Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Environmental Statement Volume 3

Chapter 6: Ground Conditions, Flood Risk and Land Use

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Vattenfall Wind Power Ltd

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Volume 3

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6 GROUND CONDITIONS, FLOOD RISK AND LAND USE

6.1 Introduction

6.1.1 This chapter sets out the results of the assessment of effects of the proposed development of Thanet Extension Offshore Wind Farm (Thanet Extension) on ground conditions, flood risk and land use. It should be read in conjunction with the Environmental Statement (ES) Volume 2, Chapter 1: Onshore Project Description (Document Ref: 6.2.1), as well as Volume 3, Chapter 5: Terrestrial Ecology (Document Ref: 6.3.5); Volume 3, Chapter 9: Air Quality (Document Ref: 6.3.9); and Volume 3, Chapter 10: Noise and Vibration (Document Ref: 6.3.10).

6.1.2 This chapter is supported by a number of annexes as listed below:

- Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1); and
- Volume 5, Annex 6-2: Flood Risk Assessment (Document Ref: 6.5.6.2).

6.1.3 This chapter outlines the relevant legislation, policy and guidance and consultation that informed the assessment, and the data gathering methodology that was adopted as part of the assessment.

6.1.4 The baseline conditions, the scope of the assessment and the assessment methodology are then described. The maximum design scenario is then identified and this is followed by the assessment of effects on the ground conditions, flood risk and land use receptors.

6.2 Statutory and policy context

6.2.1 A study of ground conditions, flood risk and land use related planning legislation, policy and guidance at the European, national, regional and local level was undertaken to highlight any requirements that Thanet Extension application needs to consider. This legislation and policy context has been summarised in Table 6.1. It is always important that policies, legislation and guidance are taken into consideration as they help to define the scope of assessment and can inform the identification of particular local issues. Further details of national and local planning policies relevant to Thanet Extension application can be found in Volume 1, Chapter 2: Consents, Policy and Legislation (Document Ref: 6.1.2).

Table 6.1: Legislation and policy context

Policy/ legislation	Key provisions	Section where provision addressed
National Planning Policy Statement (NPS) for Energy (EN-1)	This identifies requirements to assess the potential impacts of energy projects on flood risk (Section 5.7), and water quality and water resources (Section 5.15), including consideration of climate change effects over the proposed development lifetime (Section 4.8).	An assessment of effects on the water environment has been considered in: Environmental assessment during construction, operation and maintenance (O&M), and decommissioning phase - sections 6.10 - 6.12; and Volume 5, Annex 6-2: Flood Risk Assessment Study (Document Ref: 6.5.6.2).
	Paragraph 5.15.2 requests that where the project is likely to have effects on the water environment, the applicant should undertake an assessment of the existing status of, and impacts of the proposed project on, water quality, water resources and physical characteristics of the water environment as part of the ES or equivalent.	The future baseline, accounting for climate change is presented in: Volume 5, Annex 6-2: Flood Risk Assessment Study (Document Ref: 6.5.6.2). An assessment of the effects on the water environment (including water quality, water resources, and physical characteristics) is provided in: Environmental assessment during construction, O&M, and decommissioning phase - sections 6.10 - 6.12; and Embedded mitigation - section 6.1 and Mitigation - section 6.15.
	Paragraph 5.15.3 requests that "The ES should in particular describe: • The existing quality of waters affected by 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 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 in 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 WFD [Water Framework Directive] and Source Protection Zones (SPZs) around potable groundwater abstractions".	The baseline characteristics of the water environment (which includes water quality, water resources, and flood risk) has been provided in: Environmental assessment during construction, O&M, and decommissioning phase - sections 6.10 - 6.12; and Embedded mitigation - section 6.1 and Mitigation - section 6.15.

Policy/ legislation	Key provisions	Section where provision addressed
	Paragraph 5.7.7 states that "Applicants for projects which may be affected by, or may add to, flood risk should arrange pre-application discussions with the EA [Environment Agency], and, where relevant, other bodies such as Internal Drainage Boards [IDBs], sewerage undertakers, navigation authorities, highways authorities and reservoir owners and operators. Such discussions should identify the likelihood and possible extent and nature of the flood risk, help scope the FRA [Flood Risk Assessment], and identify the information that will be required by the Infrastructure Planning Committee IPC [now The Planning Inspectorate for England and Wales (PINS)] to reach a decision on the application when it is submitted."	Discussions with the EA and Lead Local Flood Authorities (LLFAs) have been carried out throughout the environmental assessment process. Details of the consultation are provided in section 6.3; and Volume 5, Annex 6-2: Flood Risk Assessment Study (Document Ref: 6.5.6.2).
	Paragraph 5.15.6 outlines that "The IPC [now PINS] should satisfy itself that a proposal has regard to the River Basin Management Plans [RBMPs} and meets the requirements of the Water Framework Directive (including Article 4.7) and its daughter directives, including those on priority substances and groundwater."	WFD classifications and objectives are taken into account, as the WFD water bodies themselves are receptors outlined in: Existing environment - section 6.7; and Environmental assessment during construction, O&M, and decommissioning phase - sections 6.10 - 6.12.
NPS for Electricity Networks Infrastructure (EN-5)	Paragraph 2.4.1 requires that "Applicants should set out to what extent the proposed development is expected to be vulnerable, and, as appropriate, how it would be resilient to: flooding, particularly for substations that are vital for the electricity transmission and distribution network; effects of wind and storms on overhead lines; higher average temperatures leading to increased transmission losses; and earth movement or subsidence caused by flooding or drought (for underground cables)."	Matters relating to the issue of resilience to flooding have been considered in: Volume 5, Annex 6-2: Flood Risk Assessment Study (Document Ref: 6.5.6.2).
Environmental Liability Directive (2004/35/EC)	This requires an operator to take preventative, as well as remedial, measures. It applies both to damage that has occurred and where there is an imminent risk of it occurring. The Environmental Liability Directive is implemented in England by the Environmental Damage (Prevention and Remediation) Regulations 2009 (SI 2009/153).	Matters relating to preventive and remedial measures have been considered in: Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1); and Embedded mitigation – section 6.1 and Mitigation - section 6.15. The WFD assessment for coastal and transitional waters is presented in Volume 4, Annex 3-1: Water Framework Directive Assessment (Document Ref: 6.4.3.1).

Policy/ legislation	Key provisions	Section where provision addressed
Water Framework Directive (2000/60/E)	The overall purpose is to establish a framework for the protection of surface fresh water, estuaries, coastal water and groundwater. The primary objectives are to improve surface water groundwater quality and ensure that pollutants are prevented from entering groundwater and surface water. This is implemented into English law through WFD (England and Wales) Regulations 2003.	Matters relating to protection of surface fresh water, estuaries, coastal water and groundwater have been considered in: Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1); and Embedded mitigation - section 6.1 and Mitigation - section6.15.
Groundwater Directive (80/68/EEC)	This aims to protect groundwater against pollution caused by dangerous substances. The Directive is primarily implemented in England and Wales by the Environmental Permitting (England and Wales) Regulations 2016 (SI 2016/1154) which has replaced the previous 2010 regulations (SI 2010/675).	Matters relating to protection of groundwater against pollution have been considered in: Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1); and Embedded mitigation - section 6.1 and Mitigation - section 6.15.
Directive on the Protection of Groundwater Against Pollution and Deterioration (2006/118/EC)	This sets out specific measures for preventing and controlling groundwater against pollution and deterioration.	Matters relating to protection of groundwater against pollution have been considered in: Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1); and Embedded mitigation - section 6.1 and Mitigation - section 6.15.
The National Planning Policy Framework (NPPF) (March 2012)	This states that local planning policies and decisions should ensure that: • A site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation; • After remediation, as a minimum, land should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990; and • Adequate site investigation (SI) information, prepared by a competent person, is presented. In addition, the NPPF states that the planning system should contribute to and enhance the natural and local environment by (a) preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability; and (b) remediating and mitigating […] contaminated […] land, where appropriate.	Potential risks arising from land contamination have been considered in: Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1); Existing environment - section 6.7; Embedded mitigation - section 6.1; Environmental assessment during construction, O&M, and decommissioning phase - sections 6.10 - 6.12; and Volume 5, Annex 6-2: Flood Risk Assessment Study (Document Ref: 6.5.6.2).

Policy/ legislation	Key provisions	Section where provision addressed
	NPPF identifies requirements for addressing flood risk for new developments, steering more vulnerable development into areas of lower flood risk. Since April 2015 the integration of Sustainable Drainage Systems (SuDS) for the management of runoff in major developments has become a planning requirement.	
Town and Country Planning Act 1990	Historical land contamination is a material consideration under this act. It is necessary to ensure that any land which is to be redeveloped is suitable for its proposed end use. Therefore, prior to development, the planning authority may require investigation of the site and, if necessary, remediation.	Matters relating to potential historical land contamination have been considered in: Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1); and Existing environment - section 6.7.
Environmental Protection Act (EPA) 1990 and Contaminated Land (England) Regulations 2012	The contaminated land regime is set out within Part 2A of the EPA 1990 (DEFRA, 1990). Part 2A provides a statutory definition of 'contaminated land' and sets out the nature of liabilities that can be incurred as a result of contaminated land and groundwater. Contaminated land is defined as: "Any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land that: • Significant harm is being caused, or there is significant possibility of such harm being caused; or • Significant pollution of controlled water is being caused or there is significant possibility of such pollution being caused". The accompanying Statutory Guidance states that Part 2A takes a risk-based approach to defining contaminated land. The guidance follows established principles of risk assessment, including the concept of a 'contaminant linkage' (i.e. a linkage between a 'contaminant' and a 'receptor' by means of a 'pathway') where: • A contaminant is a substance which is in, on or under the land and which has the potential to cause significant harm to a relevant receptor, or cause significant pollution of controlled waters; • A receptor is something that could be adversely affected by a contaminant, for example a person, an organism, an ecosystem, property or controlled waters; and • A pathway is a route by which a receptor is or might be affected by a contaminant. EPA 1990: Part 2A, Contaminated Land Statutory Guidance was published in April 2012.	Matters relating to potential contaminated land and the principles of risk assessment have been considered in: Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1); Assessment criteria and assignment of significance - section 6.5; and Existing environment - section 6.7.
Water Resources Act (WRA) 1991 and Environmental Permitting (England and Wales) Regulations 2016 ((SI 2016/1154)	For sites where contamination of controlled waters is a potential issue, in addition to the provisions of Part 2A consideration should also be given to the WRA 1991. Parts of the Act have been replaced by the Environmental Permitting (England and Wales) Regulations 2010, SI 2010 No.675 (referred to here as EPR), although some of the core definitions (e.g. controlled waters) still refer to the WRA.	Matters relating to potential contamination of controlled waters have been considered in: Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1);

Policy/ legislation	Key provisions	Section where provision addressed
	The two aspects of the EPR so far as controlled waters are concerned are: • Schedule 21: Water discharge activities – these are concerned with discharges to surface waters, that are controlled waters, of any poisonous, noxious or polluting matter; waste matter; trade effluent or sewage effluent; and • Schedule 22: Groundwater activities – these are concerned with discharges of pollutants, or other discharges that may lead to input of a pollutant, to groundwater. The 'activities' relate both to those that require a permit and activities that are unlawful (e.g. causing pollution to controlled waters), with only a small number of activities being exempt, although even these need to be registered with the EA. A 'passive' release of pollutants, such as may occur to groundwater from land where the original cause of pollution has ceased, is not considered to be an activity requiring permitting. Under the WRA, the EA still has the power to remediate pollution of controlled waters by means of Anti-Pollution Works Notices, via Section 161A of the WRA. The provisions of the WRA and EPR (and the consequent powers of the EA) can apply when the land is not Statutory Contaminated Land under the terms of Part 2A. The EA has indicated that in general Part 2A will be applied in preference to WRA powers if it is applicable (i.e. passive discharges are occurring).	Embedded mitigation - section 6.1; and Environmental assessment during construction, O&M, and decommissioning phase - sections 6.10 - 6.12.
Building Regulations 2016	The Approved Document C Site Preparation and Resistance to Contaminants and Moisture, 2013 indicates the need for risk assessment and remediation to be undertaken to ensure safe development.	Matters relating to risks to property from potential contaminants have been considered in: Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1); Embedded mitigation –section 6.1; and Environmental assessment during construction, O&M, and decommissioning phase - sections 6.10 - 6.12.
Draft Thanet Local Plan to 2031, January 2015	Policy SE01 states: "Permission for development which is sensitive to pollution will be permitted only if it is sufficiently separated from any existing or potential source of pollution as to reduce pollution impact upon health, the natural environment or general amenity to an acceptable level, and adequate safeguarding and mitigation on residential amenity". Policy SE03 Contaminated land states: "Development on land known or suspected to be contaminated or likely to be adversely affected by such contamination will only be permitted where: 1) An appropriate SI and assessment (agreed by Thanet District Council (TDC)) has been carried out as part of the application […];	Matters relating to Policy SE01, Policy SE04 and Saved Policy EP2 have been considered in: Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1); and Embedded mitigation – section 6.1; Environmental assessment during construction, O&M, decommissioning phase - section 6.10 - 6.12; and Embedded mitigation - section 6.1 and Mitigation - section 6.15.

Policy/ legislation	Key provisions	Section where provision addressed
	2) The proposed remedial measures would be acceptable in planning terms and would provide effective safeguards against contamination hazards during the development and subsequent occupation of the site. Policy SE04 Groundwater Protection states: Proposals for development within the Groundwater SPZs identified on Thanet's Groundwater Protection Zones Map will only be permitted if there is no risk of contamination to groundwater sources. If a risk is identified, development will only be permitted if adequate mitigation measures can be implemented. Saved Policy EP2 Landfill Sites states: "On or near landfill sites or where there is otherwise reason to suspect that potential danger from evolving or migrating gas may be present, development or redevelopment, including change of use, will only be permitted where: 1) The Applicant/ developer has demonstrated either that there is no danger from evolving or migrating gas or that reliable arrangements can be made to overcome such danger; and 2) Any necessary remedial measures can be achieved without unacceptable environmental impact." TDC will seek by agreement or by imposition of conditions on any consent for development, to ensure management of gas from closed landfill, and that suitable precautions are taken in construction methods together with any other arrangements considered necessary to safeguard against hazards associated with landfill gas.	
Kent Minerals and Waste Local Plan 2013 - 2030	Policy CSW 10 Development at Closed Landfill Sites states: Planning permission will be granted for development for any of the following purposes: 1) Development for the improvement of restoration for an identified after use for the site; or 2) Development for the reduction of emissions of gases or leachate to the environment; or 3) Development making use of gases being emitted and which will reduce the emission of gases to the environment. Policy CSW 14 seeks to ensure that contaminated land is treated *in situ* or in combination with other contaminated land when those sites are to be redeveloped.	Matters relating to Policy CSW 10 and Policy CSW 14 have been considered in: Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study Study (Document Ref: 6.5.6.1); Embedded mitigation – section 6.1; and Environmental assessment during construction, O&M, and decommissioning phase - section 6.10 - 6.12.

