Secondary Undifferentiated aquifer units. The Glaciolacustrine Deposits limited to the north / western areas of the Project Site are designated as Unproductive Strata (indicative of low permeability deposits with marginal groundwater storage / productivity characteristics). No active groundwater abstractions are known to be present within 1 km of the Project Site and the Project Site does not lie within a groundwater Source Protection Zone (SPZ) of any type. The UK EA no longer update the Water Framework Directive (WFD) groundwater classifications, however, the 2015 SCR indicates that groundwater resources at the Project Site have previously been classified (at that time) by the UK EA as having 'Good' quantitative status and 'Poor' chemical quality (1).

(1) http://environment.data.gov.uk/catchment-planning/WaterBody/GB40302G701300

6.90 A controlled surface watercourse (*Kettle Beck*) is present to the immediate west of the Project Site flowing in a south-north direction. The quality of water contained within this watercourse has not been rated by the EA. Kettle Beck forms a confluence with Kinkerdale Beck c. 550 m north of the Project Site, with Kinkerdale Beck flowing in a southwest-northeast direction, towards the River Tees.

6.91 A total of four drains / surface water channels, including one thought to be culverted beneath the Project Site, are also identified in the immediate surrounding area, of which two are thought to be in direct continuity with Kettle Beck.

Property

6.92 Buildings / buried utilities: the Project site is located within Wilton International industrial park (Wilton International Site), this being a multi-occupancy chemical manufacturing site. Land to the north and east of the Project Site contains numerous industrial buildings / structures (i.e. Wilton International Site). Residential properties are also present at a minimum distance of c.550 m west.

6.3.9 Land Quality – Potential Pathways

6.93 The potential pathways through which a contaminant source could plausibly be exposed to one of the receptors identified at the Project Site are listed below.

6.94 Human health pathways are as follows:

- direct / dermal contact with contaminated soils and / or groundwater;
- ingestion of contaminated soils and groundwater;
- migration of gases / vapours by diffusion and along pressure gradients and subsequent inhalation;
- inhalation of particles in windblown dusts; and
- inhalation of groundwater derived vapours.

6.95 Controlled waters pathways are as follows:

- vertical migration of mobile substances;
- dissolution of contaminants in percolating rainwaters to shallow groundwater;
- lateral migration of shallow groundwater to nearby surface waters;
- migration of water via preferentially permeable subsurface structures (drainage runs etc.); and
- surface water runoff.

6.96 Property (noting that no cultural heritage features are present) could be affected by direct contact with contaminated soil and / or groundwater.

6.3.10 Soil Quality and Resource Value

6.97 The Project Site has been developed previously (c.1991) for a similar industrial use (CCGT power station). As a result of this, Made Ground is known to be present across the Project Site area to depths of up to c.2.2 m. This layer generally comprises concrete or gravel underlain by sandy gravel and / or reworked clay, with varying proportions of ash, slag, brick, concrete, coal, limestone, mudstone and sandstone. As detailed in *Section 6.3.8*, associated with the Project Site's historical, industrial use, limited soil contamination is known to be present. Specifically 'Low' concentrations of metals, petroleum hydrocarbons and SVOCs were reported by a 2015 site investigation.

6.98 Based on the above (i.e. presence of significant Made Ground, contamination associated with historical, industrial land use), ERM considers the resource value of the onsite soils to be 'low'.

6.3.11 Regional Hydrogeology and Aquifer Designations

6.99 UK EA digital mapping indicates that the superficial till deposits (present across the majority of the Project Site) and the bedrock formation (Redcar Mudstone) underlying the Project site are designated as Secondary Undifferentiated aquifer units. This designation is usually assigned in cases where it has not been possible to attribute either category Secondary A or Secondary B to a rock type. A Secondary A rock type is defined by the EA as "*permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers*". A Secondary B rock type is defined by the EA as "*predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering*". In most cases, this means that the layer in question has previously been designated as both a minor and a non-aquifer in different locations due to the variable characteristics (i.e. permeability) of the rock type. The Glaciolacustrine Deposits limited to the north / western areas of the Project Site are designated as Unproductive Strata (indicative of low permeability deposits with marginal groundwater storage / productivity characteristics).

6.100 No active groundwater abstractions are known to be present within 1 km of the Project Site and the Project Site does not lie within a groundwater Source Protection Zone (SPZ) of any type. The UK EA no longer update the Water Framework Directive (WFD) groundwater classifications, however, the 2015 SCR indicates that groundwater resources at the Project Site have previously been classified (at that time) by the UK EA as having 'Good' quantitative status and 'Poor' chemical quality**Error! Bookmark not defined.**.

6.101 One discharge consent to groundwater is reported within 1 km of the Project Site. This consent was issued to *Imperial Chemical Industries Ltd* in October 1979, prior to being revoked in February 1991. While active, the discharge consent related to 'Trade Effluent' to underground strata, although there is no current information to confirm this.

6.3.12 Observed Hydrogeology

6.102 The 2015 SCR investigation (*Annex D3*) reported that groundwater strikes were not generally recorded during the drilling works associated with the Made Ground or superficial deposits at the Project Site (limited to 2 of 19 locations). Regarding this, this report states that there may be some continuity between groundwater, however, the differing groundwater elevations and general absence of a distinct groundwater strike (during drilling) indicates that the shallow groundwater is likely to be perched and discontinuous across the Project Site.

6.103 As part of Environ's 2015 investigation (as reported in the 2015 SCR) groundwater monitoring wells were installed and level measurement was undertaken across the Project Site, with resting groundwater levels reported as ranging between 0.44 m and 4.12 m bgl (assessed as likely representative of perched water).

6.104 Based on a groundwater contour plot, created using the results of this groundwater level monitoring, Environ assessed groundwater flow to be "predominantly towards the north" at the Project Site. This is concurrent with the general topography of the Project Site / immediate surrounding area.

6.3.13 Groundwater – Baseline Conditions

Overview

6.105 A total of 14 groundwater samples were recovered from the Project Site as part of the SCR and scheduled for chemical analysis. The results of this analysis indicated that limited concentrations of metals, sulphate, petroleum hydrocarbons and PAH were present in the groundwater underlying the Project Site. Regarding these, metals (specifically chromium VI, and selenium) a range of PAH and aliphatic and aromatic TPH fractions were reported in excess of the applied controlled waters screening level (UK EQS & DWS) however, these impacts were described as 'generally localised'. Environ concluded that the concentrations detected did not represent widespread contamination of groundwater and the risk to controlled waters was assessed by Environ as Low.

6.106 With regards to human health risks associated with groundwater derived vapours, a single exceedance of Environ's human health groundwater vapour screening value (commercial land use) was reported in the groundwater analytical data. Specifically, this related to a 100µg/l concentration of C12-C16 range aliphatic hydrocarbons reported at location WS07 (central western area of the Project Site, adjacent to former cooling tower). Regarding this, the screening value used by Environ does not appear to be a risk derived number, but instead is equivalent to the theoretical upper threshold of solubility for this compound (0.76 µg/l - i.e. it has been assumed that a potential risk is present at the point / concentration where free product may form within the groundwater). In this case, given that no free phase product was in fact

observed during groundwater monitoring at the Project Site, it is considered highly unlikely that this concentration is representative of a significant risk. This is concurrent with Environ's conclusion, as stated in the 2015 SCR.

Groundwater Quality and Resource Value

6.107 The aquifer designations of the superficial deposits (Undifferentiated Secondary Aquifer and Unproductive Strata) and bedrock strata (Undifferentiated Secondary Aquifer) underlying the Project Site suggest a low level of permeability. Recent site investigation works established that shallow groundwater is likely to be perched / discontinuous across the Project Site, with the true / permanent groundwater table determined to be at a depth of greater than 5.0 m (i.e. the permanent groundwater table was not encountered during the 2015 drilling works). Moreover, the lack of abstraction licences, safeguard zones or source protection zones in the region indicate that the shallow groundwater in the area is not extracted for potable supply, or indeed any other significant economic use.

6.108 Based on the above, and given that groundwater in the area has previously been categorised by the EA as being of 'Poor' chemical quality, ERM considers the resource value of groundwater at the Project site to be 'negligible'.