Policy/ legislation	Key provisions	Section where provision addressed
Dover District Council (DDC) Strategy Policy DM17	This safeguards against contamination in groundwater protection zones.	Matters relating to groundwater protection zones have been considered in: Existing environment – section 6.7 identifies that due to the underlying geology there is no hydrogeological linkage to groundwater protection zones; and Embedded mitigation - section 6.1 provides good practice.
Kent County Council (KCC) Local Flood Risk Management Strategy (LFRMS) (June 2013)	This includes a statutory duty to develop, maintain, apply and monitor a strategy for the management of local flood risk. The local strategy has been produced by KCC through consultation with a Flood Risk Management Committee, which comprises KCC and district, borough and IDB members and risk management authorities. The LFRMS sets out KCC's approach to managing flood risk from local sources in both the short and long-term, and outlines proposals for sustainable actions that will help to manage the risk in a way that delivers the greatest benefits to the residents, businesses and environment of Kent. It also outlines how KCC will work with other lead local flood authorities to coordinate flood management within catchments that share borders. The Strategy is accompanied by an Action Plan setting out how to deliver the objectives of the local strategy in the future. The action plan is updated annually with progress on plan deliverables.	Matters relating to the KCC LFRMS have been considered in: Volume 5, Annex 6-2: Flood Risk Assessment Study (Document Ref: 6.5.6.2); and Embedded mitigation – section 6.1.
KCC Preliminary Flood Risk Assessment (PFRA) (September 2011)	The PFRA was produced to provide a high-level overview of local flood risk across Kent, to identify which areas are most vulnerable, in order to deliver regulatory responsibilities required under the Flood and Water Management Act 2010.	Matters relating to the KCC PFRA have been considered in: Volume 5, Annex 6-2: Flood Risk Assessment Study (Document Ref: 6.5.6.2) and Embedded mitigation – section 6.1.
Thanet Stage 1 Surface Water Management Plan (SWMP)	The SWMP was produced by JBA Consulting on behalf of KCC to investigate the local flood risks in Thanet to determine what further work may be needed. The SWMP outlines the preferred surface water management strategy for Thanet and includes consideration of flooding from sewers, drains, groundwater, and run-off from land, 'Ordinary Watercourses'[1], that occurs as a result of heavy rainfall. A range of recommended actions were put forward for the reduction of flood risks across the Thanet SWMP area.	Matters relating to the Thanet Stage 1 SWMP have been considered in: Embedded mitigation – section 6.1.

[1] 'Ordinary Watercourses' are other rivers which are not shown on the EA "Main River Map". Lead local flood authorities, district councils and IDBs carry out flood risk management on Ordinary Watercourses.

Policy/ legislation	Key provisions	Section where provision addressed
The Development Plan for TDC, 2006 Local Plan, Environmental Protection Policy CC01 -CC02	Policy on Fluvial and Tidal Flooding (CC01) states that" the sequential and exception tests set out in NPPF will be applied to applications for development within identified flood risk areas. Development proposals in these areas will need a Flood Risk Assessment to be carried out by the developer." Policy on Surface Water Management (CC02) states that new development will be expected to manage surface water resulting from the development using SuDS wherever possible.	Matters relating to these fluvial, tidal and surface water management policies have been considered in: Volume 5, Annex 6-2: Flood Risk Assessment Study (Document Ref: 6.5.6.2); Embedded mitigation – section 6.1; and Environmental assessment during construction, O&M and decommissioning phase - sections 6.10 - 6.12.
Thanet District Strategic Flood Risk Assessment (SFRA) (April 2009)	The SFRA provides a technical, background evidence-based document intended to help inform decision-making in local development planning. It provides information on a range of guidance from application of the sequential and exception tests to the implementation of SuDS. Developers and Applicants should therefore consult the SFRA as a key document when preparing planning applications for new developments.	Matters relating to the Thanet District SFRA have been considered in: Volume 5, Annex 6-2: Flood Risk Assessment Study (Document Ref: 6.5.6.2); and Embedded mitigation – section 6.1.
Dover District SFRA (2007)	This SFRA provides a broad based assessment of flood risk to identify sites at flood risk from fluvial, coastal and other sources of flooding, to help inform spatial planning decisions. The SFRA identifies the level of detail required for site-specific FRAs in particular locations. It also provides information for the application of the Sequential Test, and to identify whether application of the Exception Test is likely to be necessary.	Matters relating to the Dover District Draft Flood Risk Assessment, in the Flood Risk Assessment - Volume 5, Annex 6-2: Flood Risk Assessment Study (Document Ref: 6.5.6.2).
South-East RBMP (December 2015)	The RBMP outlines the status of all surface and groundwater bodies with reference to WFD chemical and ecological targets and sets out targets for the improvement of the water environment.	Matters relating to the South East RBMP and relevant WFD targets have been considered in: Existing environment - section 6.7; and Environmental assessment - sections 6.10 - 6.12.

6.2.2 The key supporting guidance is as follows (in alphabetical order by author):

- British Standards Institution (BSI) 2013: BS10175:2011+A1 2013: Investigation of Potentially Contaminated Sites - Code of Practice;
- BS6031:2009: Code of Practice for Earthworks (2009). Best practice guidance on geotechnical aspects of earthworks and on working practices;
- BSI 2015: BS5930: 2015: Code of Practice for Ground Investigations;
- BSI 2015: BS8485:2015: Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings;
- BSI 2013: BS8576:2013: Guidance on Investigations for Ground Gases, Permanent Gases and Volatile Organic Compounds (VOCs);
- Construction Industry Research and Information Association (CIRIA) Report 132: A Guide for Safe Working Practices on Contaminated Sites (1996);
- CIRIA Report C532: Control of Water Pollution from Construction Sites (2001);
- CIRIA Report C649: Control of Water Pollution from Linear Construction Sites (2006);
- CIRIA Report C665: Assessing Risks Posed by Hazardous Ground Gases to Buildings (2007);
- CIRIA Report C692: Environmental Good Practice on-site (3rd Edition) (2010);
- Contaminated land: Applications in Real Environments (CL:AIRE) (2011): The Definition of Waste: Development of Industry Code of Practice;
- Department for Environment, Food and Rural Affairs (DEFRA), 2011: Safeguarding our Soils; a Soil Strategy for England;
- EA Contaminated Land Report (CLR 11), Model Procedures for the Management of Land Contamination, 2004. Provides the technical framework for structured decision-making about land contamination;
- EA Groundwater Protection: Principles and Practice (GP3) (2013): Outlines the regulator's framework for the management and protection of groundwater;
- EA Approach to Groundwater Protection (2017) (Version 1.1); Provides an update to the position statements set out in GP3;
- Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance, DEFRA, 2012. Describes how the local planning authorities should implement the regime on contaminated land and how they should decide whether a land is contaminated land in the legal sense of the term. It also elaborates on the remediation provisions of Part 2A;
- Government Circular 06/2005 'Biodiversity and Geological conservation: Statutory obligations and their impact within the planning system' (2005);
- Guidance for the Safe Development of Housing on Land affected by Contamination, Research and Development (R&D) publication 66: 2014, National House Builder's Council (NHBC), EA, Chartered Institute of Environmental Health. Framework for assessment of contaminated land for development based on CLR 11 above. Written to be relevant to housing development on such sites, but is also generally applicable to other forms of development, to existing developments and to undeveloped land, where such sites are on land affected by contamination;
- Health and Safety Executive (HSE) 1991: Protection of Workers and the General Public during the Development of Contaminated Land; and
- The National Planning Practice Guidance (NPPG) 2014/2015. Sets the steps that the local planning authorities are required to take to determine planning conditions for land affected by contamination.

6.3 Consultation and Scoping

6.3.1 The following consultation has been undertaken:

- The Scoping Report was submitted to the Planning Inspectorate (PINS) in February 2017;
- A consultation meeting was held with the EA, KCC and River Stour IDB on 28th June 2017. It covered flood risk, water environment assessment, including potential sources of contamination to controlled waters;
- A consultation meeting was held on 23rd August 2017 with TDC, EA, KCC and DDC. It covered issues relating to ground conditions, flood risk and land use;
- Relevant Section 42 consultation responses were received from the EA, Natural England (NE), DDC, TDC, The Coal Authority and the Health and Safety Executive (HSE) in January 2018; and
- To date, discussions have taken place with a number of the affected landowners during the informal consultation phase.

6.3.2 A summary of the consultation to date is presented in Table 6.2.

Table 6.2: Summary of consultation relating to ground conditions, flood risk and land use

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
Ground conditions and contamination		
February 2017 Scoping Opinion, PINS	General information on the baseline environment should be accompanied by figures showing the location of the features described.	Figure 6.1 shows the Red Line Boundary (RLB) and study site and area. The features described in Existing environment (section 6.7) are displayed on Figures 6.1.2 and 6.1.3 of the Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1).
	Inter-related effects with hydrogeology etc. to be considered.	Effects with hydrogeology are dealt as part of this chapter and inter-related effects are considered in section 6.10 and 6.11.
	The Secretary of State (SoS) considers that specific reference is made to the identified historical landfill sites, including during the characterisation of baseline conditions and effects of Thanet Extension.	Reference to the historical landfill sites is made in Existing environment – section 6.7; Environmental assessment – sections 6.10 and 6.11; Mitigation – section 6.15; and Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1).
	The SoS understands that no site surveys are proposed to be undertaken to inform the baseline, and considers that this approach should be discussed and agreed with relevant consultees and kept under review, for example, should potential contamination be identified through the desk studies, noting the presence of landfill sites within the onshore area of interest.	A SI is proposed pre-construction across the whole site and is discussed in Mitigation – section 6.15; and Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1). Its scope will be discussed with the relevant regulators as requested by the EA during the meeting of 28th June 2017. The aim is to inform final designs. Further works may be required pre-construction depending on findings, and would be secured by a Development Consent Order (DCO) Requirement.
	Discussion about the approach to the assessment and data gathering should be evident in the Environmental Statement (ES), specifically when it relates to matters being scoped out of the assessment.	The approach to the assessment and data gathering are described in Scope and methodology – section 6.1.

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
	The SoS notes the relative age of the Scoping data (dating back to 2005) and expects that any reference to and/ or reliance upon such data be corroborated and justified to ensure its validity.	More up-to-date data have been gathered from the regulators and Landmark and has been used for the baseline characterisation in existing environment – section 6.7; Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1); and Environmental assessment –sections 6.10 and 6.11.
	The Scoping Report does not set out the intention to undertake site-specific modelling to inform the assessment of potential impacts, nor does it explain how, in the absence of this information, the assessment will be undertaken. The SoS reminds the Applicant of the need to ensure there is sufficient information to inform an adequate assessment of the likely significant effects.	The approach to the assessment and data gathering are described in Scope and methodology – section 6.1. The assessment is also based on previous investigation reports available for the development area, notably a Detailed Qualitative Risk Assessment (DQRA) carried out for controlled waters at the former Richborough Power Station.
	The SoS recommends that the ES clearly establishes what the risks are with regards the mobilisation of contaminants during excavation works, and is specific with regard to the mitigation necessary in the Code of Construction Practice (CoCP). Furthermore, for the CoCP to provide effective mitigation, a draft of the document should be included as part of the application.	Risks and mitigation measures are detailed in Table 6.11 and Table 6.12 and are assessed in Environmental assessment – sections 6.10 and 6.11.
	The assessment methodology and details of any guidance used to support the assessment should be presented within the ES.	The assessment methodology is described in Scope and Methodology and Assessment criteria and assignment of significance - sections 6.1 and 6.5. Supporting guidance is listed in paragraph 6.2.2 *et seq*.
	The Scoping Report does not provide any justification for a 500 m cable and 1 km substation study area; but this should be included in the ES. Similarly, the study area for the consideration of cumulative impacts is defined as “within 1 km of the Onshore Area of Interest”, and this should be further justified in the ES and agreed with relevant statutory bodies.	Justification for the study area is provided in paragraphs 6.4.3 - 6.4.4. Given the proximity to the coast and on the assumption, that embedded mitigation is carried out, 1 km is considered sufficient for the purposes of ground conditions and land quality. A catchment-based approach has been applied to consider cumulative impacts from relevant developments upstream of Thanet Extension in section 6.13.
	No reference is made to factors to be taken into account or the methodology to be employed to determine the significance of effect. In the absence of this information the SoS is unable to comment as to the acceptability of the proposed approach.	The assessment methodology is described in Scope and Methodology and Assessment criteria and assignment of significance - sections 6.1 and 6.5.

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
	A Soil and Drainage Management Plan is proposed, and the Applicant is requested to consider whether this plan may overlap between mitigation for impacts on ground conditions. The use of a Construction Environmental Management Plan (CEMP) alongside the CoCP should also be considered along with the interaction with other topic chapters in the ES.	This chapter comprises a combined assessment of ground conditions, flood risk and land use, in order to avoid overlapping of the mitigation measures. Standard mitigation measures outlined in the chapter have been included in the CoCP submitted with the application (Document Ref: 8.1), and more Thanet-, O&M and CEMP-related mitigation is summarised in Table 6.12. Cross-references to other topic chapters were given in paragraph 6.1.1 and inter-related effects are considered in section 6.1.
	The onshore area of this proposal overlies a Chalk aquifer, and any pathways for contamination must be strictly controlled to avoid pollution of the principal and secondary aquifers from any historic contamination identified on the site from previous uses. At this stage, the EA does not provide detailed site-specific advice or comments with regard to land contamination issues apart from identifying the site sensitivity as above.	Effects on Controlled Waters, including the Chalk aquifer, have been assessed in Environmental assessment – sections 6.10 and 6.11; Mitigation – section 6.15; and Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1).
February 2017 Scoping Opinion, EA comments	Whilst specific advice will not be provided at this stage in the planning process, it is recommended that the requirements of the NPPF are followed. Paragraph 109 of the NPPF states that the planning system should contribute to and enhance the natural and local environment by preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels water pollution. Therefore, in completing any SIs and risk assessments the Applicant should assess the risk to groundwater and surface waters from contamination which may be present and where necessary carry out appropriate remediation.	Risks to Controlled Waters have been assessed in Environmental assessment –sections 6.10 and 6.11; A SI is proposed pre-construction across the whole site and is discussed in Mitigation – section 6.15; and Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1). Its scope will be discussed with the relevant regulators as requested by the EA during the meeting of 28th June 2017. The aim is to inform final designs. Further works may be required pre-construction depending on findings, and would be secured by DCO Requirement.
February 2017 Scoping Opinion, DDC comments	DDC note the identified risks to human health for construction workers during construction and decommissioning phases.	Risks to Human Health have been assessed in Environmental assessment –sections 6.10 and 6.11; Mitigation – section 6.15; and Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1).

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
	DDC note and agree with embedded mitigation at Paragraphs 682 and 683 that is identified as likely to include avoidance of impact through site selection (e.g. avoidance of areas with contamination risk and sensitive receptors), avoidance of impact through engineering techniques (e.g. Horizontal Directional Drilling (HDD) at sensitive points), and development and compliance with CoCP.	Mitigation measures are detailed in section 6.15 and Table 6.12.
	DDC agree that is reasonable to scope operational impacts that are referred to in Paragraph 678 out from further consideration within the Environmental Impact Assessment (EIA).	An assessment has been carried out for the remaining potential effects from maintenance works during the O&M phase in section 6.11 and embedded mitigation measures have been proposed in section 6.1.
	DDC is in agreement with the approach to assessment and data gathering in Paragraphs 684-687 and look forward to finalising and agreeing on this with the Applicant at the earliest possible opportunity, particularly once the chosen landfall site has been finalised.	The landfall options have been assessed in this chapter – sections 6.10 and 6.11.
February 2017 Scoping Opinion, NE	Given the extremely close proximity of parts of both proposed cable routes and the substation Area of Interest to designated nature conservation sites, NE advise that Ground Conditions and Contamination section in the ES is cross-referenced with the sections on onshore ecology and onshore ornithology and considers the potential for the mobilisation of contaminants to impact on sensitive receptors.	A cross-reference has been made in section 6.1.1 and inter-related effects are covered in section 6.10.
February 2017 Scoping Opinion, Public Health England	The Applicant would be expected 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. Public health impacts associated with ground contamination and/ or the migration of material off-site should be assessed and the potential impact on nearby receptors.	Potential existing contamination and ground gases have been detailed in in Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1); and Existing environment – section 6.7. The effects on receptors have been assessed in Environmental assessment –sections 6.10 and 6.11.
February 2017 Scoping Opinion, TDC	The principal effect of Thanet Extension relates to excavation of the cable trench and soil/ spoil handling procedures during construction and decommissioning which have the potential for mobilising contaminants (if present). A CoCP is to be employed during construction/ decommissioning works to ensure that all appropriate practice guidelines, including the now withdrawn Pollution Prevention Guidance (PPG) notes, are followed. It is recommended that this should form part of the CEMP produced as part of the EIA or secured by condition of any permission thereof.	Mitigation measures are detailed in section 6.15 and Table 6.12.
	An assessment of the operational impact of the development is proposed to be scoped out of the EIA. This is deemed acceptable given the nature and operational function of the proposed onshore development, i.e. no ground excavation or soil/ spoil handling, and all infrastructure is to remain *in situ*.	An assessment has been carried out for the remaining potential effects from maintenance works during the O&M phase in section 6.11, and embedded mitigations measures have been proposed in section 6.1.

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
January 2018, S42 Consultation Response, Health and Safety Executive (HSE)	HSE noted that the onshore connection to the National Grid is not within the consultation zones of any major hazard site or pipeline. Hazardous Substances Consent would not be required if the site is intending to store or use any of the Names Hazardous Substances or Categories of Substances and preparations at or above the controlled quantities set out in Schedule 1 of these regulations.	Noted. No further action required.
January 2018, S42 Consultation Response, The Coal Authority	Whilst the southern area of the proposed wind farm (proposed offshore export cable corridor) falls within the coalfield area, The Coal Authority can confirm that the area does not contain any recorded risks from past coal mining activity and there are no surface coal resources present. On this basis The Coal Authority has no specific comments to make.	Noted. No further action required.
January 2018, S42 Consultation Response, DDC	In terms of contaminated land DDC has no concerns in relation to these matters. DDC is in agreement with the approach to the assessment and data gathering and accepts the factors and methodology identified. DDC is satisfied that the EA and TDC will address these aspects sufficiently.	Noted. No further action required.
January 2018, S42 Consultation Response, EA	The EA understands that additional SIs are to be carried out to confirm route engineering. Until these investigations have been carried out the EA has no detailed comments to make at this time. The EA suggests site assessments may need to include additional risk parameters based on investigation findings and depending on design options chosen.	A SI is proposed pre-construction to inform final design. A detailed characterisation for the purposes of EIA is presented Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1). The assessment presented here has been based on the 'maximum adverse scenario', which has taken into account reasonable worst-case site conditions in Key parameters for assessment - section 6.1; and Environmental assessment - sections 6.10 and 6.11.
January 2018, S42 Consultation Response, TDC comments	TDC note that due to the risk of landfill contaminants impacting the SSSI once the sea wall are removed (and rebuilt) and potential impacts of ground gas on the planned infrastructure traversing the landfill site, appropriate mitigation will be vital to safeguard the natural environmental, onsite workers and future site users. As per the conclusions of the desk study report, further intrusive “site investigation and groundwater monitoring of the site will [need to] be undertaken in the landfill site” to inform appropriate mitigation.	A SI is proposed pre-construction, including across the historic Cliffsend Landfill, to inform final designs. The proposed scope will be discussed with the relevant regulators. Further works may be required pre-construction depending on findings, and would be secured by a DCO Requirement. This has been noted in Embedded mitigation –section 6.1; and concluded in Environmental Assessment – sections 6.10 and 6.11.

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
	The PEIR advises that 'appropriate mitigation measures will be agreed with TDC, KCC and the EA prior to construction'. As previously raised, risks of asphyxiation from a build-up of ground gases (particularly carbon dioxide (CO_2 pooling in lower level inspection bays) during the O&M phase should also be included within the embedded mitigation measures, especially with regard to inspection pits in Transition Joint Bays (TJBs) located within the saltmarsh (CAD reference: 1526/004/012). Further detail on the works to the sea wall and the use of cofferdams will also be required. This additional information must be submitted to the TDC/LPA to confirm that the development can be progressed with regard to these material planning considerations prior to construction. This will minimise the possibility of permitting of an effect that is still significant in EIA terms.	TJBs are no longer required in the saltmarsh. An outline of proposed mitigation measures has been put for O&M procedures at the landfall, and on good construction industry practice principles for cofferdam installation. These are presented in: Embedded Mitigation –section 6.1: and Environmental Assessment – sections 6.10 and 6.11. A SI is proposed pre-construction, including across the historic Cliffsend Landfill, to inform final designs. The proposed scope will be discussed with the relevant regulators. Further works may be required depending on findings, pre-construction post-DCO submission, for engineering purposes, including the refinement of proposed mitigation, and would be secured by a DCO Requirement.
	TDC note that during investigation and subsequent development, works must be carried in a strictly controlled manner to ensure that contaminants are not exposed, nor releases allowed to air, land or controlled waters, which could cause pollution, harm or nuisance. Clearing areas, particularly removing hardcover, must be done in a manner not likely to expose contaminants to flushing by incipient rainfall or surface water run-off on the site. Temporary surface water controls and management of any materials movement on site is critical to ensure protection of controlled waters at the site.	Temporary surface water control measures have been identified in Embedded Mitigation –section 6.1.
January 2018, S42 Consultation Response, Natural England	Natural England's main concern in relation to Option 1 is that there is the potential for leachate contamination during construction.	The chapter has taken into account the potential for leachate contamination associated with the latest proposed development options (1 – 3) set out in Volume 2, Chapter 1: Onshore Project Description (Document Ref: 6.3.1). The maximum adverse design scenario has been assessed in sections 6.10 and 6.11, based on the embedded mitigation set out in section 6.1, which includes provision for a cofferdam or a suitable alternative to control leachate contamination.
Land use		
February 2017 Scoping Opinion, PINS	Figure 3.5 appears to have been based on the 'Provisional Series' of Agricultural Land Classification (ALC) maps which were designed at a 1:250,000 scale, but these maps are not sufficiently accurate for use in assessment at individual development level.	A review of publicly available data based on ALC Grades - Post 1988 Survey has been undertaken for the ALC of the site and its surroundings, see paragraph 6.7.41.

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
	Drainage is referred to again in Paragraph 758 where is stated that there will be an impact on drainage during operation associated with the presence of buried cables. It is therefore unclear as to whether drainage is proposed to be assessed in full under the 'land use' section in the ES or whether the consideration of these effects will be made by cross-referred to the water resources assessment in the ES. The Applicant is requested to be clear on where topics are discussed and assessed in the ES in respect of drainage.	This chapter comprises a combined assessment of ground conditions, flood risk and land use.
January 2018, S42 Consultation Response, DDC	DDC suggests that a plan be included in the ES showing land use. This should include tourism and leisure uses – the impacts on these uses should all be assessed and the impact during construction. Will the project include any changes to land use along the cable route, if so what will this be, and what will be the impact?	This chapter looks at the effect of the proposed development on various land quality receptors including humans: on-site and adjacent site users, on-site property, land use (agricultural soils), and controlled waters. Potential effects are described within Environmental Assessment –sections 6.10 and 6.11. Potential effects on flood risk are presented within Volume 5, Annex 6-2: Flood Risk Assessment (Document Ref: 6.5.6.2). Effects on current activities such as tourism and leisure are presented in Volume 3, ES Chapter 3: Socio-economics (Document Ref: 6.3.3) and Chapter 4: Tourism and Recreation (Document Ref: 6.3.4).
January 2018, S42 Consultation Response, Natural England	Natural England notes that the site itself is not classified as agricultural land (based on ALC Grades - Post 1988 Survey, Ministry of Agriculture Fisheries and Food).	Noted. No further action required.
Flood risk		
February 2017 Scoping Opinion, PINS, SoS	The SoS welcomes the proposal for a FRA and a WFD compliance assessment. These assessments should form an appendix to the ES. The scope of these assessments should be discussed and agreed with relevant consultees including the EA, the relevant IDBs and local planning authorities. Section 4 of this Opinion provides further comments as to the need for WFD assessment.	The scope of the FRA has been discussed with the EA and the Lead Local Flood Authorities (LLFA), and is presented in Volume 5, Annex 6-2: Flood Risk Assessment (Document Ref: 6.5.6.2) and cross-referenced throughout this chapter. A separate WFD assessment has been carried out for coastal and transitional waters in Volume 4, Annex 3-1: Water Framework Directive Assessment (Document Ref: 6.4.3.1).

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
	The FRA should consider the most up-to-date climate change allowances and cover tidal flood risk as well as fluvial impacts under present and projected sea level scenarios.	As outlined in Volume 5, Annex 6-2: Flood Risk Assessment (Document Ref: 6.5.6.2), it has been discussed and agreed that a climate change allowance of a 20% increase in flow is appropriate for the site. The FRA has presented an assessment of all relevant sources of flood risk, including tidal and fluvial sources, which have been presented within section 6.7 Existing environment; and Assessment of construction and O&M effects -sections 6.10 - 6.11.
	The Applicant is advised that Flood Defence Consents that may be required for working in/ over/ adjacent to watercourses have been replaced by Flood Risk Activity Permits (FRAPs) under the Environmental Permitting (England and Wales) Amendment (no 2) Regulations 2016.	Within the embedded mitigation section 6.1, the need for Consents has been taken into account including FRAPs for 'Main Rivers[2]'.
	The SoS welcomes the use of a CoCP to secure mitigation. The Applicant should ensure that sufficient detail is included in the draft CoCP and that the content is appropriately secured.	Section 6.1 has provided details of the embedded mitigation measures included in the CoCP which is submitted with the application (Document Ref: 8.1). Where specified the measures which are to be further developed within a CEMP document would be submitted post-DCO application, prior to construction.
January 2018, S42 Consultation Response, EA	Based on the options put forward in the Preliminary Environmental Information Report (PEIR), the EA presently has no objections or comments, but would encourage further engagement once more is known about the chosen option for the area where the cable comes ashore and the associated transition areas.	The assessment in this chapter has been on a worst-case design scenario. The rationale for this approach is presented in section 6.1, and the key parameters for the worst-case are discussed in section 6.1.

[2] "Main Rivers" are usually larger rivers and streams. The Environment Agency carries out maintenance, improvement or construction work on "Main Rivers" to manage flood risk.