6.3.14 Surface Water Resources

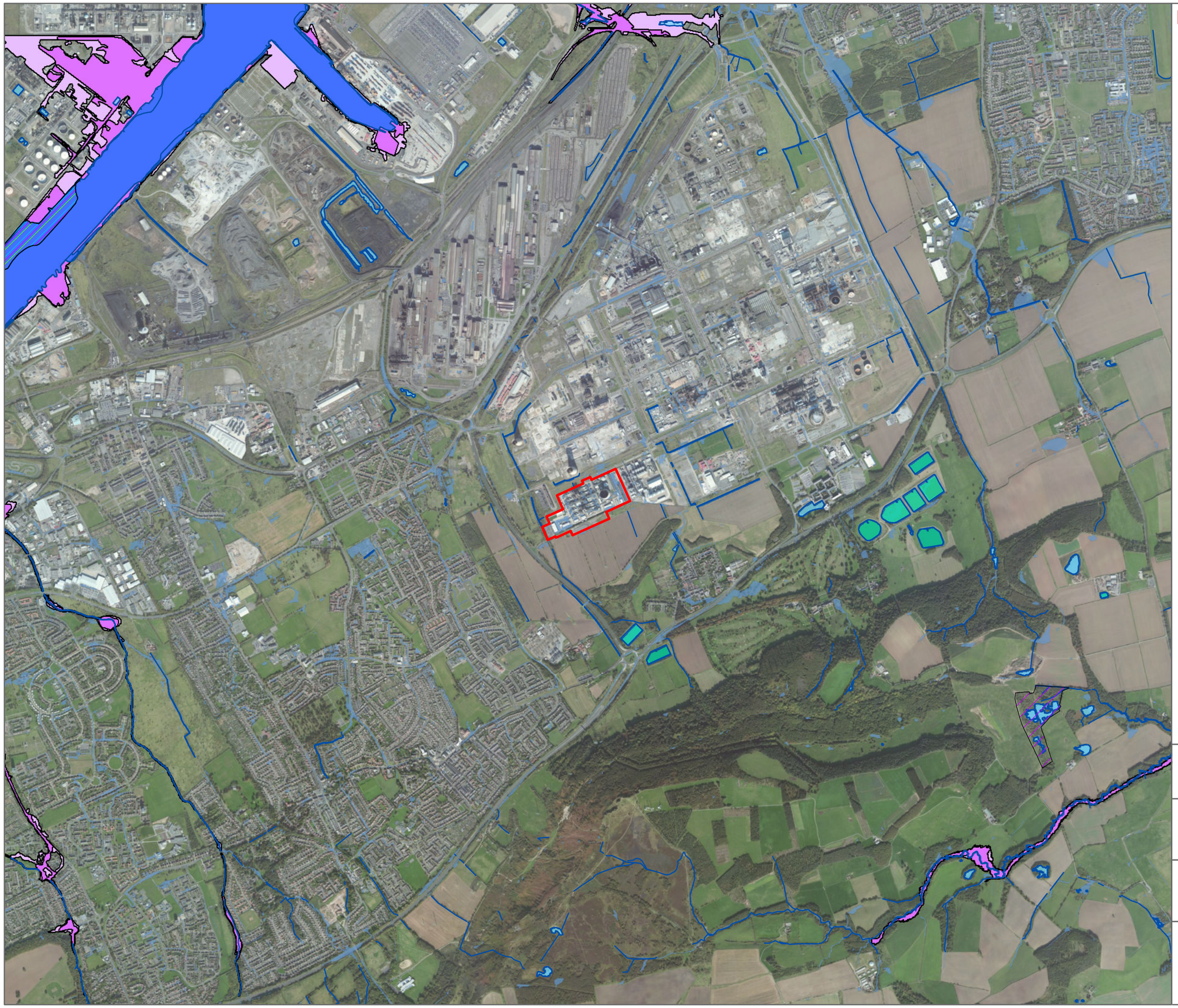
Regional Hydrology

6.109 The Project site lies within the Tees catchment of the Northumbria River Basin District (NRBD), with the Tees catchment covering an area of over 1,834 km² from the Pennines to the Tees Estuary on the North Sea coast. The catchment has an annual rainfall ranging from 400 – 700 mm in low lying area near the coast (in the vicinity of the project site) to 1500 – 2200 mm in the upper Pennines [(1)] . Land use in the west of the catchment area is predominantly moorland and pasture. On the lower slopes and middle catchment the land use changes to a greater amount of pasture and woodland. To the east, land use is predominantly arable farmland interspersed with large built up areas, including Middlesbrough and Stockton-on-Tees. Furthermore, in the lower reaches of the Tees, the Tees Barrage forms an artificial barrier between the Tees Estuary and the upstream catchment. This helps maintain water levels for amenity purposes and eliminates tidal effects further upstream.

Local Water Bodies

6.110 A number of surface watercourses and drains are located in the vicinity of the Project, these are shown in *Figure 6.1*. The most notable of these is the Kettle Beck that is located immediately adjacent to the western site boundary and flows in a northerly direction towards the River Tees. There are also four other small drainage ditches within close proximity of the Project site, one of

(1) Based on data from Stockton-on-Tees weather station.
http://www.metoffice.gov.uk/public/weather/climate/gcxn3ykru [Accessed: 06/04/2017].



SCALE: See Scale Bar	VERSION: A01
SIZE: A3	DRAWN: WB
PROJECT: 0375193	CHECKED: AG
DATE: 19/05/2017	APPROVED: RE

Figure 6.1
Water Quality and Flood Risk

ERM

sembcorp

PROJECTION: British National Grid

Path: \\ukbrsdc02\Data\Bristol\Confidential Projects\0375193 TLP2 DCO Support.RE\2. Working Folders\2. GIS\MAPS\PEIR\Fig06.01_0375193_Hydrology_A01.mxd

which is understood to be culverted underneath the southern extent of the Project Site and discharges into the Kettle Beck to the west of the Project Site. Surface water across the Wilton Site generally drains into the Dabholm Gut at the north of the site. The Dabholm Gut, is a small artificial channel into which the Dabholm Beck flows before entering the estuary.

6.111 Beyond the Project Site boundary, the following watercourses of note include:

- River Tees / Tees Estuary approximately 3.5 km northwest of the Project site boundary;
- two reservoirs located at approximately 900 m south of the Project site boundary adjacent to the A174 / A1053 roundabout;
- one pond located at approximately 500 m east of the Project site boundary; and
- a series of reservoirs approximately 1.5 km east of the Project.

Surface Water Quality

6.112 An assessment of water quality baseline conditions has been carried out based on information from the EA (1) and the Envirocheck Report (*Annex D2*).

6.113 The EA is responsible for monitoring water quality in the Northumbria River Basin District (NRBD) and manages a comprehensive programme of flow gauging, chemical and biological testing. Such monitoring informs the EA's compliance reviews for abstractions and discharges, together with supporting the progression of targets and requirements under the Water Framework Directive (WFD) and associated UK legislation(2).

6.114 The closest WFD waterbody to the project site is the Tees Estuary South Bank (WFD ID: GB103025072320). The *Water Framework Directive (WFD, 2000/60/EC)* has the main objectives of protecting, enhancing and restoring Europe's waters, establishing a baseline of no deterioration, and encouraging the sustainable use of water resources and the water environment. The Tees Estuary South Bank is currently classified by the EA as 'moderate potential' for ecological quality and 'good' for chemical quality. The status of a waterbody (its WFD Status) is assessed according to the following criteria, and shown in *Table 6.13*:

- Biological quality: measured by composition and abundance of specified elements such as fish, benthic invertebrates, aquatic flora;

(1) http://environment.data.gov.uk/catchment-planning/WaterBody/GB103025072320
(2) The EU Water Framework Directive (WFD, 2000/60/EC) in 2000 and its transposition into UK law through the Water Environment (Water Framework Directive) (England and Wales) Regulations in 2003

- Hydromorphological quality: measured by reference to elements such as river continuity, channel patterns, dynamics of flow or substrate of the river bed;

- Physico-chemical quality: measured by reference to elements such as temperature, oxygenation, pH, nutrient conditions and the concentrations of specific pollutants (synthetic and non-synthetic); and

- Chemical quality: measured by reference to environmental quality standards for chemical substances at European level. These standards specify maximum annual average concentrations for specific water pollutants.

Table 6.13 Ecological and Chemical Quality of Water Framework Directive Watercourses in the Area Surrounding the Project Site (1)

Topic	Tees Estuary (South Bank)
Waterbody ID	GB103025072320
Waterbody Name	Tees Estuary (South Bank)
River Basin District	Northumbria
Hydromorphological Designation	Heavily modified
Current Ecological Quality (2015)	Moderate Potential
Current Chemical Quality (2015)	Good
2027 Predicted Ecological Quality	Good
2027 Predicted Chemical Quality	Good

Summary of Discharge Consents to Surface Water and Pollution Incidents

6.115 There have been two separate pollution incidents to controlled water within the within 1km of the Project site. The nature and severity of the incident and approximate locations are provided in *Table 6.14*.

Table 6.14 Summary of Pollution Incidents within a 1 km Radius of the Project Site

Distance from the Project site (approximate in m)	Direction from the Project site	Year of Incident	Accident Severity	Pollutant	Receptor of Incident
727	South	1996	Cat. 3 (Minor incident)	Oils - Other Oil	Groundwater
775	West	1995	Cat. 3 (Minor incident)	Oils - Other Oil	Freshwater Stream/River

6.116 The Envirocheck report obtained for this assessment (see *Annex D2*) has identified 9 discharge consents (2), which contribute to the surface water quality of receiving water bodies near the Project site. *Table 6.15* summarises the surface water discharge points adjacent to, or within 1 km from the site of the Project site.

(1) http://environment.data.gov.uk/catchment-planning/WaterBody/GB103025072320
(2) Excluding revoked consents

Table 6.15 Summary of Discharge Consents within 1 km Radius of the Project Site

Distance and Direction From the Project site (approximate in metres)	Operator	Location	Discharge Type	Receiving Water Body	Status
327 (south)	National Grid Electricity Transmissions Plc	Lackenby 275kv Substation Lackenby Lane, Lackenby, Middlesbrough, Cleveland	Trade Discharges - Site Drainage	Tributary Of Kettle Beck	Active
397 (east)	Northumbrian Water Limited	Pasture Lane(Wilton Mh23/) Cso, Wilton	Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company	Dabholm Beck	Active
405 (east)	Northumbrian Water Limited	Pasture Lane(Wilton Mh23/) Cso, Wilton	Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company	Dabholm Beck	Active
411 (east)	Northumbrian Water Limited	Pasture Lane(Wilton Mh23/) Cso, Wilton	Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company	Dabholm Beck	Active
446 (east)	Northumbrian Water Limited	Pasture Lane(Wilton Mh23/) Cso, Wilton	Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company	Dabholm Beck	Active
453 (southeast)	Northumbrian Water Limited	Pasture Lane(Wilton Mh23/) Cso, Wilton	Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company	Dabholm Beck	Active
454 (east)	Northumbrian Water Limited	Pasture Lane(Wilton Mh23/) Cso, Wilton	Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company	Dabholm Beck	Active
500 (southeast)	Northumbrian Water Limited	Wilton Sso No 21b, Wilton	Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company	Dabholm Beck	Active
609 (northeast)	Imperial Chemical Industries Ltd (now owned / operated by Sembcorp)	Cavities Ws10/Ws11, Wilton Works, Cleveland	Trade Effluent	Groundwater	Active

Water Feature Designations and Statutory Designated Sites with Hydrological Connectivity to the Site

6.117 The Tees Estuary is a Special Protection Area (SPA) under the Habitats Regulations, an internationally important wetland under the Ramsar Convention and is home to a number of nationally designated as a Sites of Special Scientific Interest (SSSI). All of these designated sites are located over 1 km from the Project site.

6.118 The Project site is also on the edge of the Lovell Hill Pools SSSI Impact Risk Zone. Since the Lovell Hill Pools SSSI is up gradient from the Project Site, there is no hydraulic connectivity between the SSSI and the Project.

Surface Water Resource Value

6.119 Surface water resource values can be established from the understanding of the general water quality of the watercourse, the current and predicted condition under the Water Framework Directive, whether it provides a valuable economic abstraction source (for commercial, industrial or domestic use) and its supporting role for diverse populations of flora and / or fauna. In consideration that the River Tees, at this location, is part of the Tees Estuary (an international and nationally designated site); this resource value is considered to be 'high'. In regards to the Kettle Beck and land drains within the Wilton International Site; these resource values are considered to be 'medium', based on current water quality / WFD status, current abstraction use (supporting local agriculture practices and energy production) and the regulating role the watercourses play in the hydrologic cycle, in terms of storage, flows and flood alleviation.

6.3.15 The Future Baseline

6.120 The site itself, being within the wider Wilton International Site, is allocated for industrial development and if the Project did not proceed it would likely be replaced by another form of industrial development. Any such development would be required under planning and environmental permitting regulations to be built and operated in such a way that no significant effects resulted on soil and water resources.

6.121 While the site itself is not at risk of flooding, it is anticipated that in response to climate change future rainfall events will be more intense. The Project will incorporate a surface run-off and drainage system that is designed and sized to take into account the future effects of climate change.

6.122 During operation the project will require a water supply for cooling. Although under some climate change scenarios parts of the country may become subject to water stress at certain times of year, the Project will not be a major user of water. Hybrid cooling systems, as proposed for the Project, are designed for the efficient use of water.

6.4 ASSESSMENT OF POTENTIAL EFFECTS

6.4.1 Introduction

6.123 Scoping of potential effects has been informed by the available baseline data for the Project site. Qualitative assessment of risk from potentially contaminated land is covered under guidance documents (1), the approach for which has been combined with impact assessment methodologies in the following sub-sections with a view to identifying mitigation that may be required during construction, operation and decommissioning.

6.124 The purpose of the following sections is to assess likely significant effects and mitigation for the three phases (namely construction, operation and decommissioning) of the Project upon the land and water environment. This includes effects linked to other specialist subjects, for instance the potential for contamination and changes in surface water conditions to affect ecological receptors.

6.125 It is not anticipated that land quality issues, groundwater, surface water and flood risk are likely to present a significant source of potential effects from the Project due to design controls to be implemented during the construction, operation and decommissioning phases.

6.4.2 Construction Phase Potential Effects

General Considerations

6.126 Potential effects during the construction phase of the Project may result from excavation works, piling, dewatering of pits, construction traffic movement, use of plant and equipment and storage of substance with polluting potential (e.g. concretes, fuel, oils and solvents). A laydown area will also potentially be required. This will potentially result in:

- impacts on receptors, which may include construction workers, local residents and commercial workers in adjacent properties;
- changes to development levels and the nature of wastes produced;
- storage and handling of materials (oil, fuel and others) which could leak and/or spill, introducing contaminants to the ground / ground water; and
- changes to the nature and location of contamination sources.

6.127 Effects during construction have the potential to result from changes in contamination sources, including surface water contamination and /or flood risk sources, pathways and receptors (construction workers and visitors), compared to baseline conditions. Construction of the Project may be expected to include potential activities which could, in the absence of mitigation, influence these sources and pathways, as detailed in *Table 6.16*.

(1) Guidance for the Safe Development of Housing on Land Affected by Contamination, R&D Publication 66:2008

6.128 It is important to note that 'an effect' would only be expected where a pollutant linkage exists (i.e. a defined source was connected via a defined pathway to a defined receptor). In the majority of cases, potential effects during construction can be avoided and minimised through standard construction management practices preventing any such pollutant linkages occurring. In addition, other specific additional mitigation, such as method statements and pollution prevention measures, are identified where required.

Potential Soil Resources and Land Quality Effects

6.129 Soils (mainly sub-soils where present as opposed to topsoil) will be affected by physical disturbance during the clearance, stripping, compaction and excavation associated with the construction areas of the Project. Specifically, this will include excavation works for building foundations, piping infrastructure and utilities. Where permanent infrastructure is installed, including foundations to buildings and their footprint, and the introduction of an engineered industrial surface, the impact will be permanent soil loss. However, the site is already largely covered in concrete and the transition to a new engineered industrial surface is considered to be a negligible change, therefore any permanent soil loss will be negligible.

6.130 In terms of impact assessment, the soils at the site are assessed as being of low value due to the presence of the former slabs and foundations and the content of Made Ground associated with historic industrial use (former power station). The overall significance of effect (as defined in *Section 6.2* above) is considered to be negligible in relation to topsoil and minor in relation to subsoil. Where possible, and in the interests of sustainability, it is proposed to re-use the soils on site during the construction of the power station. In the event that soils are removed from site it is proposed to seek opportunities to re-use the soils off site, with disposal to landfill being an option of last resort. The principles and procedures are presented in the draft CEMP and Framework SWMP.

Potential Water Resources Effects

6.131 The construction phase of the Project may include activities such as excavation and clearing of Made Ground, which could, in the absence of mitigation, influence groundwater and / or surface water quality through the mobilisation of existing contaminants. There is also the potential to adversely affect the quality of local water resources by the accidental introduction of materials from the storage of oils, fuels and solvents which could leak or spill to the land or water environment). The direct impacts on surface water quality could include an increase in concentration of heavy metals, hydrocarbons (e.g. from cutting and grinding) or volatile organic compounds (e.g. from paints), an increase in total suspended solids from sediment mobilisation, geochemical variations (i.e. pH values become more acidic or alkaline), and alterations to the flow regime. These potential impacts on surface water / groundwater quality could also contribute to additional adverse effects on the aquatic ecology of the watercourses as well as other

abstraction users (for agricultural / irrigation purposes) downstream, as detailed in *Table 6.16*. It should be noted that 'an effect' would only be expected where a pollutant linkage exists (i.e. a defined source was connected via a defined pathway to a defined receptor). The construction activities that could lead to such impacts would include, but are not limited to, shallow and deep excavations, foundation work such as piling, stockpiling of soils and materials, dewatering of excavation pits / trenches, uncontrolled discharge of water and other fluids and accidental spillage to ground of fuels, oils and lubricants. However it is important to note that potential impacts of this nature can be readily and effectively managed through standard good practice construction methods as set out in the draft CEMP (*Annex* L.

6.132 In terms of impact assessment, the shallow groundwater has been assessed to be of low value, based on the regional aquifer designations and the quality of the shallow groundwater locally.

6.133 The River Tees, at this location, is part of the Tees Estuary (an international and nationally designated site) and therefore this resource is considered to be of high value. However, the pollutant linkage from the activities of the Project to the River Tees is considered to be very low.

6.134 In regards to the Kettle Beck to the west of the Project Site; this resource is considered to be of medium value, based on current water quality / WFD status and the regulating role the watercourses play in the hydrologic cycle, in terms of storage, flows and flood alleviation. The potential pollutant linkage to this watercourse is considered to be low, due to the presence and operation of the Wilton International internal drainage system into which all surface waters will be drained during construction. This drainage system incorporates a number of emergency buffer tanks to mitigate the effects of loss of material to the drainage system, and continuous water quality monitoring is also undertaken, which is regulated under an Environmental Permit prior to discharging into the River Tees.

6.135 The magnitude of the impacts (as defined in *Section 6.2* above) from the area of site clearance, excavation of foundations, and potential accidental leakage of stored fuels and oils is considered low as all construction activities will be undertaken following strict best practice techniques as presented in the draft CEMP *Annex* L. =

6.4.3 Production and Management of Waste Materials

6.136 A number of waste streams will inevitably be produced during the construction phase of the Project. This is likely to include construction waste (such as concrete, brick, metals etc.) and general waste (such as plastics, packaging etc.).

6.137 A separate /standalone draft CEMP(Annex L) has been produced for the Project, together with a Framework SWMP (*Annex D4)*.

6.138 The Framework SWMP provides an outline waste management strategy for the construction phase of the Project, considering likely waste arising from all construction based activities, and addresses how this will be managed through reduction, separation, control and disposal. An approximate breakdown of the types and quantities of waste likely to be produced during the construction phase of the Project is also included in this document.

6.139 Further to the above, the draft CEMP / SWMP documents:

- provide a summary of the legal framework relating to waste production within which the Project will operate;
- describe the waste minimisation / mitigation actions which are anticipated to be employed to manage waste production throughout the construction phase (by the principles of segregation, reuse, recycling etc.);
- identify the likely personnel who will occupy various roles during the construction phase relating to waste production / management (for example the Site Manager, the Site Environmental Co-ordinator etc.); and
- provide details of what monitoring / auditing is anticipated to take place throughout the construction phase, with regards to waste management.

The draft CEMP and Framework SWMP documents are presented in full as *Annex L* and *Annex D4* and will be developed as requirements to the DCO.

Summary of Effects during Construction and their Significance

6.140 In the majority of cases, potential impacts during construction will be avoided and minimised through standard construction management practices. In addition, other specific additional mitigation options with respect to water quality risk (e.g. method statements, water management plans and pollution prevention measures) and flood risk (e.g. flood prevention and surface water management measures), will be implemented where required.