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
	The EA would also recommend that it is contacted to discuss the means of crossing the Minster Stream, along with any other works within 16 m of the tidal River Stour (or within 8 m of the Minster Stream). Any such works will require a FRAP prior to the commencement of any construction within the byelaw margins.	The potential Minster Stream crossing works and overall permitting requirements were discussed between the EA and VWPL during a consultation meeting on 8th December 2017 as noted in this table below, and within the EIA Evidence Plan Report (Document Ref: 8.5). These potential requirements have been outlined within section 6.1, and then assessed in section 6.10 and 6.11. A worst-case scenario has been assumed as part of the assessment, whereby a culvert replacement and in stream works are considered in relation to flood risk and water quality matters. The requirements for FRAP have been outlined in section 6.1; and Annex 6-2; Flood Risk Assessment (Document Ref: 6.5.6.2).
Consultation Meetings for Each Topic[3]		
28th June 2017, PEIR, VWPL Progress Meeting with Relevant Stakeholders	Landfall Sea Wall: It was identified that there is a sea wall which is situated in the vicinity of the proposed landfall location, which will need to be re-engineered. TDC advised that it is its responsibility, however the EA also noted that it would be interested in ongoing discussions. TDC was asked to provide a plan which showed where its defences start and end. The EA pointed out a permit from TDC may be required. The phasing of the works was briefly discussed and this will be followed up between Amec Foster Wheeler Environment & Infrastructure UK Ltd (Amec Foster Wheeler) and the engineers. Drainage: It was identified that a raised bund is being proposed at the landfill site. KCC advised that it was not concerned with impacts on drainage, and that cross drains could be provided under a concrete slab if it was identified that surface water might pond behind the raised bund. Flood Risk: Amec Foster Wheeler identified that the cables would be buried under Flood Risk Zone 3, at the southern end of the landfill. The EA advised that it would not be necessary to move the stockpiles from Flood Zone 3 to Zone 1, given that there is tidal risk at this location. However, it suggested that this be considered. Amec Foster Wheeler noted that the current 'EA 2010/2012 Lower Stour Model' (flood model) indicates that flooding up to 0.9 m could be experienced during a 0.5 Annual Exceedance Probability (AEP) event. In relation to the proposed Compound location the EA advised that it is unlikely to be concerned with the location being within Flood Zone 2.	Information has been taken into account on the different options for the design envelope including the landfall sea wall, and associated drainage within Table 6.11 and within the Environmental assessment –sections 6.10 and 6.11. Information on potential contamination sources is provided and assessed in Existing environment – section 6.7; and Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1). The relevant flood risk information in relation to the design envelope has been taken into account within this chapter in section 6.7 and an assessment has been carried out within sections 6.10 and 6.11. This has been based on the detailed information which is provided in Volume 5, Annex 6-2: Flood Risk Assessment (Document Ref: 6.5.6.2). The Flood Risk Assessment includes information regarding embedded mitigation measures such as FRAPs within 'Main River'

[3] The actions and formal responses for each of these consultation meetings are provided in more detail within the EIA Evidence Plan Report (Document Ref: 8.5).

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
	In relation to the substation location Amec Foster Wheeler identified that the EA Product 4 flood risk information indicates that the substation would be dry for the agreed climate change allowance (+ 20%), from fluvial/ tidal flooding, and the EA acknowledged these points. The EA also advised that the updated model is likely to become available in August or September 2017, and that predicted flood levels are likely to be lower using the new model. The EA also advised that surface water drainage measures would be required at the substation area. The EA advised that a FRAP would be required for the crossing of the Minster Stream, and would possibly be required for the location of temporary stockpiling associated with the flood zones and 16 m from 'Main Rivers'. The EA also confirmed that the 8 m permitting distance would be applied to the Minster Stream. Watercourse Crossing: The IDB advised that the Minster Stream crossing is an existing culvert crossing. The EA confirmed that there will be a requirement for future maintenance to ensure the integrity of the culvert is covered by the DCO. In relation to potential contamination sources, the EA advised that any breaking of ground at the road and the Energy Park (and also at the Sports Club (and pitches) and the car auction site) will need a desk study and a SI. Amec Foster Wheeler advised that a Phase 1 Desk Study had been prepared and was to be updated. Potential contamination sources were identified, including the landfills, a closed pollution incident at the Sports Club and past uses of the power station at Energy Park. The risks to maintenance workers and controlled waters have been identified. Amec Foster Wheeler asked whether any investigation, monitoring data and any details about the caps were available for the landfills. The EA answered in an email on 10th July 2017 that the historic information/ data monitoring for this site is held by KCC Estates and TDC for the Contaminated Land Files. Amec Foster Wheeler advised that ground gas monitoring and water sampling could be carried out as part of the pre-construction SI, which would also comprise soil testing and waste classification testing. The EA advised that CL:AIRE Definition of Waste Code of Practice will have to be followed. Stockpiling of material may also need an environmental permit. The EA noted that it would like to be consulted on the scope of the SI. Amec Foster Wheeler advised that there is a former oil pipeline (with its part within the Energy Park believed to having been decommissioned) present along the northern and eastern boundary of the substation site, and that the cable would cross this. The pipeline is above ground, and may need a couple of metres removed to enable crossing. The EA asked if Amec Foster Wheeler could get hold of reports to confirm that the pipeline has been decommissioned. If it has, the EA advised that it may be fine to do so, but that will need to be checked with the EA contamination team. The EA suggested that the Oil Pipeline Agency be contacted for advice. If the pipeline is to be removed/ capped off then an investigation for leaks should also be carried out and remediated.	and 'Ordinary Watercourse' limits and the watercourse crossings has been put forward within Table 6.12 as requested. The Flood Risk Assessment has been based on findings from Product 4 Flood Model received from the EA on 4th April 2017, which is the most up-to-date model available at the time of writing.

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
	Substation area: The EA advised that with respect to ground contamination issues, the substation should be treated as any other potentially contaminated site. In relation to the route of the cables onto the former Richborough Power Station, the EA's preference is that it runs anti-clockwise north (not along the river). Any breaking of ground proposed would require appropriate level of SI.	
11th July 2017, PEIR, Meeting with Relevant Stakeholders	Flood Risk: Amec Foster Wheeler presented an overview of the assessment, including a description of the methodologies used. It was identified that the data from the 'EA 2010/ 2012 Lower Stour model' is being used in the interim, and that if the updated Kent model becomes available in time this data will be used. Cumulative Effects: Projects which may have a cumulative impact before 2020 or after 2020 have been considered. TDC commented that they would like to see live projects and the effects of existing discharges being considered. Amec Foster Wheeler proposed that it would circulate the methodology for the cumulative effects section.	As advised by the EA, the FRA has used the latest available information from the Lower Stour Model (received in April 2017) as presented within Volume 5, Annex 6-2: Flood Risk Assessment (Document Ref: 6.5.6.2). The EA advised that the April 2017 model represents the latest available information. This information on cumulative effects has also been incorporated into Table 6.14. For ground conditions and land quality a search area of 1 km from the RLB has been implemented. For water resources and flood risk receptors a catchment-based approach has been applied to consider the projects within the same catchment as the RLB.
23rd August 2017, PEIR, Meeting with the EA, TDC, KCC and VWPL	The main purpose of the meeting was to review the proposals for Thanet Extension export cables making landfall at the Pegwell Bay Country Park. Amec Foster Wheeler also provided a brief summary of the methodology and key findings from the Phase 1 Geo-environmental Desk Study. There was a discussion on the identified sources of contamination across the study area. Historic Cliffsend Landfill: Amec Foster Wheeler led a discussion on the landfill, which is now the Pegwell Bay Country Park. Information on the history of the landfill had been obtained from an Envirocheck data search, with additional information provided by KCC and TDC. The main concern for KCC is the lack of detailed knowledge of the landfill construction techniques. Information was provided by KCC regarding two surface watercourses/ drains that run beneath the landfill (known as PB-S1 and PB-S2) and that are regularly sampled. VWPL gave an overview of the project and the proposals for the onshore export cable. The offshore export cable will follow the route of the existing Thanet Offshore Wind Farm (TOWF) cable to make landfall at a location in the centre of the Pegwell Bay Country Park. There are offshore constraints, e.g. the Nemo Link Cable and the Ramsgate Harbour channel, which need to be avoided. Offshore the worst-case will require four offshore export cables, and these will need to transition to onshore cables within TJBs. From the TJBs the cable will run above ground through the country park using a similar technique to the Nemo Link project. The proposed sub-station is within the former Richborough Port, and the connection to the National Grid Electricity Transmission Network is within the Richborough Energy Park.	Information about the landfill is provided in section 6.7. The updated onshore project description is provided in Volume 3, Chapter 1: Onshore Project Description (Document Ref: 6.3.1). The landfall options differ significantly from those previously presented, and are assessed in sections 6.1 and 6.10 to 6.12. Mitigation measures to be embedded in the design are presented in section 6.1.

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
	KCC asked if the project could make landfall adjacent to the Nemo Link project and then follow the same route running alongside the Nemo Link cable. TDC asked if any landfall options that could avoid a landfall within the Pegwell Bay Country Park were explored. VWPL stated that the options of landfall adjacent to the Nemo Link project and further north were looked at, but there is not enough space due to constraints including the existing TOWF export cable, the Cliffsend petrol station, the former Ramsgate Hoverport and ecological constraints. There were initially three options considered for the onshore landfall design and location of the TJBs, however following VWPL design review only two options are assessed in the PEIR. All the options will require the construction of new rock armour defences to create an area in front of the landfill for the cables to be buried in order to rise onto the top of the country park; this will avoid the need for any excavation within the former landfill. This will require some land take from the saltmarsh, which is a Site of Special Scientific Interest (SSSI). A concern for the EA would be the loss of the saltmarsh habitat. VWPL stated that the engineering solution would look to reduce the land take within the saltmarsh as much as possible. The preference of the EA would be to keep the existing sea wall in place. TDC agreed to this position. KCC commented that it would be concerned if any excavation was undertaken within the Pegwell Bay Country Park (no holes in the side of the landfill). KCC would also need to have continued access around the country park on the existing footpaths and access tracks. There was a discussion on the ownership and construction of the existing sea wall around the Pegwell Bay County Park. It will be determined whether it is TDC or KCC who are responsible for the sea wall. TDC will look into its records for any information on the age of the sea wall. KCC suggested that consultation with the Pegwell Bay Country Park group should be undertaken. Any other business: TDC asked if there was any potential for a build-up of landfill gasses within the cable ducts and inspection pits that cross the landfill. For the option where the inspection pits/ cable joins are located adjacent to the sea (and sealed to prevent ingress of water), the level of the inspection pits is significantly below the level of the cable ducts that cross the landfill. Therefore, if there were any pathway for the ingress of landfill gases into the sealed concrete cable ducts (e.g. broken seal) there is the potential for pooling/ concentration of denser gases in the inspection pits (i.e. CO_2 – asphyxiant). Although any maintenance works would include standard HSE protocols, such as a Confined Spaces Procedure, given the very rapid effects of entering a space with high levels of potential asphyxiants, consideration of passive ventilation of the inspection pits (or other mitigation) as part of the design may be desirable. VWPL stated that the ducts would be sealed plastic pipes within a sealed concrete box, therefore it would not be possible for gas to enter the ducts. Amec Foster Wheeler also stated that the construction works and operational procedures for any maintenance works would include standard HSE protocols, such as a Confined Spaces Procedure, to mitigate any risks.	

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
	KCC stated that it would like to see details of any planned site intrusive works for review and approval. KCC asked if there will be a preferred option for the landfall when the DCO is submitted. VWPL confirmed that it was the intention to present one landfall option in the DCO application. Flood Risk: The EA confirmed that it was not responsible for the existing sea wall. It also confirmed that there would be no need for a FRAP for any works adjacent to the country park defences. KCC and TDC stated that they should be consulted but that they have no formal consenting/ approval process for any SI works at the construction phase in this area.	
8th December 2017 Meeting with EA	EA sought clarification on the proposed design to cross the culvert and VWPL noted that trenching in the ground above the existing culvert and avoiding engineering/ culverting is preferential. EA agreed that its preference would be to retain the existing culvert and not to build new structures that would restrict flow in the watercourse. Both parties agreed that additional SI would be required prior to construction, and any design information would be helpful. VWPL confirmed that although it would not be available at the EIA stage, SI would inform the DCO application, and the final design, at the proposed substation area and at the landfall in the saltmarsh. VWPL also confirmed that a cofferdam is proposed to control leachate at the landfall, and the EA advised that SI should be undertaken at the proposed landfall. The EA also noted previous issues associated with dewatering and discharge at the sea wall and reiterated that the development will need to ensure no pathways are created. VWPL confirmed it would agree works with all third parties (KCC, EA, TDC). The EA requested that potential impacts associated with trenching are considered, and that effective mitigation to control contamination is put forward within the EIA.	The assessment has been presented in section 6.10 and 6.11 and identifies the need for future SI works at the landfall, to help further inform appropriate mitigation measures at the post-DCO detailed design stage. An assessment has been made for potential impacts associated with trenching. In section 6.1 a series of mitigation measures including the provision of a temporary cofferdam have also been outlined for control of contamination sources at the landfall.
18th December Meeting with KCC, EA and Natural England	VWPL noted that there is enough existing information to characterise the baseline environment of the entire Site for the purposes of the EIA, and that in accordance with the requests of KCC, a contractor will undertake SI to inform the feasibility and final design (following submission of the EIA). It also confirmed that SI works will determine the feasibility of trenching etc at the landfall in the Pegwell Bay Country Park based on available ground conditions and engineering constraints, and in the interim this EIA will include an over-ground scenario for consideration. It was confirmed that the worst-case scenario for each topic would be considered in the EIA. In relation to SI works, EA raised concerns about the depth of trial pits and their potential interaction with groundwater, due to the creation of pathways for landfill contaminants. It requested justification for trial pits, and additional information on boreholes (e.g. size) and methodologies to be employed. VWPL noted concerns which will be taken into account by the appointed SI contractor. The EA identified that the SI proposals do not provide sufficient detail to provide assessment of the potential impact on the sea wall, and VWPL confirmed that SI works would inform if the TJB could be buried.	The assessment in this chapter has been based on a set of worst-case design scenarios outlined in section 6.1 based on Volume 3, Chapter 1: Onshore Project Description (Document Ref: 6.3.1). The assessment has identified the need for further SI works to help further inform design proposals and associated mitigation measures as appropriate at the post-DCO submission stage.

6.4 Scope and methodology

6.4.1 This section describes the approach to defining the scope of the assessments, and includes:

- Definition of the site and the study area used in this assessment;
- The approach to the collation and analysis of baseline data; and
- The approach to the definition of receptors, including the spatial and temporal scope of the assessment.

6.4.2 These elements are described further in the following sections.

Defining the site and the study area

6.4.3 The RLB for the onshore cable route is presented on Figure 6.1, and the following definitions have been used within the ES and the Phase 1 Geo-environmental Desk Study:

- ‘On-site’ being located within the development area RLB;
- ‘Off-site’ being located beyond the development area RLB; and
- 'Study site' being the development area RLB plus a 500 m buffer.

6.4.4 A study area has also been characterised for the assessment of the water environment. This includes the surface water catchments that are occupied by Thanet Extension, to take account of the limited potential for hydrological and flood risk effects to be propagated upstream and downstream of Thanet Extension. Licensed abstractions and discharges have been identified within the RLB plus a 500 m buffer. Licensed abstractions have also been identified downstream of the RLB outside of the 500 m buffer.

Baseline data collation

6.4.5 The following baseline data has been used in this assessment:

- British Geological Survey (BGS) mapping website; (http://mapapps.bgs.ac.uk/geologyofbritain/home.html): Borehole logs, BGS maps (geological map, sheet no. 274, Ramsgate and no. 290 Dover, 1:50,000, published 1980 and hydrogeological map of the Chalk and Lower Greensand of Kent, sheet no. 3, 1:126,720, published 1970);
- EA website: ‘What's in your backyard?’ (http://apps.environment-agency.gov.uk/wiyby/default.aspx): Aquifer designations, groundwater protection zones, catchment and surface water quality, etc.;
- MAGIC website (http://www.magic.gov.uk/MagicMap.aspx): Land-based designations;
- EA catchment data search (http://environment.data.gov.uk/catchment-planning/): Information held by EA on the water environment which supports and builds upon the data in the WFD RBMP;
- EA Product 4 flooding information, including the ‘EA 2010/2012 Lower Stour Model’, which is subject to change (with details updated following receipt of any refinements to the model);
- Catchments and hydrological features (springs, waterbodies etc) shown on Ordnance Survey (OS) mapping, aerial photography, and the Flood Estimation Handbook (FEH) CD ROM;
- Envirocheck report dated 3rd March 2017 (reference 116412988_1_1);
- EA, DDC and TDC environmental data search (see Table 6.3); and
- Findings of the site walkovers carried out by Amec Foster Wheeler on 5-6th April and 28th June 2017. As noted earlier, a SI is proposed pre-construction across the whole site and is discussed in Mitigation – section 6.15.

6.4.6 Consultations relating to the site were undertaken with the regulators as detailed in section 6.3 and Table 6.2.

Table 6.3: Baseline data requests

Data request	Baseline data collated
3rd March 2017 Request to the EA for an environmental data search for the study site	The results of the data search were received on 3rd March 2017 and are summarised below. • The EA hold no records of any contravention of licence or authorisation terms and any enforcement actions taken; • There are no licences and authorisations for which application has been made but that have not yet been given; • The EA has no boreholes in the area. The EA confirmed that the site is not a SPZ and that superficial and bedrock secondary aquifers underlie the site. The EA also confirmed that the abstraction wells in the area are for agricultural and/ or commercial purposes; • The EA confirmed that there are permits for a radioactive waste treatment facility, a waste water treatment facility, and a combined heat and power biomass plant, all located at Sandwich i.e. off-site to the south; • No planning liaison or development control issues have been reported by the EA; and • The pollution incidents that are recorded by the EA are of category 4, i.e. no impact, or category 3, i.e. minor impact, on land and water.
5th May 2017 Request to the EA for additional information about soil and groundwater pollution incidents occurred at two sites: the Pegwell Bay Petrol Filling Station (PFS), located off-site within the study site, and the Pfizer Sports Ground, located on-site	The following information was received on 22nd May 2017: • The investigations carried out at the PFS showed no significant ongoing issues and only limited historic impacts; and • Remediation works and monitoring were carried out following the leak that occurred at the Pfizer Sports Ground. There are limited residual contaminants that are stable and reducing. Freedom-of-information (FoI) requests were sent on 22nd May 2017 by Amec Foster Wheeler to the EA and the Petroleum Officer at KCC Trading Standards in order to be provided with the reports for both sites. KCC responded that it does not hold any records. The EA responded that its retention of records schedule for this type of record is four years. It advised that Amec Foster Wheeler contact the consultancies (AECOM and SLR Consulting Ltd) that carried out the investigations. Requests were sent on 4th July 2017 to both consultancies: • No response has been received from SLR Consulting Ltd to date; and • AECOM's client response on 14th November 2017 was it is not able to supply the report to third parties given that it no longer owns the property in question.

3rd March 2017
Request to the TDC for an environmental data search for the study area
	Results of the data search received on 4th May 2017 include:
	• Planning application references for the demolition of the former Richborough Power Station and for underground High Voltage direct current (HVDC) cables from Pegwell Bay to the former Richborough Power Station;
	• A list of potentially contaminated sites that are located in the surroundings of the proposed cable route. These are:
	  ○ an old military rifle range, located offshore in Pegwell Bay PFS sites;
	  ○ an old KCC landfill site (named Cliffsend) that has been partly capped and used to receive inert, putrescible and difficult waste. It is currently a Country Park reserve;
	  ○ the former Richborough Power Station, which closed in 1996 and is listed for its use as a power station and also for the potential presence of asbestos; and

Data request	Baseline data collated
	○ the railway network – located west of the site. • A list of the 2017 permitted installations. TDC advised that an investigation has been conducted in liaison with the EA at the Pegwell Bay PFS located off-site to the north, within the study site. Based on the information gathered from previous reports supporting planning applications within the study area, intrusive and remediation works were carried out at the Pegwell Bay PFS following free-phase hydrocarbon products being encountered in groundwater during an investigation conducted at an adjacent lay-by. According to the EA, remediation works were successful and the adjacent site did not show evidence of significant impact beyond the corner of the site first identified. A request for further information was sent by Amec Foster Wheeler to the EA and the information received is collated above. TDC has no record of pollution incidents at the site or surrounding sites. TDC confirms that there are no private water supplies in proximity to the site, and that Pegwell Bay has a number of designations, including status as a SSSI and Ramsar site. TDC is not intending to take action under Part 2A of the EPA 1990 based on the information currently held. Information regarding potential contamination of soil and groundwater at the hoverport was requested on 5th May 2017. TDC response on 16th March 2018 was that the hoverport site is understood to be constructed from colliery spoil. As such there exists the potential for contamination to be present. To TDC's knowledge it was never added as a landfill site to the Kent Landfill Atlas. TDC's Planning Department stated that it would be in contact if any historic reports were archived for the site. However, there has been no response to date, indicating that TDC does not hold any relevant information.
3rd March 2017 PEIR Request to the DDC for an environmental data search for the study area	DDC was not able to undertake the search because the request is for a search of a vast area and identifies a number of sites that would require researching and seeking advice on. Gathering the information together would involve a significant cost and a diversion of resources from the Department's other work.
5th June 2017 Request to EA for Product 4 Flood Risk Information	Amec Foster Wheeler contacted the EA in relation to flood risk information required to be included in the FRA (Volume 5, Annex 6-2: Flood Risk Assessment (Document Ref: 6.5.6.2)). It was identified that the substation area of interest is classified as Essential utility infrastructure in accordance with the NPPF Classification System. It was proposed that a 20% climate change allowance would be used, and that the 'EA 2010/2012 Lower Stour Model' would be used to assess flood risk at the site. The EA responded and confirmed that the 20% climate change allowance was acceptable. It also commented that the fluvial and tidal EA model would be applicable until summer 2017 (when the new East Kent model would be available) and that Amec Foster Wheeler could use this information for the FRA.
14th August 2017 PEIR Request to the KCC for an environmental data search for the historic Cliffsend Landfill	KCC provided data about the historic Cliffsend Landfill on 14th August 2017, refer to Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1, Appendix E) comprising: • A one page document summarising information about tipping and made ground refuse; • Logs of the boreholes located at the landfill site; and • Its latest environmental monitoring report produced by Waterman Infrastructure & Environment.

Data request	Baseline data collated
2nd October 2017 Request to the DDC for an environmental data search for the study area	A new request was submitted as the RLB has changed and the search is now for a smaller area. Data from DDC were received on 18th October 2017. Authorisations under the EPR 2016 exist within 250 m of the site for: • BCA Fleet Solutions 2 Limited – re-spraying of road vehicles (permit ref TDS/156/V3/P5); • Rana petroleum – petrol vapour recovery stage 1 (permit ref PTL/004); and • Richborough Service Petrol Station – petrol vapour recovery stage 1 (permit ref SH/247). The following sites that may potentially be contaminated have been identified by DDC: • Port Richborough (site 1) – transport supply and cargo handling 1946; • Port Richborough (site 2) – 1946; • Depot 1960 (site 3) – currently BCA Fleet Solutions 2 Limited; • Two petrol stations/ petrol storages (site 4 and 5); • Richborough Power Station 1990 (site 6) – electricity production and distribution; and • Areas of unknown filled ground 1874, 1908 (site 7). At the present there is no register of contaminated sites under Part 2A. The first five sites listed above are listed by DDC as potentially contaminated sites and prioritised out of 398 sites.

Approach to identifying receptors

6.4.7 The identification of receptors within the previously defined study area that require an assessment of effects has been based on relevant guidance and the professional judgement of qualified technical specialists who have undertaken a desk study for the area. In some cases, even without quantified information, it is reasonable to assume that some potential receptors would not experience significant effects, and so do not require assessment. This can be based on the assumption that features are identified as not being in hydrological connectivity with the site, based on the baseline environment summarised in section 6.7. Alternatively, some receptors can be precluded from assessment based on an understanding of tried and trusted mitigation measures that have been incorporated into the scheme, and which might reasonably be expected to be effective. This form of exclusion is based on experience from similar construction works and or experience of the application of similar mitigation, where relevant. Further information can be found in section 6.1, which establishes the maximum adverse scenario (allowing for good practice construction methods), and section 6.9, which details the embedded mitigation.

6.4.8 The receptor types within the study area being considered in the assessment have been defined as follows:

- WFD receptors: Defined as WFD waterbodies in hydrological connectivity with the site;
- Conservation sites: Defined as locally, nationally or internationally designated sites in hydrological connectivity with the site;
- Water Resources: Defined as licensed or unlicensed abstraction and discharges in hydrological connectivity with the site;
- Flood risk: Flood risk receptors are defined in detail by the Volume 5, Annex 6-2 Flood Risk Assessment (Document Ref: 6.5.6.2), and for the purposes of this chapter they are considered to be on-site users and adjacent site users; and
- Land quality receptors are defined as:
    - Human receptors: those on-site, and also the off-site neighbours;
    - Property: those on-site;
    - Land use: soils have been defined as those located off-site adjacent to the north-west and classified as of very good and good agricultural lands and also those located along the St Augustine's Golf Club and the A256 classified as of very good and good quality; and
    - Controlled waters: rivers and groundwater in hydrological connectivity with the site.

6.4.9 The temporal scope of the assessment is considered in the following way:

- The FRA (Volume 5, Annex 6-2: Flood Risk Assessment (Document Ref: 6.5.6.2)) has been submitted along with this chapter and appropriately considers the February 2016 update to the NPPF climate change allowances in designing the volume of on-site storage; and
- The assessment considers all proposed activities for Thanet Extension, including those in the construction, O&M and decommissioning phases. Where there are different potential effects from each project phase, these are outlined and each assessed separately.

THANET EXTENSION OFFSHORE WIND FARM

Figure 6.1
Red Line Boundary and Study Area

Legend

- Onshore Red Line Boundary
- 500m buffer from onshore Red Line Boundary

Datum: OSGB 1936
Projection: BNG

1:15,000 0 0.4 0.8 km

Drg No	39080-Lon143a		
Rev	1.0	Date	01/05/2018
By	JP	Layout	N/A

Figure 6.1

6.5 Assessment criteria and assignment of significance

6.5.1 This section presents the approach to the definition of significant effects on ground conditions, flood risk and land use receptors. In accordance with guidance documentation the overall approach draws from the source-pathway-receptor approach required by CLR 11 when dealing with land contamination issues. This approach has been expanded for application to all receptors considered in this chapter. The approach is described in more detail below and in Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1).

6.5.2 The CLR 11 Tier 1 Preliminary Risk Assessment (PRA) approach is summarised as:

- Development of a conceptual model;
- Consideration of potential contaminants, pathways and receptors to identify the potential 'contaminant linkages'; and
- Identification of further risk assessment requirements.

6.5.3 The conceptual model represents the characteristics of the study area and for land contamination issues indicates the possible relationships between contaminants (sources), pathways and receptors, where:

- A contaminant is a substance which is present in, on, or under the land and has the potential to cause harm;
- A receptor is something which could be adversely affected by the contaminant, for example, human beings, animals, plants, buildings and controlled waters; and
- A pathway is a route or means by which a receptor could be exposed to, or affected by, a contaminant.

6.5.4 For a potential contamination risk to exist at a site all three of the above elements must be present, and linked together so that a contaminant has been identified, a receptor is located on or near the site and there is an exposure pathway that links the contaminant to the receptor. The term 'contaminant linkage' is used to describe a particular combination of contaminant-pathway-receptor relationship.

6.5.5 As noted above, the concept of the source-pathway-receptor model has been expanded to assess potential effects on all receptors within this chapter, including effects resulting from changes in the local flow regime (sources) on flood risk and water resources receptors.

6.5.6 Overall significance has been derived from an assessment of the sensitivity (value) of a receptor and the potential magnitude of the effect, as defined by the source-pathway-receptor model. Final decisions on significance are also influenced by considerations of the likelihood and duration of any potentially significant effect, and whether it is temporary or permanent.

6.5.7 The definitions of sensitivity and magnitude used in this assessment can be found in Table 6.4 and Table 6.5. Table 6.6 shows how the sensitivity of a receptor and magnitude of an effect has been combined to support an overall conclusion on significance. An effect can either be positive or negative and overall significance has been defined as either Negligible, Minor, Moderate or Major, with only the latter two categories being considered as significant effects in EIA terms (for further information see Volume 1, Chapter 3: Approach to EIA (Document Ref: 6.1.3)).