6.141 *Table 6.16* below presents the Project construction activities, the impacts they may have on receptors and the likelihood of these leading to significant effects. The right half of the table lists the value (combining use, importance, sensitivity and vulnerability, as determined in *Section 6.2* above) of the soil or water resource and magnitude of the impact (as defined in *Section 6.2* above) if it were to occur. Engineering design, development procedures and other specific provisions already planned will act to mitigate these impacts (i.e. will reduce the magnitude) and so the *significance* (determined from the matrix of *value vs. magnitude*, see *Table 6.10*) takes into account this magnitude reduction. The final significance of effects has been determined as if the impact had actually happened; since low-likelihood events may lead to certain impacts it is important to also consider the likelihood of an event occurring in assessing the significance of effects.

Table 6.16 Potential Effects during the Construction Phase of the Project

Activity	Potential Effect / Receptor (bold)	Pathway	Likelihood of Source and Linkage	Receptor Value	Magnitude of Impact Prior to Mitigation (1)	Key Mitigations	Magnitude of Impact After Mitigation	Final Significance
Human Health								
Excavation of materials / soil removal	**Construction workers** exposed to historic and current potentially contaminated soil sources on Site	Inhalation of dust and volatile vapours / gases, ingestion and dermal contact	Low	High	Small	• Identification and appropriate procedures to address the risks of contaminated land during excavation • Use of Personal Protective Equipment (PPE) and Respiratory Protective Equipment (RPE) • Handling and storage of potentially hazardous waste soils excavated in accordance with Technical Guidance and best working practices	Negligible	Not Significant
Excavation activities including dewatering of pits	**Construction workers** exposed to potentially contaminated groundwater during excavation and dewatering	Dermal absorption and inhalation of volatile vapours	Low	High	Small	• Identification and appropriate procedures to address the risks of contaminated land during excavation • Use of PPE and RPE • Handling and storage of potentially hazardous waste soils and pit dewatering, excavated in accordance with Technical Guidance and best working practices	Negligible	Not Significant
Traffic movement, creation of	**Construction workers, local residents and**	Inhalation of airborne dust	Low	High	Small	• Dust suppression using industry-standard techniques such as	Negligible	Not Significant

Activity	Potential Effect / Receptor (bold)	Pathway	Likelihood of Source and Linkage	Receptor Value	Magnitude of Impact Prior to Mitigation (1)	Key Mitigations	Magnitude of Impact After Mitigation	Final Significance
contaminative dust	**neighbouring commercial workers** exposed to dust from historic and current potentially contaminated soils					covering soil heaps, misting exposed soils, vehicle and wheel washes • Use of PPE		
Environment including Groundwater and Surface Water Resources								
Disturbance (i.e. excavation, stockpiling, redistribution and / or removal) of historic and current contaminated soils (Made Ground) at / near surface	Potential to remove, relocate or mobilise contaminants (if present) to adjacent **agricultural land to south** which will reduce soil quality in this area	Spreading of soil and migration of contaminants via atmosphere and / or surface run-off on to adjacent land	Low	High	Medium	• Identification and appropriate procedures to address the risks of contaminated land during excavation • Storage of potentially hazardous waste soils excavated in accordance with Technical Guidance and best working practices • Use of construction bunds, temporary site drainage and sediment traps, as required • Dust management on site	Negligible	Not Significant
Disturbance (i.e. excavation, stockpiling, redistribution and / or removal) of historic and current contaminated	Potential to remove, relocate or mobilise contaminants (if present) to nearby **surface waters including Kettle Beck and local drainage features.** This would result in reduced water	Migration of contaminants from surface run-off to surface waters	Low	Medium	Small	• Ensure discharge of all construction site surface water drainage to the Wilton International site drainage system • Identification and appropriate procedures to address the risks of contaminated land during excavation	Negligible	Not Significant

Activity	Potential Effect / Receptor (bold)	Pathway	Likelihood of Source and Linkage	Receptor Value	Magnitude of Impact Prior to Mitigation (1)	Key Mitigations	Magnitude of Impact After Mitigation	Final Significance
soils (made ground) at / near surface	quality with adverse effects on ecology.					• Handling and storage of potentially hazardous waste soils excavated in accordance with Technical Guidance and best working practices • Use of construction bunds, temporary site drainage and sediment traps, as required		
Disturbance (i.e. excavation, stockpiling, redistribution and / or removal) of historic and current contaminated soils (Made Ground) at / near surface	Potential to erode soils and mobilise sediments to nearby **surface waters including Kettle Beck and local drainage features** by surface water runoff. This would increase suspended load and decrease overall water quality.	Migration of eroded materials by surface run-off to surface waters	Low	Medium	Small	• Ensure discharge of all construction site surface water drainage to the Wilton International site drainage system • Use of construction bunds, temporary site drainage and sediment traps, as required • Water quality monitoring programme during construction phase	Negligible	Not Significant
Disturbance (i.e. excavation, stockpiling, redistribution and / or removal) of historic and current contaminated soils	Potential to remove, relocate or mobilise contaminants (if present) to **underlying groundwater** which reduces water quality	Migration of leaching contaminants to the underlying groundwater and potentially laterally to surface water bodies	High	Low	Medium	• Identification and appropriate procedures to address the risks of contaminated land during excavation • Minimise potential to create pathways via appropriate design • Foundation Works Risk Assessment in reference to	Small	Not Significant

Activity	Potential Effect / Receptor (bold)	Pathway	Likelihood of Source and Linkage	Receptor Value	Magnitude of Impact Prior to Mitigation (1)	Key Mitigations	Magnitude of Impact After Mitigation	Final Significance
						EA guidance		
Construction of deep foundations (piles)	Potential to mobilise contaminants (if present) to **underlying groundwater** which reduces water quality	Migration of leaching contaminants to the underlying groundwater and potentially laterally to surface water bodies	High	Low	Medium	• Identification and appropriate procedures to address the risks of contaminated land during excavation • Minimise potential to create pathways via appropriate design • Foundation Works Risk Assessment in reference to EA guidance •	Small	Not Significant
Dewatering of excavations	Discharge of potentially contaminated groundwater to nearby **surface waters including Kettle Beck and local drainage features.** Potential alteration to hydraulic connectivity between groundwater systems and watercourses; Potential effect on water quality and aquatic life.	Migration of contaminants from dewatering and surface run-off to surface waters	Medium	Medium	Medium	• Identification and appropriate procedures to address the risks of contaminated land during dewatering • Ensure that all de-watered excavations are discharged into the Wilton International drainage network as per the anticipated detail presented in the draft CEMP.	Negligible	Not Significant
Dewatering	Disruption of the	Reduction in	High	Low	Medium	• Identification and	Small	Not

Activity	Potential Effect / Receptor (bold)	Pathway	Likelihood of Source and Linkage	Receptor Value	Magnitude of Impact Prior to Mitigation (1)	Key Mitigations	Magnitude of Impact After Mitigation	Final Significance
of excavations	**shallow groundwater system** (flow and continuity) due to dewatering activities	leaching / infiltration and groundwater baseflow.				appropriate procedures to address the risks of contaminated land during dewatering • Monitoring and containment / treatment programme for all water discharges and / or sediment laden runoff • Monitoring programme for groundwater		Significant
Increased traffic on-Site, movement of construction machinery	Potential for sediment mobilisation to nearby **surface waters including Kettle Beck and local drainage features** with a reduction in water quality, in infiltration and increasing surface water runoff	Migration of sediments by surface water runoff to adjacent water bodies	Low	Medium	Small	• Dust suppression using industry-standard techniques such as covering spoil heaps, misting exposed soils, vehicle and wheel washes • Use of sediment traps, as required • Water quality monitoring programme during construction phase	Negligible	Not Significant
Increased traffic on-Site, movement of construction machinery	Potential for sediment mobilisation to nearby **agricultural land to south**	Migration of sediments by surface water runoff to adjacent agricultural land	Low	High	Small	• Dust suppression using industry-standard techniques such as covering spoil heaps, misting exposed soils, vehicle and wheel washes • Use of sediment traps, as required	Negligible	Not Significant
Use of plant	Potential of	Overland flow	Medium	Medium	Medium	• Storage, handling and	Negligible	Not

Activity	Potential Effect / Receptor (bold)	Pathway	Likelihood of Source and Linkage	Receptor Value	Magnitude of Impact Prior to Mitigation (1)	Key Mitigations	Magnitude of Impact After Mitigation	Final Significance
and equipment during construction and storage and use of materials and substances with polluting potential (e.g. concretes, fuel, oils and soils)	accidental leakage or spill of fuels and oils from vehicles, storage or handling areas, introducing contaminants to **surface water including Kettle Beck and local drainage features** which reduces water quality and affect aquatic life.	or through soils to surface waters				fuelling to be undertaken in properly surfaced and bunded areas • Use of construction bunds, temporary site drainage and sediment traps, as required • Rapid spill response planning and training and the implementation of a CEMP		Significant
Use of plant and equipment during construction and storage and use of materials and substances with polluting potential (e.g. concretes, fuel, oils and soils)	Potential of accidental leakage or spill of fuels and oils from vehicles, storage or handling areas, introducing contaminants to **groundwater** which reduces water quality	Vertical migration of product or leaching contaminants to the underlying aquifer	Medium	Low	Medium	• Storage, handling and fuelling to be undertaken in properly surfaced and bunded areas • Rapid spill response planning and training and the implementation of a CEMP.	Negligible	Not Significant
Use of plant and equipment during construction and storage	Potential of accidental leakage or spill of fuels and oils from vehicles, storage or handling areas,	Direct spill of contaminants to agricultural land.	Medium	High	Medium	• Storage, handling and fuelling to be undertaken in properly surfaced and bunded areas • Rapid spill response	Negligible	Not Significant