Table 6.4: Sensitivity/ importance of the environment

Receptor sensitivity/ importance	Description/ reason
High	• Receptor of high intrinsic value e.g. humans, ecological receptors with international or national designations, and strategically important/ high value buildings and built environment; • Land use types defined as 'Essential infrastructure' and 'More Vulnerable' in the NPPF flood risk classification; • Principal Aquifer and any supported licenced public water supply abstractions and/ or within SPZ's; • Permitted discharges linked to the public water supply network; • Soil grade 1 (extremely good quality) and/ or Grade 2 (very good quality) agricultural land/ soil classification; and/ or • High value or sensitive surface watercourses with WFD elements currently attaining at least 'High' status.
Medium	• Receptor of medium value e.g. important buildings to be constructed on-site, habitats or ecology of regional importance; • Land use types defined as 'Less Vulnerable' in the NPPF flood risk vulnerability Classification; • Nitrate Vulnerable Zones (NVZs); • Secondary A or B Aquifer; • Any licensed abstractions; • Permitted discharges not associated with the public water supply; • Unlicensed potable abstractions, water quality of receptor waterbody classified under WFD as 'Good' ecological status/ potential; and • Soil grade 3 (good to moderate quality) agricultural land/ soil classification.
Low	• Receptors of low value e.g. hardstanding, drains/ sewers; ecology/ ecosystem with only local and/ or no designations or protection; • Land use types defined as 'Water-compatible development' under NPPF; • Unproductive Aquifers; • Unlicensed non-potable surface water abstractions; • Water quality of receptor could be expected to be classified under the WFD as 'Moderate', 'Poor' or 'Bad' and/ or ecological status/ potential, or classified as non-reportable WFD river waterbodies); and • Soil grade 4 or 5 (poor and very poor quality) agricultural land/ soil classification.
Negligible	• Commonplace feature with low yield or quality with good potential for substitution; • Water resources that do not support human health, and are of only limited economic and environmental benefit; and • Features that are resilient to flooding.

Table 6.5: Magnitude of impact

Magnitude	Human Health	Controlled Water	Ecology	Property Structures/ Crops and Animals	Examples
High	Adverse Highly elevated concentrations likely to result in 'significant harm' to human health as defined by the Environmental Protection Act 1990, Part 2A, if exposure occurs.	Adverse Equivalent to EA Category 1 pollution incident including persistent and/ or extensive effects on water quality; leading to closure of a potable abstraction point; major impact on amenity value or major damage to agriculture or commerce. Non-temporary downgrading of WFD status (of overall status or element status). Complete loss of licensed water resource or severely reduced resource availability and/ or quality, permanently compromising the ability of water users to exercise licensed rights. Complete loss of non – licensed resource water resource or severely reduced resource availability and/ or quality. Major impact on permitted discharge resulting in impact on permit holder.	Adverse Major damage to aquatic or other ecosystems, which is likely to result in a substantial adverse change in its functioning or harm to a species of special interest that endangers the long-term maintenance of the population.	Adverse Catastrophic damage to crops, buildings or property. Change in baseline flood risk resulting in potential loss of life or major structural damage to property and infrastructure.	Significant harm to humans as death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions. Major fish kill in surface water from large spillage of contaminants from site. Highly elevated concentrations of hazardous or priority substances present in water close to potable abstraction (high sensitivity). Explosion, causing building collapse (can also equate to immediate human health risk if buildings are occupied). Measures put in place to achieve WFD 'Good' Status/ Potential rendered ineffective and result in WFD non-compliance.
	Beneficial Removal of all identified contaminant linkages that pose a risk to receptors.	Beneficial Removal of all identified contaminant linkages that pose a risk to receptors Development aids in the achievement of WFD 'Good' Status or Potential.	Beneficial Removal of all identified contaminant linkages that pose a risk to receptors.	Beneficial Removal of all identified contaminant linkages that pose a risk to receptors. Decrease in flood risk from baseline.	Change in landform and flood storage a capacity results in a decrease in mapped flood extents from the baseline assessment.

Magnitude	Human Health	Controlled Water	Ecology	Property Structures/ Crops and Animals	Examples
Medium	Adverse Elevated concentrations which could result in 'significant harm' to human health as defined by the Environmental Protection Act 1990, Part 2A, if exposure occurs.	Adverse Equivalent to EA Category 2 pollution incident including significant effect on water quality; notification required to abstractors; reduction in amenity value or extensive damage to agriculture or commerce. Temporary downgrading of WFD Status (of overall status or element status). Moderate reduction in licensed water resource availability and/ or quality, which may compromise the ability of water users to exercise licensed rights on a temporary basis or for limited periods. Moderate reduction in non – licensed water resource availability and/ or quality. Moderate impact on permitted discharges, such that a small change in discharge approach may be required.	Adverse Damage to aquatic or other ecosystems, which may result in a substantial adverse change in its functioning or harm to a species of special interest that may endanger the long-term maintenance of the population.	Adverse Extensive damage to crops, buildings or property. Change in baseline flood risk resulting in potential for moderate/ internal damage to property and infrastructure.	Significant harm to humans as death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions. Damage to building rendering it unsafe to occupy e.g. foundation damage resulting in instability. Ingress of contaminants through plastic potable water pipes.
	Beneficial Removal of the majority of identified contaminant linkages so that risks to receptors are reduced.	Beneficial Removal of the majority of identified contaminant linkages so that risks to receptors are reduced Development facilitates a measurable improvement in WFD Status/ Potential.	Beneficial Removal of the majority of identified contaminant linkages so that risks to receptors are reduced.	Beneficial Removal of the majority of identified contaminant linkages so that risks to receptors are reduced.	WFD status classification improves, or is supported in its improvement.
Low	Adverse Exposure to human health unlikely to lead to 'significant harm'.	Adverse Equivalent to EA Category 3 pollution incident including minimal or short lived effect on water quality; marginal effect on amenity value, agriculture or commerce. No short-term or permanent change to WFD Status (of overall status or element status). Minor reduction in resource availability and/ or quality, but unlikely to affect the ability of water users to exercise licensed rights. Minor impacts on permitted discharges.	Adverse Minor or short lived damage to aquatic or other ecosystems, which is unlikely to result in a substantial adverse change in its functioning or harm to a species of special interest that would endanger the long-term maintenance of the population.	Adverse Minor damage to crops, buildings or property. Change in baseline flood risk resulting in potential for minor/ external damage to property and infrastructure.	Exposure could lead to slight short-term effects (e.g. mild skin rash). Surface spalling of concrete.
	Beneficial N/A	Beneficial N/A	Beneficial Minor or short lived improvement to aquatic or other ecosystems, which is unlikely to result in a substantial positive change.	Beneficial Change in baseline flood risk resulting in potential for reduction of frequency of minor/ external damage to property and infrastructure.	N/A

Magnitude	Human Health	Controlled Water	Ecology	Property Structures/ Crops and Animals	Examples
Negligible	Adverse No measurable effects on humans.	Adverse Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems. No measurable change in licensed water resource availability or quality and no change in ability of water users to exercise licensed rights. No measurable change in licensed water resource availability or quality. No impacts on permitted discharges.	Adverse Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems.	Adverse Repairable effects of damage to buildings, structures and services. Increased frequency of flood flows, but which does not pose an increased risk to people, property and infrastructure.	The loss of plants in a landscaping scheme. Discoloration of concrete.
	Beneficial N/A	Beneficial N/A	Beneficial Equivalent to slight improvement in water quality with no observed effect on water quality or ecosystems.	Beneficial Decreased frequency of flood flows, but which does not pose a decreased risk to people, property and infrastructure.	N/A

Table 6.6: Significance of potential effects

		Sensitivity			
		High	Medium	Low	Negligible
Negative Magnitude	High	*Major*	*Major*	*Moderate*	*Minor*
	Medium	*Major*	*Moderate*	*Minor*	*Negligible*
	Low	*Moderate*	*Minor*	*Minor*	*Negligible*
	Negligible	*Minor*	*Minor*	*Negligible*	*Negligible*
Beneficial Magnitude	Negligible	*Minor*	*Minor*	*Negligible*	*Negligible*
	Low	*Moderate*	*Minor*	*Minor*	*Negligible*
	Medium	*Major*	*Moderate*	*Minor*	*Negligible*
	High	*Major*	*Major*	*Moderate*	*Minor*

Note: Shaded cells are defined as significant effects in EIA terms

6.6 Uncertainty and technical difficulties encountered

6.6.1 The ES is based on a desk study and site walkover, carried out to characterise the receiving environment for the purpose of EIA and to support the technical assessments in this chapter and in accordance with CLR 11. In line with standard practice further SI is proposed to inform the final design.

6.6.2 The site walkovers, undertaken by Amec Foster Wheeler to support the FRA (Volume 5, Annex 6-2: Flood Risk Assessment (Document Ref: 6.5.6.2)) and PRA of Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1), did not cover the Waste Water Treatment Works (WWTW), the Ebbsfleet Solar Farm and Ebbsfleet Farm Biogas and Richborough Port as access was not permitted given the nature of the sites. However, observations were made from outside each site. Only limited access to the St Augustine's Golf Club and Richborough Energy Park, which is the location of the former Richborough Power Station, was possible. However, despite these limitations it is considered that the ground and water environment has been adequately characterised for the purposes of the EIA. Potential contamination sources that have been identified during the desk study for these areas have been assessed using reasonable worst-case scenarios, details of which can be found in Table 6.11.

6.7 Existing environment

Approach to characterisation

6.7.1 The Phase 1 Geo-environmental Desk Study (Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1)) was undertaken to inform the land quality assessment in accordance with CLR 11. It supports the ES in providing a conceptual understanding of the geology and ground conditions of the onshore site and its surroundings and an identification of the key ground, groundwater and surface water constraints which may influence Thanet Extension. The definitions for the PRA were taken from 'Guidance for the Safe Development of Housing on Land Affected by Contamination'[4].

6.7.2 The baseline characterisation of the water environment has further included the identification of receptors including the aquatic environment, namely WFD, designated sites, water resources and flood risk receptors. The water environment baseline presented here is a product of information collected during a desk-based assessment, including the review of published information and other research that has been carried out as part of the FRA (Volume 5, Annex 6-2: Flood Risk Assessment (Document Ref: 6.5.6.2)).

[4] "The guidance, whilst written to be relevant to housing development on such sites, is also generally applicable to other forms of development, to existing developments and to undeveloped land, where such sites are on land affected by contamination."

6.7.3 The site walkovers were undertaken by an Amec Foster Wheeler environmental consultant and a geotechnical engineer on 5th – 6th April and 28th June 2017 to obtain additional information about the site's current setting for the purposes of the FRA (Volume 5, Annex 6-2: Flood Risk Assessment (Document Ref: 6.5.6.2)), to undertake site reconnaissance that would allow identification of geotechnical issues and constraints requiring further investigation and assessment, and to identify any potential land quality issues for the purposes of the Phase 1 Geo-environmental Desk Study (Volume 5, Annex 6--1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1)).

Current baseline conditions

Topography and climate

6.7.4 The proposed onshore cable route and substation area is situated on low lying topography, at an elevation between approximately 3 - 5 m Above Ordnance Datum (AOD). The proposed substation area of interest is predominantly 3 m AOD, and the elevation gradually undulates along the cable route, peaking at approximately 5 m AOD at the north-eastern end of the RLB in the vicinity of the proposed landfall area in Pegwell Bay Country Park.

6.7.5 The local average annual rainfall recorded at the nearest rain gauge to Thanet Extension, namely that at the Manston Climate Station, located at an elevation of approximately 54 m, 1.7 km to the north of the study area, is 592.5 mm, between 1981 and 2010 (Source: Meteorological Office (Met. Office), 2017). The climate station is considered to be a representative proxy for the RLB, given its close proximity and topographical characteristics.

Land use

6.7.6 Historical mapping of the RLB can be found in Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1, Appendix A). The earliest maps for the site (1872) show that the area was largely undeveloped, with the exception of Sandwich Road which is present from the earliest available maps until the present day. Railway sidings had been constructed by the 1938 maps and extended up to the location of the replacement land for HMRC. The later 1960 - 1961 map describes the area of this development as Richborough Port, but there is still evidence of railway sidings on-site up until the 2006 map. However, railway sidings are no longer visible at the location of the replacement land for HMRC to the south of Richborough Port – one drain was installed by 1955-56.

6.7.7 Richborough Power Station was constructed between 1958 - 1963 and is located to the south-west of the site. The power station operated up until 1996, initially coal-fired but later converted to burn oil in 1971. Following plant closure, demolition was carried out over a period of time between 1999 and 2017.

6.7.8 There have also historically been a number of landfills within the RLB. The fireworks factory is labelled for the first and only time on the maps from 1977 to 1987 over the location of the replacement land for HMRC, to the south of Richborough Port. However, no buildings are visible on the maps, presumably because the fireworks factory was actually located off-site on the other side of Ramsgate road, and as such it has been assessed as a potential off-site source. The motor vehicle depot / car park is present on-site adjacent north and south of Richborough Port from 1984 until the present day. The existing land adjacent to the site is made up of a combination of agricultural, natural sand and mud flats (Sandwich Flats) and industrial land. The industrial land includes an historical salt works (that was active from 1931 to approximately 1999), laundry (1938), fireworks factory (1955-assumed1987), waste paper merchants (1980-1981), motor vehicle (1999-2017) and an industrial estate.

6.7.9 Various railways including the Ashford, Canterbury and Ramsgate Branch and the Deal Branch lie within 1 km of the site (i.e. data search buffer of the Envirocheck report in Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study, (Document Ref: 6.5.6.1, Appendix A). Richborough Way (the A256) is first shown on the 2017 map.

Landfilling/ waste disposal

6.7.10 The historic Cliffsend Landfill is located on-site to the east of the Sandwich Road in the Pegwell Bay Country Park. The last input to this landfill was in 1972, and during its operational life it took in household and inert waste and also non-degradable and slowly degradable waste, scrap metal, putrescible waste, hazardous waste and household waste. Based on the information received from TDC, it may have been partly capped. During the April 2017 site walkover by Amec Foster Wheeler, some boreholes were observed on the perimeter of the Pegwell Country Park, indicating that ongoing monitoring may be taking place.

6.7.11 A request for monitoring data and information about the landfill was sent to KCC and the data was received on 14 August 2017. According to the data provided by KCC, and related reports produced by Clayton Environmental Consultants, (1992) and Babtie Group (2002):

- The landfill was land-raised with approximately one million cubic metres of waste, including likely putrescible waste;
- The anthropogenic and geological strata recorded on-site include Made Ground, landfill refuse, Alluvium deposits, Thanet Formation (TAB), and the Chalk Formation;
- The TAB is in hydraulic continuity with the Chalk Formation;
- Soil samples indicated concentrations of heavy metals (nickel and lead), and Polycyclic Aromatic Hydrocarbons (PAHs) were present in the topsoil layer;
- The major components of landfill gas are methane (CH_4) and carbon dioxide (CO_2), with landfill refuse considered to be the principal ground gas source;

- It is likely that the landfill was constructed using the dilute-and-disperse principles, and no liner is present to prevent leachate from migrating into the underlying groundwater. However, KCC does not have exact records or details of the construction;
- Detected concentrations of polychlorinated biphenyls (PCBs), PAHs and heavy metals were considered to pose a very low to moderate risk to human health and wildlife depending on their locations and whilst remaining undisturbed; and
- Additional SI was recommended should the historic Cliffsend Landfill be developed for other purposes.

6.7.12 There was some possible fill material noted where footpath erosion had removed the grass and topsoil and exposed areas of anthropogenic material, glass, brick and ceramic. The landfill is also protected by a rock armour sea wall, which is the responsibility of TDC.

6.7.13 There are several landfills located off-site in the vicinity of the site:

- One historical landfill is located off-site to the west, at the location of the former Richborough Power Station. This reportedly holds inert waste. The last input was in 1987;
- Two historical landfills are located off-site adjacent to the west of the Sandwich Road, namely Ebbsfleet - Ovenden Historical Landfill and Ebbsfleet Lane Registered Landfill. The last input to the Ebbsfleet - Ovenden Historical Landfill was in 1991. The deposited waste included inert waste. According to the EA website, the waste received at this landfill was waste that remains largely unaltered once buried, such as glass, concrete, bricks, tiles, soil and stones. Ebbsfleet Lane Landfill is recorded as taking Special Waste and as having a large input rate (equal to or greater than 75,000 and less than 250,000 tonnes per year). The St Augustine's Golf Club and the Stonelees Golf Centre are located on these landfills;
- The former Sandwich Road Tip is located off-site to the east of the Sandwich Road, along the coast. This held household and inert waste; and
- The Richborough landfill, old Central Electricity Generating Board Site at Richborough, and Back Sand Point landfill are located off-site further to the south.

6.7.14 There is also the currently operational Stonelees inert soil transfer station located off-site adjacent west to the Sandwich Road, to the south of the Ebbsfleet - Ovenden Historical Landfills. The location of all these features can be found on Figure 6.1.3 in Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1).

Soils

6.7.15 The soils on and surrounding the site are classed as variable and highly permeable soils of high leaching potential (Envirocheck, 2017). The Land Information System (LANDIS) soils database indicates that the RLB is underlain by mostly well drained, loamy and clayey soils of coastal flats with naturally high groundwater. Shallow groundwater and marginal ditches mean that the water resource is vulnerable to pollution from nutrients, pesticides and wastes applied to the land.

Geology and hydrogeology

6.7.16 According to the borehole data contained in the BGS database, the site and surrounding buffer area is underlain by superficial deposits predominantly comprising Tidal and Beach deposits (clay, silt and sand), with Head deposits (clay and silt) at the northern end of the route and Storm Beach deposits (sandy gravel) in the vicinity of the River Stour. Drift deposits are absent along the corridor of the A256 Richborough Way between Ebbsfleet Roundabout and Cottington Lane. Where present, the superficial geology is underlain by bedrock geology comprising the TAB and Chalk bedrock (Margate Chalk Member and Seaford Chalk Formation).

6.7.17 The available BGS borehole information for the area does not record the presence of Made Ground. However, Made Ground was encountered during SIs carried out at the former Richborough Power Station (WSP, 2007; URS, 2009) and off-site at a lay-by located along Sandwich Road (Royal Haskoning, 2007). The presence of Made Ground was further confirmed at the former Richborough Power Station, and also at the proposed substation area, during the walkover carried out by Amec Foster Wheeler in June 2017 (Figure 6.1.3 in Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1)). Therefore, the site is anticipated to be locally underlain by Made Ground associated with its past and current uses. This includes potentially deep deposits of colliery spoil material used to artificially raise levels and form a development platform at Richborough Power Station (as confirmed by the 2008 investigation) and at Pegwell Bay hoverport (off-site). Deeper deposits of Made Ground are expected to exist in the former landfills (see Figure 6.1.3 in Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1)) on either side of Sandwich Road, and other areas of infilled ground identified in the Envirocheck reports. The available KCC borehole log information indicated that the base of landfill deposits varies between 2.2 m – 5 m below ground level (bgl).

6.7.18 The superficial deposits are classed as unproductive strata on-site and off-site to the west, and as a Secondary A aquifer off-site to the south-east (EA, 2017). The TAB underlying the site is classed as a Secondary A aquifer. The underlying Chalk Group is classed a Principal Aquifer[5]. KCC borehole log information indicates that groundwater water level ranged approximately between 1.8 m – 3.5 m bgl across the Pegwell Bay Country Park, with levels recorded at 1.9 m bgl along the intertidal zone.

6.7.19 The Phase 1 Geo – Environmental Desk Study: Volume 5, Annex 6-1 (Document Ref: 6.5.6.1) indicates that the groundwater level is at 0 m AOD across the site, based on the BGS Hydrogeological Map (sheet no. 3, 1,126,720, published 1970). Available information in the BGS database indicates that groundwater within the Margate Chalk Member was encountered approximately 26 m bgl at the Richborough Energy Park (BGS borehole TR36SW27) and approximately 33 m bgl (BGS borehole TR36SW65) west of Thanet Extension. However, information from the BGS Hydrogeological Map indicates that groundwater levels are shallower across the site, around approximately 0 m AOD. No prevailing flow direction can be deduced from the water level contours on the Hydrogeological Map. However, it is assumed to be from land to sea in a west to east direction, although likely to be subject to local influences in the form of abstractions. Shallow groundwater (within superficial deposits) beneath the proposed former Richborough Power Station location flows towards the River Stour. Information from the boreholes nearest to the shore indicates that the groundwater is tidally affected, which is confirmed by groundwater monitoring conducted on-site in 2000 and off-site in 2007.

6.7.20 Although the majority of the bedrock under the site is classed as a Secondary A aquifer, the site does not lie in a groundwater SPZ. The closest SPZ lies approximately 1.5 km to the north of the site area (outside of the study area) and is associated with an abstraction from the Chalk on the Isle of Thanet.

Surface watercourses and other features

6.7.21 The River Stour lies within a few metres of the proposed substation area and it runs parallel and adjacent to the south of the proposed cable route and the substation area at Richborough Port. The river has a tidal reach extending from the coast to Plucks Gutter approximately 6 km west of the proposed substation area. At low tide the river flows in a southerly direction beyond the substation area then bends around Great Stonar towards Pegwell Bay where the river discharges into the North Sea. The River Stour is designated as a 'Main River' by the EA (see Figure 6.2).

6.7.22 The other 'Main River' situated within the south and south-western parts of the study area is the 'Minster Stream' which crosses Ramsgate Road and the proposed cable route at approximately National Grid Reference (NGR) 633739 161947 (see Figure 6.2). This water feature generally flows in a south-easterly direction and appears to be an artificially straightened drainage channel, which discharges into the River Stour at NGR 633761 162253 (see Figure 6.2). A roadside drain is located on the eastern side of Sandwich Road, and runs parallel and approximately 20 m to the west of the proposed cable route in a north –southerly orientation.

6.7.23 There is also an 'Ordinary Watercourse' which consists of an interconnected man-made drain situated to the south of Sandwich Road, within the central part of the study area, between Pegwell Bay Country Park and Stonelees Golf Course. This drainage feature is generally orientated towards the south and is situated within the central part of Thanet Extension.

6.7.24 There is a saline estuary situated adjacent to the proposed landfall location at Pegwell Bay. The tidal stream runs parallel to Sandwich Road and the mudflats and discharges into the River Stour at approximately National Grid Reference (NGR) 634465 162535 (see Figure 6.2). There is a small pond at approximately NGR 633858 162712 (see Figure 6.2).

[5] A Secondary Aquifer is described by the Environment Agency (EA) (2015) as permeable layers capable of supporting water supplies at local rather than strategic scale, and in some cases forming an important source of base flow to rivers. A Principal Aquifer is described as layers of rock or drift deposits that have high intergranular and/ or fracture permeability – meaning they usually provide a high level of water storage. They may support water supply and/ or river base flow on a strategic scale.

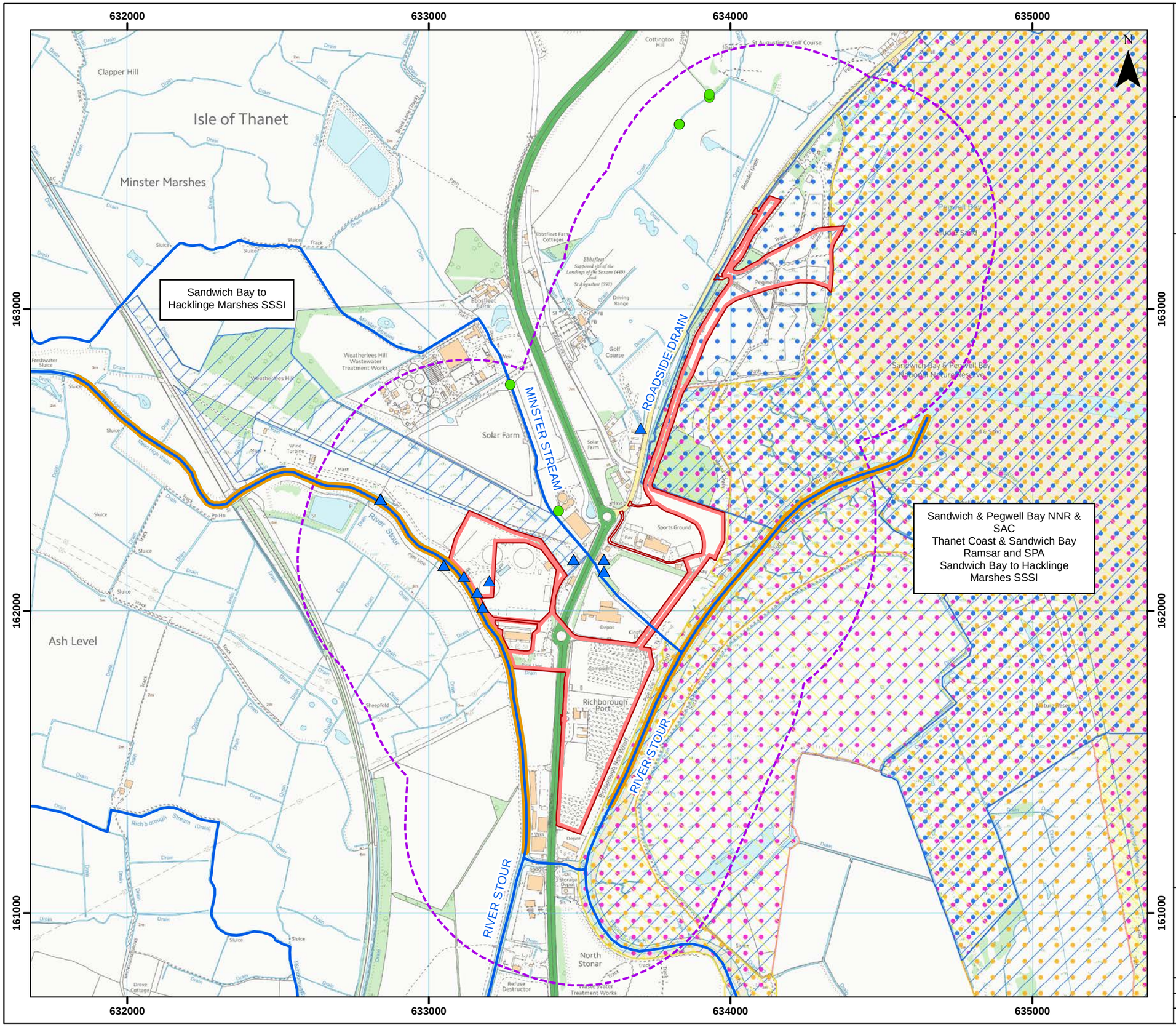
Water Framework Directive water bodies

6.7.25 Following the implementation of the WFD, European Union Member states divided the water environment into a series of River Basin Districts (RBDs). For each RBD the competent authority for WFD (which in England is the EA) produces a RBMP every six years in order to report on the progress towards, and the action needed to achieve the objectives of the WFD. The fundamental requirement of the WFD is to attain 'Good' overall status within each defined waterbody and to ensure that deterioration in status in prevented. All waterbodies are assessed for chemical status, in addition Surface Water bodies (e.g. rivers, lakes and estuaries) have an ecological status classification and groundwater bodies have a quantitative status classification. For a waterbody to be of 'Good' overall status, all status classifications must be at least 'Good'.

6.7.26 Whilst ecological status is defined as a slight variation from undisturbed natural conditions in natural waterbodies, Heavily Modified Water Bodies (HMWBs) are unable to achieve natural conditions given their designated 'human use'. Instead, HWMBs have a target to achieve 'Good' ecological potential, which aims to make sure their ecology is protected as possible without compromising their human use. The ecological potential is measured on the scale of 'High', 'Good', 'Moderate' or 'Bad'.

6.7.27 The River Stour and Minster Stream lies within the Monkton and Minster Marshes WFD waterbody which is classified at Moderate Ecological Potential in the 2015 South-East RBMP. It is designated as a HMWB due to the existing point and diffuse sources of pollution within the catchment. Thanet Extension is also situated within the East Kent Tertiaries Groundwater waterbody which is currently classified as having 'Poor' overall status, and has an objective of achieving 'Good' overall status by 2021 (EA, 2017). Table 6.7 provides further information on the WFD classification status, objectives and mitigation.