Activity	Potential Effect / Receptor (bold)	Pathway	Likelihood of Source and Linkage	Receptor Value	Magnitude of Impact Prior to Mitigation (1)	Key Mitigations	Magnitude of Impact After Mitigation	Final Significance
and use of materials and substances with polluting potential (e.g. concretes, fuel, oils and soils).	introducing contaminants to **agricultural land to south** which reduces soil quality.					planning and training and the implementation of a CEMP.		
Excavation of foundations and hard standing.	Potential to alter infiltration patterns, shallow flow pathways and leaching rates.	Creation or reduction of new pathways, reduction in leaching / infiltration.	-	Low	Medium	• Minimise potential to create pathways via appropriate design. • Foundation Works Risk Assessment in reference to EA guidance. • Surface water and groundwater monitoring plan during construction phase.	Small	Not Significant
Surface Water Drainage and Flood Risk								
Excavation, soil removal, and increase of, building footprint, and roads coverage.	Potential for reduction in infiltration and increasing surface water runoff rate.	Creation or reduction of new pathways (e.g. creation of new engineered drainage system and removal of exiting artificial and/ or natural systems).	-	Medium	Medium	• Ensure no large increase in areas of hardstanding. • Minimise potential to create pathways via appropriate design. • Design site drainage to discharge into existing Wilton International surface water drainage system • Use of SUDs where appropriate.	Negligible	Not Significant

(1) The majority of the impacts derive from risk or the possibility of an impact occurring in the first place so the table includes the potential magnitude of impact before measures are included to address the risk

6.4.4 Operational Phase Potential Effects

General Considerations

6.142 Potential effects during the operational phase of the Project may result from the following.

- Where permanent infrastructure is installed (pipework, offices, cooling towers and storage vessels etc.), the impact will be permanent soil loss until the site is decommissioned, although the loss is likely to be negligible since the layout of the proposed structure is similar to the former power station now demolished to slab level, together with the general absence of native soils.

- Impacts on soil quality, groundwater and watercourses could potentially occur during operation from accidental spills from handling or leakage of fuels, lubricants, stored chemicals and process liquids, as presented in the *Table 6.16*. Standard industry practices will be adopted to mitigate potential impacts on soil quality from accidental spills or leaks and so the discussion of impacts will be accordingly proportionate.

- Receptors will change from the baseline and will now include site occupants, commercial users and visitors.

- The nature and volumes of wastes will change including an increase in trade effluent discharges to the Wilton Site drainage system.

- The nature and location of contamination sources will change.

Soil Resources and Land Quality Effects

6.143 Permanent infrastructure of the Project will result in some permanent soil loss (until the decommissioning phase), although it should be noted that topsoil is largely absent from the site. Other temporary impacts will be mitigated by using suitable soils / fill to return the affected areas back to the required quality and value for the planned land use following decommissioning. Details of which are presented in the draft CEMP (*Annex* L). The main potential effect on land quality is from accidental spills and leakage from operational plant and from handling or leakage of fuels, lubricants, stored chemicals and process liquids. This will be mitigated by standard industry practices including appropriate storage and bunding measures, as presented in *Table 6.17*.

6.144 The magnitude of the impact (as defined in *Section 6.2* above) from the limited permanent soil loss and from accidental leaks and spillage, are classified as medium and small respectively.

Water Resources Effects

6.145 The operational phase could potentially generate new impacts on the nearby water environment, principally from the introduction of new, permanent contamination sources (storage of oils, fuels, lubricants and solvents associated with the operational plant and maintenance storage) and an increase in trade effluents (cooling water discharge) to the Wilton Site Drainage System, and ultimately into the River Tees estuary.

6.146 The magnitude of the impacts (as defined in *Section 6.2* above) from trade effluent discharge (cooling water) and from potential accidental leakage of stored fuels and oils and from plant leakage is classified as small, prior to mitigation.

Summary of Effects during Operation and their Significance

6.147 As with the construction phase (see *Table 6.16*), it is envisaged that the majority of potential impacts can be avoided and /or minimised through good operational management practice as defined in the draft CEMP *Annex* L.). The volumes of chemicals stored on site will be small, relating to lubricating oils and water treatment additives. The potential effects during operation are summarised in *Table 6.17*.

Table 6.17 Potential Effects during the Operational Phase of the Project

Activity	Potential Effect / Receptor (bold)	Pathway	Likelihood of Source & Linkage	Receptor Value	Magnitude of Impact Prior to Mitigation (1)	Key Mitigations	Magnitude of Impact After Mitigation	Final Significance
Human Health								
Site operations	Operational users, nearby residents and commercial users and visitors	Inhalation, ingestion and dermal contact of remaining contamination sources in soil and groundwater	Low	High	Small	• Storage and handling of process chemicals to be undertaken in properly surfaced and bunded areas • Rapid spill response planning and training and the implementation of Construction Environmental Management Plan	Negligible	Not Significant
Environment including Groundwater and Surface Water Resources								
Permanent building footprint, hardstanding and roads coverage	Permanent loss of small amounts of mainly sub-**soil** underlying these permanent structures	-	High	Low	Negligible	• Where possible some small areas of open ground/ landscaped areas shall be retained on site.	Negligible	Not Significant
Permanent building footprint, hardstanding and roads coverage	Reduction in infiltration levels affecting shallow aquifer recharge in **groundwater**.	-	High	Low	Medium	• Water monitoring plan during operation • Surface water management system in place including use of (SUDS) where appropriate	Negligible	Not Significant
Site activities including operation of large plant and cooling operations	Spills and leaks, e.g. of lube oil, water treatment chemicals and other polluting substances related to the plant entering **surface waters**	Spill of materials following mechanical failures of plant and lateral	Low	Medium	Medium	• Storage and handling of process chemicals to be undertaken in properly surfaced and bunded areas to industry standards • Bunds, where required and likely to be limited to only	Negligible	Not Significant

Activity	Potential Effect / Receptor (bold)	Pathway	Likelihood of Source & Linkage	Receptor Value	Magnitude of Impact Prior to Mitigation (1)	Key Mitigations	Magnitude of Impact After Mitigation	Final Significance
	including Kettle Beck and local drainage features. Decrease in water quality, changes in geochemistry and effect on aquatic ecology.	migration from surface water run-off				a few locations, will provide 110% of stored volume and constructed with impermeable materials • Rapid spill response planning and training and the implementation of EMPs		
Discharge of process water and surface water runoff from Project site	Pollution of **surface waters including Kettle Beck and local drainage features.** Decrease in water quality, changes in geochemistry and on aquatic ecology.	Vertical migration of process waters and through drainage infrastructure and surface water run-off	Low	Medium	Small	• All process water will discharged to the existing Wilton Site drainage system, through which it will be monitored through the Environmental Permit before discharge into the River Tees • Separate foul water management system including interceptors and treatment where required. • Regular monitoring of water discharges integrated as part of the data control system (DCS)	Small	Minor to Not Significant
Site activities and facilities including handling and containment of waste and oil storage areas	Spills and leaks of oil, fuel and other polluting substances entering and affecting the **groundwater.** Decrease in water quality	Vertical migration of product or leaching contaminants to the underlying aquifer	Low	Low	Small	• Storage and handling of process chemicals to be undertaken in properly surfaced and bunded areas to industry standards • Bunds will provide 110% of stored volume and constructed with	Negligible	Not Significant

Activity	Potential Effect / Receptor (bold)	Pathway	Likelihood of Source & Linkage	Receptor Value	Magnitude of Impact Prior to Mitigation (1)	Key Mitigations	Magnitude of Impact After Mitigation	Final Significance
						impermeable materials rapid spill response planning and training and the implementation of EMPs • Volumes of chemicals stored on site will be limited.		
Site activities and facilities including handling and containment of waste and oil storage areas	Accidental spillage and leaks of oil, fuel and other polluting substances entering and affecting **surface waters including Kettle Beck**. Decrease in water quality, changes in geochemistry and on aquatic ecology.	Spill of materials followed by overland flow or leaching or lateral migration from surface run-off	Low	Medium	Small	• Storage and handling of process chemicals to be undertaken in properly surfaced and bunded areas to industry standards • Bunds will provide 110% of stored volume and constructed with impermeable materials • Rapid spill response planning and training and the implementation of EMPs • Volumes of chemicals stored on site will be limited. • All of the operational site area and chemical stores will be designed to drain into the Wilton Site drainage system.	Negligible	Not Significant
Site activities and facilities including handling and containment	Spills and leaks of oil, fuel and other polluting substances entering and affecting adjacent	Direct spill of contaminants to adjacent agricultural land	Low	High	Small	• Storage and handling of process chemicals to be undertaken in properly surfaced and bunded areas to industry standards	Negligible	Not Significant

Activity	Potential Effect / Receptor (bold)	Pathway	Likelihood of Source & Linkage	Receptor Value	Magnitude of Impact Prior to Mitigation (1)	Key Mitigations	Magnitude of Impact After Mitigation	Final Significance
of waste and oil storage areas	**agricultural land to south** with adverse effects on soil resource value.					• Bunds will provide 110% of stored volume and constructed with impermeable materials. • Volumes of chemicals stored on site will be limited. • Rapid spill response planning and training and the implementation of the CEMP.		
Surface Water Drainage and Flood Risk								
Footprint of operational plant and new hardstanding areas	Potential for reduction in infiltration and increasing surface water runoff rate and volume	Creation or reduction of new pathways (e.g. creation of new engineered drainage system and removal of existing artificial and/ or natural systems)	Low	Medium	Small	• The area of hardstanding / impermeable surfaces will not be increased. • The Wilton Site drainage system will undergo regular inspections and maintenance to ensure effective operation.	Negligible	Not Significant

(1) The majority of the impacts derive from risk or the possibility of an impact occurring in the first place so the table includes the potential magnitude of impact before measures are included to address the risk

6.4.5 Decommissioning Phase Potential Effects

General Considerations

6.148 The decommissioning phase is anticipated to involve the removal of all above surface structures and some buried services, followed by reinstatement of ground to a condition suitable for whatever after use is proposed. A laydown area will also potentially be required.

6.149 Potential effects during the decommissioning phase will be broadly similar to those during the construction phase mentioned in *Section 6.4.2*, in that there will be an influx of new contractors to deconstruct the plant and equipment.

6.150 Potential effects during the decommissioning phase of the Project may result from:

- changes to receptors to include demolition contractors;
- production of bulk wastes from demolition of buildings and hardstanding;
- excavations and dewatering of pits / trenches;
- storage and handling of materials (oil, fuel and others) which could leak and/or spill, introducing contaminants to the ground / ground water and surface watercourses; and
- possible disturbance of contamination sources through ground disturbance which migrate into groundwater and nearby watercourses.

Soil Resources and Land Quality Effects

6.151 Soils within the site of the Project site will be affected by physical disturbance during the clearance, stripping, compaction and excavation associated with the decommissioning phase. Soil rehabilitation will be undertaken for most of the Project infrastructure across the site as pipework, roadways, offices and other non-permanent infrastructure is demolished. However, the extent of rehabilitation will be a function of the proposed after use of the site and so, for example, an industrial after use would likely require no soil rehabilitation at all. The overall objective will be to return the land to a suitable condition for follow on activities. During the removal of surface materials and excavation activities, construction workers may be exposed to historic and current potentially contaminated soil. The other potential effect on land quality during the decommissioning phase is from accidental spills and leakage during the decommissioning of plant and from handling or leakage of fuels, lubricants, stored chemicals and process liquids. This will be mitigated by standard industry practices.

6.152 The magnitude of the impact (as defined in *Section 6.2* above) from accidental leaks and spillage is classified as small.

Water Resources Effects

6.153 The decommissioning phase of the Project will likely include activities similar to the construction phase, such as excavation and clearing of Made Ground, which could, in the absence of mitigation, influence surface water quality through the mobilisation of existing contaminants.

6.154 Decommissioning activities would include, but are not limited to, shallow and deep excavations (with potential associated dewatering of excavation pits / trenches), removal of previous foundation works such as piling and building infrastructure and pipework, uncontrolled discharge of water and other fluids and accidental spillage to ground of fuels, oils and lubricants. Local water resources quality could be adversely affected by the accidental introduction of temporary new effluents (storage of oils, fuels and solvents which may leak or spill to the land or water environment) used during the decommissioning phase, although with appropriate planning in relation of the sequencing of the works, the impact is likely to be limited. The direct impacts on surface water quality could include an increase in concentrations of heavy metals, hydrocarbons or volatile organic compounds, an increase in total suspended solids from sediment mobilisation, geochemistry variations (i.e. pH values become more acidic or alkaline), and alterations to the flow regime (decrease in surface water levels), however again these risks are likely to be limited given appropriate sequencing of the works and the application of standard good practice.

6.155 The removal of hardstanding from the Project site to natural soils would also affect infiltration rates into the groundwater.

6.156 These potential impacts on surface water / groundwater quality could also contribute to additional adverse effects on the aquatic ecology of the watercourses, as detailed in *Table 6.18*. It should be noted that 'an effect' would only be expected where a pollutant linkage exists (i.e. a defined source was connected via a defined pathway to a defined receptor).

6.157 The magnitude of the impacts (as defined in *Section 6.2* above) from the area of site clearance, excavations for removal of building infrastructure and foundations, dewatering of pits and potential accidental leakage of stored fuels and oils are classified as medium. In regards to the magnitude of the impacts from decommissioning of above ground infrastructure (plant), temporary abstraction and site traffic movements; these are considered to be small.

Flood Risk Effects

6.158 The decommissioning phase of the Project may lead to changes to surface water runoff, hydrological characteristics and flood risk on the Project Site and surrounding environment. Specifically, the decommissioning activities (e.g. excavation of materials, soil replacement, and a decrease in hardstanding coverage) could potentially alter the soil properties and drainage

characteristics, leading to alterations in surface water runoff rate and volume and creating new potential pathways. Following the decommissioning phase, infiltration rates could potentially mirror a pre-development setting, before the introduction of land raising and hardstanding.

6.159 In the majority of cases, potential impacts from decommissioning activities can be avoided and minimised through standard construction management practices. The potential effects during decommissioning are summarised in *Table 6.18*.

Table 6.18 Potential Effects during the Decommissioning Phase of the Project

Activity	Potential Effect / Receptor (bold)	Pathway	Likelihood of Source & Linkage	Receptor Value	Magnitude of Impact Prior to Mitigation (1)	Key Mitigations	Magnitude of Impact After Mitigation	Final Significance
Human Health								
Excavation of materials / soil removal	**Demolition workers** exposed to historic and current potentially contaminated soil sources on Site	Inhalation, ingestion and dermal contact	Low	High	Small	• Identification and appropriate procedures to address the risks of contaminated land during excavation • Use of PPE and RPE • Handling and storage of potentially hazardous waste soils excavated in accordance with Technical Guidance and best working practices	Negligible	Not Significant
Dewatering of excavation pits and trenches	**Demolition workers** exposed to potentially contaminated groundwater during excavation and dewatering	Dermal absorption and inhalation of volatile vapours	Very Low	High	Small	• Identification and appropriate procedures to address the risks of contaminated land during excavation • Use of PPE • Handling and storage of potentially hazardous waste soils and pit dewatering, excavated in accordance with Technical Guidance WM2	Negligible	Not Significant

Activity	Potential Effect / Receptor (bold)	Pathway	Likelihood of Source & Linkage	Receptor Value	Magnitude of Impact Prior to Mitigation (1)	Key Mitigations	Magnitude of Impact After Mitigation	Final Significance
Removal of surface structures and crushing of concrete/brick	**Demolition workers** exposed to potentially contaminated dust	Inhalation of airborne dust	Low	High	Small	• Development and implementation of decommissioning plan (DP) • Dust suppression using industry-standard techniques such as covering spoil heaps, misting exposed soils, vehicle and wheel washes • Use of PPE	Negligible	Not Significant
Traffic movement, creation of contaminative dust	**Demolition workers and nearby residents / workers** exposed to potentially contaminated dust	Inhalation of airborne dust	Low	High	Small	• Development and implementation of DP • Dust suppression using industry-standard techniques such as vehicle and wheel washes • Use of PPE	Negligible	Not Significant
Environment including Groundwater and Surface Water Resources								
Decommissioning of buildings, pipework and infrastructure; use of plant and vehicles during decommissioning	Potential of accidental leakage of process chemicals from buildings, pipelines during decommissioning; and fuels spills from storage and handling and from plant and vehicles introducing contaminants to	Overland flow or through soils to surface waters	Low	Medium	Small	• Storage and handling of fuels to be undertaken in properly surfaced and bunded areas • Use of temporary bunds, site drainage and sediment traps, as required • Development and implementation of DP • Rapid spill response planning and training	Negligible	Not Significant

Activity	Potential Effect / Receptor (bold)	Pathway	Likelihood of Source & Linkage	Receptor Value	Magnitude of Impact Prior to Mitigation (1)	Key Mitigations	Magnitude of Impact After Mitigation	Final Significance
	surface water. This would result in reduced water quality with adverse effects on ecology.					and the implementation of the CEMP.		
Decommissioning of process pipework and infrastructure; use of plant and vehicles during decommissioning	Potential of accidental leakage or spill of process chemicals from buildings, pipelines during decommissioning; and fuels spills from storage and handling and from plant and vehicles introducing contaminants to **groundwater.** This would result in reduced water quality.	Vertical migration of product or leaching contaminants to the underlying shallow groundwater	Medium	Low	Small	• Storage and handling of fuels to be undertaken in properly surfaced and bunded areas • Development and implementation of DP • Rapid spill response planning and training and the implementation of CEMP.	Negligible	Not Significant
Decommissioning of process pipework and infrastructure; use of plant and vehicles during decommissioning	Potential of accidental leakage or spill of process chemicals from buildings, pipelines during decommissioning; and fuels spills from storage and handling and from plant and vehicles introducing	Direct spill of contaminants to agricultural land	Low	High	Small	• Storage and handling of fuels to be undertaken in properly surfaced and bunded areas • Development and implementation of DP • Rapid spill response planning and training and the implementation of the	Negligible	Not Significant

Activity	Potential Effect / Receptor (bold)	Pathway	Likelihood of Source & Linkage	Receptor Value	Magnitude of Impact Prior to Mitigation (1)	Key Mitigations	Magnitude of Impact After Mitigation	Final Significance
	contaminants to **agricultural land to south** which would reduce soil quality.					CEMP.		
Increased traffic on-Site, movement of decommissioning machinery	Potential for sediment mobilisation to nearby **surface waters including Kettle Beck and local surface water features** with a reduction in water quality, in infiltration and increasing surface water runoff	Migration of sediments by surface water runoff to adjacent water bodies	Low	Medium	Small	• Dust suppression using industry-standard techniques such as vehicle and wheel washes • Use of sediment traps, as required • water quality monitoring programme during construction phase	Negligible	Not Significant
Export, excavation, stockpiling, redistribution and / or removal of the Made Ground	Potential to remove, relocate or mobilise contaminants (if present) to adjacent **surface water.** This would result in reduced water quality with adverse effects on ecology.	Migration of contaminants from surface run-off to surface waters	Medium	Medium	Medium	• Identification and appropriate procedures to address the risks of contaminated land during excavation • Handling and storage of potentially hazardous waste soils excavated in accordance with Technical Guidance and best working practices • Use of construction bunds, temporary site drainage and sediment traps, as required	Negligible	Not Significant

Activity	Potential Effect / Receptor (bold)	Pathway	Likelihood of Source & Linkage	Receptor Value	Magnitude of Impact Prior to Mitigation (1)	Key Mitigations	Magnitude of Impact After Mitigation	Final Significance
						• Water Monitoring Programme		
Export excavation, stockpiling, redistribution and / or removal of the Made Ground	Potential to remove, relocate or mobilise contaminants (if present) to underlying **groundwater.** This would result in reduced water quality.	Migration of leaching contaminants to the underlying groundwater and thereby laterally to surface water bodies	High	Low	Medium	• Identification and appropriate procedures to address the risks of contaminated land during excavation • Minimise potential to create pathways via appropriate design • Monitoring Program	Negligible	Not Significant
Export, excavation, stockpiling, redistribution and / or removal of the Made Ground	Potential to remove, relocate or mobilise contaminants (if present) to adjacent **agricultural land to south**	Migration of contaminants by atmosphere and / or from surface run-off to adjacent land	Low	High	Medium	• Identification and appropriate procedures to address the risks of contaminated land during excavation • Handling and storage of potentially hazardous waste soils excavated in accordance with Technical Guidance and best working practices • Use of construction bunds, temporary site drainage and sediment traps, as required	Negligible	Not Significant
Removal of hardstanding and buildings	Discharge of potentially contaminated water	Migration of contaminants from	Low	Medium	Small	• Minimise potential to create pathways via appropriate design	Negligible	Not Significant

Activity	Potential Effect / Receptor (bold)	Pathway	Likelihood of Source & Linkage	Receptor Value	Magnitude of Impact Prior to Mitigation (1)	Key Mitigations	Magnitude of Impact After Mitigation	Final Significance
	to **surface water.** This would result in reduced water quality with adverse effects on ecology	dewatering and surface run-off				• Development and implementation of DP • Surface water and groundwater monitoring plan during decommissioning phase		
Removal of hardstanding and buildings	Change in the groundwater system (flow and continuity) due to potential raising of shallow **groundwater.** This would result in reduced water quality.	Migration of leaching contaminants to the underlying groundwater	High	Low	Medium	• Minimise potential to create pathways via appropriate design • Development and implementation of DP • Surface water and groundwater monitoring plan during decommissioning phase	Negligible	Not Significant
Removal of foundation works and buried services	Preferential pathway created for migration of contaminated materials to underlying **groundwater.** This would result in reduced water quality.	Contaminated soils could leach and / or groundwater could migrate vertically through shallow deposits to underlying groundwater	Medium	Low	Medium	• Development and implementation of DP	Negligible	Not Significant
Surface Water Drainage and Flood Risk								
Excavation, soil removal, and decrease of hard	Potential for an increase in infiltration and	Creation or reduction of new	-	Medium	Medium	• Minimise potential to create pathways via appropriate design	Negligible	Not Significant

Activity	Potential Effect / Receptor (bold)	Pathway	Likelihood of Source & Linkage	Receptor Value	Magnitude of Impact Prior to Mitigation (1)	Key Mitigations	Magnitude of Impact After Mitigation	Final Significance
standing, building footprint, and roads coverage	decrease surface water runoff rate and volume	pathways (e.g. creation of new engineered drainage system and removal of exiting artificial and/ or natural systems)				• Flood prevention measures to be designed including surface water management on the Site • Development and implementation of DP		

(1) The majority of the impacts derive from risk or the possibility of an impact occurring in the first place so the table includes the potential magnitude of impact before measures are included to address the risk

6.4.6 Cumulative Effects

Geology and Land Contamination

6.160 It was proposed to scope out cumulative geology and land contamination impacts on the basis that all ground condition and contamination impacts would be confined to the Project site and there would be no great requirement for off-site soil disposal. However, Section 6.3.5 of the Scoping Report also states that *if* contamination *is* encountered on the site, mitigation measures will be incorporated into the construction programme, which suggests that there may still be potential for significant effects.

6.161 It should be noted that the approach adopted above is common to the redevelopment of all brownfield sites, in that a brownfield site cannot be guaranteed to be free from contamination even following an extensive site investigation. The potential for a contaminant hotspot to be present between boreholes is a risk, although the risks are reduced through a review of the site history, recordable spills, and the results of the site investigation.

6.162 At this stage the results of the investigation are favourable; any spills appeared to have been managed and the site history is known. The risk of encountering contamination worthy of remediation is considered to be low. Details of the spills recorded during the operation of the former Teesside Power Station are presented in the *Surrender Site Condition Report for Teesside Power Station, October 2015* (*Annex D3*)

Water and Drainage

6.163 The Project will be constructed on the site of a former power station, utilising the existing water supply and drainage networks that are present within the Wilton International Site. As all of the industrial bodies within the Wilton International site are connected into the same water supply and drainage network, it is reasonable to conclude that cumulative effects would only arise as a result of the water uses of organisations within the Wilton International Site. As such, the Wilton International Site can be considered to be a simple hydrological network, with a single shared input and shared output.

6.164 The shared input is the main Northumbrian Water main, which supplies water to all businesses on the site. The output is the Wilton International surface water drainage system, which collects surface water runoff and effluent from all businesses on the site and ultimately discharges to the River Tees estuary via the Dabholm Gut.

6.165 With regards to cumulative effects on water availability, the water supply to the Project will be provided by Northumbrian Water (as is the current situation), and as such the availability of water will be regulated within the water supply agreement between Sembcorp and Northumbrian Water. Northumbrian Water has a responsibility to all of its customers to ensure that

the quantity of water taken from its system by any single customer, or group of customers will not have a detrimental (cumulative) effect on any other water users; i.e. customers outside of the Wilton International Site. As such, in terms of water supply, no cumulative effects on other water users are anticipated.

6.166 With regards to cumulative effects on water quality, the discharge of waste water from the site will be via the Wilton International Site surface water drainage system. This discharge is monitored on site and operated under an existing environmental permit (254/1813, 2005). When granting an environmental permit, the EA considers the other permitted activities in the locality to ensure that, in combination, these activities will not have an unacceptable cumulative effect. As the Project will be operated under the requirements of an Environmental Permit, it is anticipated that no cumulative effects on water quality will result.

6.5 UNCERTAINTY AND KEY ASSUMPTIONS

6.167 The current Conceptual Site Model (CSM), presented within this chapter is based on the accuracy of previous intrusive site investigations conducted to date noting that EA has accepted the site surrender report.

6.168 A key assumption of the CSM is the potential for plausible pathways that may exist relevant to the Project; specifically, the assumed likelihood, in the absence of mitigation, for lateral migration of contaminants to affect adjacent agricultural land and enter the adjacent field surface water receptors (Kettle Beck and local drainage features). It is anticipated that there will be no impacts on any water bodies that are separated by some distance from the Project site since they will not be linked hydraulically in any way to construction activity or be too distant for lateral flows to affect them. With regard to the Kettle Beck, processes will be put in place to ensure that stockpiles and other sources of potential pollution are sufficiently distant from the watercourse to ensure there is no pathway for pollution to move from the construction site to the receptor (as detailed in the draft CEMP).

6.6 MITIGATION

6.6.1 Introduction

6.169 This section provides provisional mitigation measures for the Project in regards to land quality, water resources and flood risk.

6.6.2 Construction Phase

6.170 In order to mitigate the impacts during foundation works and general earthworks, appropriate good practice techniques will be employed. The mitigation measures will follow the principles of negative impact mitigation, namely avoid, minimise, reduce and repair. That is, it is preferable to avoid or

change the activity such that the impact is reduced/minimised/removed. If that cannot be practically achieved, then actions will be taken to repair the area after the impact has occurred. If all other mitigation fails, it may be necessary to provide an offset for an affected resource.

6.171 Mitigation will be achieved through professional judgement in the design of the Project and careful management of the construction process. Resources to assist with design and construction will include the draft CEMP, the design aspects of the Construction (Design and Management) Regulations 2015 (CDM), and guidance from the Construction Industry Research and Information Association (CIRIA) and DEFRA guidance on the management of soils and water in development projects, such as;

- CLR11 - Model Procedures for the Management of Land Contamination, Environment Agency 2004;
- GPLC2 – FAQs, technical information, detailed advice and references as published by the Environment Agency; and
- Groundwater Pollution Prevention Principles (GP3), Environment Agency, March 2017.

6.172 Some of the core elements of the final CEMP in relation to geology, hydrogeology, land quality, surface water and flood risk, will be as follows.

- Materials moved onto and around the Project site will be minimised through careful design of the Project and the construction schedule. The movement and re-use of soils shall be tracked in an MMP.
- If external fill material is used during site earthworks and surfacing activities, then it will be validated prior to use and tracked from origin in the MMP.
- The removal from site of materials during construction will be minimised through adopting the principles of re-use on site where appropriate and a balanced cut and fill approach.
- The disposal of waste, including any surplus spoil, will be managed so far as is reasonably practicable to maximise the environmental and development benefits from the use of surplus material and reduce any adverse environmental effects of disposal in accordance with the relevant waste management regulations e.g. Environmental Permitting Regulations 2016 and Waste (England and Wales) Regulations 2011 and as presented in the Framework SWMP (*Annex D4*).
- The potential to create pathways for contaminants to travel to the underlying groundwater will be minimised through appropriate design of pilings. Planning and preparing for piling works will follow a separate pre-construction Foundation Works Risk Assessment, and the construction

activities will be undertaken in reference to EA guidance, specifically "*Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention*".

- If contamination that has not been previously identified is encountered on the Project site, no further activity at that location would take place which could disturb that contaminated material until a site investigation has been carried out and appropriate mitigation identified. Moreover, the safety officer (or similar) will ensure that a workers 'safety information sheet' is prominently displayed in rest/mess rooms and wash rooms covering such matters as hygiene, work practices and clothing requirements.

- In the unlikely scenario that unforeseen contamination is found on the Project site, and requires remediation, risk assessments and a remediation strategy would be used to outline elimination of the contaminated materials. These would be agreed with the regulators before the works commenced.

- In the unlikely event that soil gas is identified as a risk requiring vapour / gas mitigation measures, monitoring would be carried out and the necessary gas mitigation measures would be applied.

- All dewatering activities during excavation and foundation works will include monitoring of water discharges or sediment laden runoff, and will where appropriate be treated prior to discharge to the Wilton Site drainage system. All discharged water will transit through a sedimentation pond with in the drainage system to remove particulates prior to discharge into the River Tees as per the Environmental Permit.

- Performance of the construction temporary drainage network, including foul drainage provisions, will be monitored regularly for water quality prior to discharge.

- In the event of accidental spills involving hydrocarbons, contaminated water will be isolated at the closest intermediate point of intervention and appropriately treated on site prior to disposal or removed off-site for appropriate treatment and disposal.

- A Construction SWMP will be developed in accordance with relevant non-statutory guidance from the Department for Environment Food and Rural Affairs (DEFRA, 2008) e.g. pb13530 Waste Hierarchy Guidance (2011) and Non-statutory guidance for site waste management plans (2008), the Waste Resources Action Programme (WRAP) and in consultation with &CBC. The plan will identify:
  - responsibilities for waste management in accordance with the 'Duty of care';
  - the waste category and quantities of materials generated;
  - measures to minimise waste generation;

- opportunities for recycling and/or re-use;
- proposed treatment and disposal routes; and
- licensing requirements.

- The Construction SWMP will include an audit programme to be undertaken to demonstrate compliance with statutory requirements.

- Provision will be made within the Construction SWMP for a suitable environmental specialist to identify any 'Hazardous Waste' as defined in The Hazardous Waste (England and Wales) Regulations 2005 (as amended) so that it can be suitably managed and disposed of during works.

- The re-use of soil and crushed concrete shall be managed on site based on a site specific MMP as developed based on the principles presented in the Definition of Waste Code of Practice (DoWCoP) authored by CL:AIRE.

- Appropriate precautions will be taken if materials containing asbestos are encountered. The contractor will observe the exposure limits and measurement methods for asbestos, set out in the Control of Asbestos Regulations 2012.

6.173 At the pre-construction stage a separate Sediment Control Plan (SCP) will be designed and followed by contractors throughout the construction process. This will outline the routine working and emergency procedures for the control and mitigation of erosion and dust generation during excavations and soil handling, such as stockpiling soil away from watercourses and undertaking earthworks during dry weather conditions where possible (see *Chapter 9: Air Quality*).

6.174 The Project will be constructed in accordance with best working practices and measures to protect the water environment and will be in accordance with those measures set out in relevant EA Pollution Prevention Advice and Guidance (PPG) notes.

6.175 The final CEMP will be developed in consultation with the EA, R&CBC and the Engineering, Procurement and Construction ('EPC') contractor. It will include mitigation measures for avoiding spills and leaks of materials used during the construction process, such as fuels, oil and lubricants. The final CEMP will include provision for a temporary drainage system to deal with surface water runoff within the construction area, and ensure that it is discharged to the existing Wilton Site drainage system.

6.176 With these measures all identified temporary adverse impacts in relation to ground conditions, contamination and the water environment will be suitably mitigated.

6.6.3 Operational Phase

6.177 During the operational phase of the Project, potential effects on the land and water environment, including flood risk, mainly relate to the storage and use of polluting materials (i.e. oils and fuel) and waste management.

6.178 The process water required for, and liquid effluents resulting from, the Project will be managed by the existing Wilton Site drainage system, and monitored under the existing Environmental Permit. Operational effluents including oil-contaminated, chemically-contaminated, drainage from storage areas and cooling-water effluents will be discharged to the Wilton Site drainage system before being monitored and discharged.

6.179 Surface water runoff, processing and waste water discharges to the Wilton Site drainage system will be to the acceptable standards as agreed in the Environmental Permit with the EA and prior to any temporary or operational discharges. Data from the continuous and regular monitoring of water discharges will be integrated into the Project's DCS, with relevant control-room alarms. Operational staff will have access to environmental information and be trained in the understanding of regulatory limits and the measures necessary to comply with them. Historical records will be maintained in accordance with the terms of the permit.

6.180 In terms of surface water runoff management, the Project will utilise the existing Wilton International drainage system. This system will ensure that there is no change in the surface water discharge regime as a result of the Project and that all surface waters are monitored and tested before being discharged through the existing infrastructure.

6.181 All areas where potentially polluting substances will be stored and used will be designed with appropriate bunding to industry standards. Bunds will provide 110% of stored liquid volumes and be constructed of impermeable materials. In the unlikely event of an oil or chemical spill into the bund system, the oil would be pumped out for re-use if possible, or disposed of in an environmentally acceptable manner; such as delivery to an appropriately licensed waste recovery / disposal facility.

6.182 Management procedures for waste transport on to /off the Project site will be in place, and regularly audited.

6.183 Emergency and contingency plans will be developed to safeguard operational activity, Site users and quality of surface water.

6.184 The operation of the combustion plant will be controlled under a new Environmental Permit, subject to further discussion with the EA. The Project will be operated in accordance with best working practices and measures to protect the land and water environment and will be in accordance with those set out in relevant EA Pollution Prevention Advice and Guidance (PPG) notes.

6.6.4 Decommissioning Phase

6.185 The mitigation measures to avoid, minimise and reduce potential negative impacts during the decommissioning phase are very similar to those of the construction phase mentioned in *Section 6.6.2*. The design of the Project will have had the post-operational land use in mind, and have been designed to minimise the amount of rehabilitation works needed and the operational phase will have been operated so as to have minimised the amount of waste or contamination to handle during the decommissioning phase.

6.186 Decommissioning activities will be undertaken through the development of a DP. The Contractor will be required to adhere to the DP which will be enforced and discharged via the local planning authority.

6.187 The DP will be developed in consultation with the EA, RCBC and site contractor. It will include mitigation measures for avoiding spills and leaks of materials used during the decommissioning process, such as oil and lubricants. Within the context of surface water quantity and quality, the DP considers the drainage and water quality monitoring systems to deal with surface water runoff, sediments and contaminants migration during the decommissioning phase.

6.188 In order to mitigate the effects during decommissioning works, appropriate good practice techniques will be employed, including the following.

- Site investigations will be undertaken before decommissioning to assess the potential for contamination from the operational phase. If the potential for contamination exists, no material will be moved until the risks of that contamination have been assessed and can be appropriately managed.

- A SWMP will include decommissioning activities. The plan will identify:
  - responsibilities for waste management;
  - the waste category and quantities of materials generated;
  - measures to minimise waste generation;
  - opportunities for recycling and/or re-use;
  - proposed treatment and disposal routes; and
  - licensing requirements.

- The SWMP will also include an audit programme to be undertaken to demonstrate compliance with statutory requirements.

- Provision will be made for a suitable environmental specialist to identify any 'Hazardous Waste ' as defined in The Hazardous Waste (England and Wales) Regulations 2005 (as amended) so that it can be suitably managed and disposed of during works.

- The movement of materials on site will be minimised through careful design of the Project Site and the decommissioning schedule. This should be completed in line with a bespoke MMP.

- Fill material for site earthworks activities (filling excavations, levelling etc.) will be sourced from on-site wherever possible.

- The disposal of waste will be managed so far as is reasonably practicable to maximise the environmental and development benefits from the use of surplus material and reduce any adverse environmental effects of disposal.

- Minimising the potential to create pathways for contaminants to travel to underlying groundwater through appropriate decommissioning of pilings.

6.189 The SCP noted in *Section 6.6.2* will be designed to include the decommissioning phase and returning the site to its end use. It will outline the routine working and emergency procedures for the control and mitigation of erosion and dust generation during excavations and soil handling, such as stockpiling soil away from watercourses and undertaking earthworks during dry weather conditions where possible.

6.190 A site emergency response and contingency plan will be developed in consultation with the EA, RCBC and the EPC contactor. The plan will be a requirement to the DCO, and will include measures for safety of people working on the Project site (in respect to flood risk and water quality issues) during the decommissioning phase.

6.191 The Project will be decommissioned in accordance with best working practices and measures to protect the land and water environment and will be in accordance with those set out in relevant EA PPG notes applicable at the time. Furthermore, the decommissioning phase will be designed to be in full compliance with technical guidance and best practices documents relevant to other Health and Safety legislation that will apply throughout any works on the Project site at the decommissioning phase.

6.192 With these measures in place, all identified temporary adverse impacts in relation to ground conditions and contamination, groundwater and surface water resources and flood risk will be dealt with.

6.7 CONCLUSIONS

6.193 From a land and water resource perspective, potential effects during the construction phase of the Project are particularly focused on preventing the mobilisation of material which may affect the environment. This may be sub-soil or pre-existing contamination sources within the sub-soil.

6.194 The soil and groundwater condition at the site are considered to be low risk given the presence of low permeability superficial deposits overlying mudstone. Whilst there are several minor watercourses/drainage ditches in close proximity to the site, the potential for existing contamination is limited.

6.195 In relation to the Project, potential impacts during construction can be avoided and minimised through standard construction management practices, as outlined in the draft CEMP. This will include the development of a SWMP and MMP to maximise the re-use of soils and crushed concrete on site where possible.

6.196 During the operational phase, land quality impacts will be of lesser concern. Potential effects on the water environment are also unlikely as the Project will be constructed to make use of the existing site water disposal and drainage infrastructure, via the Wilton International Site surface water drainage system.

6.197 Potential impacts during operation can be avoided and minimised through appropriate water management plans and designs for flood prevention management measures.

6.198 As with the construction-related effects, demolition effects can be avoided and minimised through standard construction management practices. Given the anticipated operational life of the Project, and the ever improving standards for construction, current best practices may not be applicable at the time that the Project is decommissioned, and as such, a Decommissioning Plan will be produced and submitted to the appropriate authority prior to decommissioning. This will be secured by way of a requirement attached to the DCO.

6.199 Following a review of available information, it is believed that the risks can be appropriately managed and there should be no significant effects on the ground, water resources and flood risk during the construction, operation and decommissioning of the Project.