6.7.28 A full WFD assessment for coastal and transitional waterbodies is presented in Volume 4, Annex 3-1: Water Framework Directive Assessment (Document Ref: 6.4.3.1).



amec foster wheeler

VATTENFALL

THANET EXTENSION OFFSHORE WIND FARM

Figure 6.2
Water Environment Features

Legend

- Onshore Red Line Boundary
- 500m buffer from onshore Red Line Boundary
- Licensed abstraction
- Licensed discharge
- Environment Agency main
- Overall WFD classification status
- National Nature Reserve (NNR)
- Ramsar site
- Special Area of Conservation
- Special Protection Area
- Site of Special Scientific Interest (SSSI)

Datum: OSGB 1936
Projection: BNG

1:12,500 0 0.3 0.6 km

Drg No	39080-Lon144a		
Rev	1.0	Date	01/05/2018
By	JP	Layout	N/A

Figure 6.2

Table 6.7: Surface Waterbody status, objectives and mitigation (South-East RBMP, 2015)

WFD Waterbody (Waterbody Type)	2015 Waterbody status	Reasons for failure to meet Good	Overall Objective	Types of mitigation measures anticipated
Monkton and Minster Marshes	Overall HWMB with Moderate Potential (Ecological: 'Moderate', Chemical: 'Good').	Phosphate - Probable source: sewage discharge (diffuse) from towns, cities and transport.	'Good' potential by 2027.	Reduce diffuse pollution at source. Reduce diffuse pollution pathways i.e. control entry to water environment. Mitigate/ remediate diffuse pollution effects on receptor.
		Dissolved oxygen – Probable source: physical modification and flow (land drainage - water level management).		Improvement to the condition of channel/ bad and/ or banks. Removal or modification of engineering structure. Change to O&M. Vegetation management. Water demand management. Control pattern/ timing of abstraction. Use alternative source/ relocate abstraction or discharge.
East Kent Tertiaries Groundwater Body	Overall Status 'Poor' (Quantitative Status: 'Poor', Chemical Status: Poor).	Quantitative: Groundwater levels in the aquifer are being affected by abstraction; Chemical: There are localised impacts at groundwater quality monitoring stations from pesticides and microbiological contamination.	'Good' by 2021.	Groundwater body wide measures to address diffuse agricultural pollution, through pollution prevention schemes and audits, and sewer upgrade works in the urban areas and agricultural stewardship.

Abstractions and discharges

6.7.29 There are no licensed abstractions located within the RLB, but eight licence holders abstract water up to 500 m outside the RLB (Table 6.8). There are a further two abstractions from the River Stour, which are situated more than 500 m from the RLB, which have been included in the baseline assessment given that they are situated within the catchment of Thanet Extension. Each of the identified licensed abstractions are surface water fed, and there are no groundwater abstractions identified within the study area. Based on the hydrogeological information within this report it is unlikely that there is any potential for groundwater pathways from the site to abstractions outside of the delineated study area.

6.7.30 The abstractions are for private water undertaking, agriculture, amenity and recreational purposes (Table 6.8). It is assumed that where no permit end date is provided in the Envirocheck Report the abstraction is currently in use.

Table 6.8: Abstractions within 500 m and downstream of the RLB

Licence holder	Purpose	Source	NGR	Operational	Direction from RLB	Approx. distance from RLB (m)
Edward Spanton Farms	General Agriculture: Spray Irrigation – Direct	Surface	633930 163700	Yes	N	348
Edward Spanton Farms	Spray Irrigation	Surface	633390 163710	Yes	N	360
Stonelees Golf Centre	General Agriculture: Spray Irrigation – Storage (X2)	Surface	633830 163610	Yes	N	396
Mr R J Chapman	General Agriculture: Spray Irrigation – Storage (X2)	Surface	633830 163610	Yes	N	411
St Nicholas Court Farms Ltd	General Agriculture: Spray Irrigation – Direct	Surface	633430 162330	Yes	NW	160
Dyas Farms 1988 Ltd	General Agriculture: Spray Irrigation – Direct	Surface	633430 162330	Yes	NW	160
St Nicholas Court Farms Ltd	General Agriculture: Spray Irrigation – Direct	Surface	633270 162750	Yes	NW	464
Dyas Farms 1988 Ltd	General Agriculture: Spray Irrigation – Direct	Surface	633270 162750	Yes	NW	464
EA	Remedial River/ Wetland Support	Surface	632350 158920	Yes	W	1671
Sandwich Town Council	Amenity: Make-up or Top-up	Surface	632270 159530	Yes	W	1853

6.7.31 There are four permitted discharges identified within the RLB, as follows:

- Two discharge permits held by Powergen Plc (Consent numbers Aa3344, N00066) for trade cooling water discharge into the River Stour;
- A discharge permit held by Sanctus Limited (Consent number Eprdb3792ef) for trade effluent discharge into the River; and
- A discharge permit held by Erith Remediation Technologies Limited (Consent number Eprdb3597ns) for trade effluent discharge into the River Stour.

6.7.32 There are a further seven permitted discharges identified up to 500 m outside the RLB. All those identified discharge to land, river or saline estuary, being used for single domestic properties, surface waters, site drainage and process waters from trade effluents or storm sewage overflows for public supplies. It is assumed that where no revocation date is provided in the Envirocheck Report the discharge is currently operational.

6.7.33 All the permitted discharges are identified in Table 6.9 and shown on Figure 6.2.

Table 6.9: Licenced discharges within 500 m of the RLB

Operator	Discharge type	Grid Reference (NGR)	Estimated distance from RLB	Receiving Water	Status
D Tarjomani Esq	Sewage Discharges – Final/ Treated Effluent – Not Water Company	633702 162605	60 m (north-east)	Tributary of River Stour	Currently Operational
Little Chef and Travelodge	Sewage Discharges – Final/ Treated Effluent – Not Water Company	633580 162170	55 m (south)	Saline Estuary	Currently Operational
Travel Lodge Hotels Ltd	Sewage Discharges – Final/ Treated Effluent – Not Water Company	633580 162170	55 m (south)	Saline Estuary	Currently Operational (PNR)
The Occupier	Surface Water Discharge	633580 162130	80 m (south)	Saline Estuary	Currently Operational
Rontec Watford Ltd	Discharge of Other Matter – Surface Water Sewage Discharges – Final/ Treated Effluent – Not Water Company	633480 162170	45 m (north-west)	Saline Estuary	Currently Operational
Southern Water Services	Sewage Discharges – Final Treated Effluent – Water Company	632834 162372	290 m (south west)	Saline Estaury	Currently Operational
Powergen Plc	Trade Discharges – Cooling Water	632200 162100	22m (south)	Saline Estuary	Currently Operational (Pre NRA)
Powergen Plc	Trade Discharges (x2) – Cooling Water	633156 162057, 633203 162102	Within RLB	River Stour	Currently Operational
Sanctus Limited	Trade Effluent Discharge – Site Drainage	633178 162012	Within RLB	River Stour	Currently Operational (New, issued under EPR 2010)
Erith Remediation Technologies Limited	Trade Effluent Discharge – Site Drainage	633116 162113	Within RLB	River Stour	Currently Operational

Flood risk

6.7.34 The following section provides a summary of the baseline sources of flood risk which have been identified in more detail within Volume 5, Annex 6-2: Flood Risk Assessment (Document Ref: 6.5.6.2). EA flood risk mapping has been presented within Volume Figure 6.2.3 (Volume 5, Annex 6-2: Flood Risk Assessment), which supports the FRA. EA flood risk mapping indicates there are small isolated areas of coastal flooding within Thanet Extension. The land adjacent to Pegwell Bay Country Park, namely Stonelees and Sandwich Road in the central and northern part of Thanet Extension, is situated within an area where flooding is identified as high risk and within Flood Zone 3 (i.e. annual probability > 1 in 200 (0.5%) of tidal flooding) (EA, 2017). The source of flood risk in this area is associated with tidal flooding at the estuary of the River Stour. There are also discrete areas within Flood Zone 2 (i.e. annual probability between 1 in 100 and 1 in 1000 (equivalent to 1 - 0.1% chance of occurrence in any given year) of river flooding or between 1 in 200 and 1 in 1000 (0.5 - 0.1%) of sea flooding in the central and southern areas of the RLB, adjacent to Minster Stream and Richborough Port.

6.7.35 Flooding from land (rainfall run-off and surface water flooding) is considered to be a potential source of flood risk to Thanet Extension, in particular in the lower elevation ground across the central and southern areas of Thanet Extension. The flood risk would occur through rainfall falling directly onto the development site, particularly when ground is saturated. The majority of this flood risk has been identified to be of low risk (each year, the chance of flooding is between 1 in 1000 (0.1%) and 1 in 100 (1%)). There are areas of higher risk (with a greater than 1 in 30 (3.3%) chance of flooding) in the vicinity of Sandwich Road and Richborough Port, which are likely to be associated with depressions. Further information is presented in Volume 5, Annex 6-2: Flood Risk Assessment (Document Ref: 6.5.6.2).

6.7.36 Within each of these flood inundation envelopes there are a number of receptors which are classified as being 'More Vulnerable' and 'Less Vulnerable' infrastructure under NPPF. The 'More Vulnerable' receptors include the National Grid connection at Richborough and the historic landfill in Pegwell Bay Country Park. The 'Less Vulnerable' receptors include the Sports Ground situated adjacent to the roundabout junction between Richborough Way and Ramsgate Road.

6.7.37 Groundwater flooding within the Thanet District is not identified to be of strategic concern, but a SFRA completed for TDC (Entec, 2009) recommended that flooding from groundwater, surface water and foul water drainage networks is considered at a site-specific level. As Thanet Extension is covered with relatively permeable soils and geology, groundwater flooding is not considered to be a significant risk to the development site (Volume 5, Annex 6-2: Flood Risk Assessment (Document Ref: 6.5.6.2)).

6.7.38 It is anticipated that there are sewer drainage networks within the RLB. These are likely to serve the Baypoint Sports Club and BCA car auction site to the south of Pegwell Bay Country Park. However, even in these areas, sewers are unlikely to constitute a significant source of flooding (Volume 5, Annex 6-2: Flood Risk Assessment (Document Ref: 6.5.6.2)). Sewer drainage networks have therefore been scoped out of the remainder of this assessment.

Conservation sites

6.7.39 The site is located, in part, within several sensitive land use areas as follows:

- Thanet Coast and Sandwich Bay Special Protection Area (SPA), which is situated within the RLB at Stonelees;
- Sandwich Bay Special Area of Conservation (SAC);
- Sandwich and Pegwell Bay National Nature Reserve (NNR), which is situated within the RLB along the central and northern sections between Stonelees and the Pegwell Bay Car Park;
- Thanet Coast and Sandwich Bay Ramsar Site, which is situated within the RLB along the central section of the cable route at Stonelees;
- Sandwich Bay to Hacklinge Marshes (Stonelees Unit) SSSI, which is situated within the RLB at Stonelees; and

- Nitrate Vulnerable Zone (NVZ, Sensitive Land Uses maps, Envirocheck report (Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1, Appendix A)). The WFD RBMPs include a summary of the measures needed for water-dependent Natura 2000 sites to meet their conservation objectives. Supporting Site Improvement Plans (SIPs[6]) provide an overview of the issues (both current and predicted) affecting the current condition and outline the priority measures required to improve the condition of the features. Sandwich Bay SAC, Thanet Coast and Sandwich Bay SPA and Thanet Coast and Sandwich Bay Ramsar Site are water-dependent and fall under the North-East Kent (Thanet) SIP.

6.7.40 Measures for the Sandwich Bay SAC and Thanet Coast and Sandwich Bay SPA were agreed in 2015 to enable conservation objectives to be met according to the SIP. For Sandwich Bay SAC the measures will be complete by 2027, and requires implementation of management actions to address and adapt to changes in water levels affecting sand dune vegetation.

Agricultural land quality

6.7.41 A review of publicly available data[7] has been undertaken for the ALC of the site and its surroundings. This classifies the area (of approximately 30.5 ha) located directly north-west of the former Richborough Power Station as being Grade 2 (very good quality agricultural land) and Grade 3a (good quality agricultural land) lands. A Grade 2 and Grade 3a area (of approximately 21 ha) is also located along the St Augustine's Golf Club and the A256. The site itself is not classified as agricultural land (based on ALC Grades - Post 1988 Survey, Ministry of Agriculture Fisheries and Food). The ALC is shown on Figure 6.3.

[6] SIPs: provides an overview of the issues (both current and predicted) affecting the current condition and outlines the priority measures required to improve the condition of the features

[7] http://www.magic.gov.uk/MagicMap.aspx

THANET EXTENSION OFFSHORE WIND FARM

Figure 6.3

Agricultural Land Classification

Legend

- Onshore Red Line Boundary
- 500m buffer from onshore Red Line Boundary

Land Classification

- Grade 2
- Grade 3a
- Other

Datum: OSGB 1936
Projection: BNG

Notes:
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1:12,500 0 0.25 0.5 km

Drg No	39080-Lon136a			Figure 6.3
Rev	1.0	Date	01/05/2018	
By	JP	Layout	N/A	

Current and historic site activities

6.7.42 The following current and historic site activities have been identified based on the information available for the site and the site walkovers carried out by Amec Foster Wheeler in April and June 2017. More details are provided in Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1). The potential contamination sources detailed below are displayed on Figure 6.1.3 within that Annex.

Fuel storage and use (on-site and off-site)

6.7.43 Three on-site historic tanks are recorded in the Envirocheck report (Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study, Appendix A), located at the former Richborough Power Station. Their presence and condition could not be confirmed during the April and June 2017 site walkovers as the area could not be accessed. They are assumed to be present for the purposes of this assessment. The Richborough Power Station leaflet[8] indicates that heavy fuel oil storage tanks will have been on-site following the conversion from coal to oil power (Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1)). A further on-site tank is recorded in the Envirocheck report, located to south of Richborough Port. Another on-site historic tank is recorded in the Envirocheck report, located on the proposed substation site. This could not be confirmed during the April and June 2017 site walkovers as the area could not be accessed.

6.7.44 There are six off-site tanks recorded in the Envirocheck report (Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1, Appendix A). One is located adjacent north of the former power station, one is located at the former power station east of the site boundary, one is located at the Pegwell Bay PFS, one is located to the north in Cliffsend and one is located to the south along the Sandwich/ Ramsgate Road. In addition, one off-site historic tank is recorded in the Envirocheck report, located to the north of the motor vehicle deport and Richborough Port.

6.7.45 A petrol station used to be on the proposed substation area, but this could not be confirmed during the April 2017 and June site walkovers as the area could not be accessed. In addition, two operational PFSs are located off-site adjacent to the proposed location of the substation, namely an Esso PFS on the northbound A256, and a Gulf PFS on the southbound carriageway, the latter with a tank used as part of the car wash facility, but of unknown content. Additionally, an operational Jet PFS, which is referred to as the 'Pegwell Bay PFS' in the regulatory databases, is located off-site to the north. Site investigations and remediation works were carried out at the Pegwell Bay PFS following the identification of free-phase hydrocarbon products in groundwater during an investigation conducted at an adjacent lay-by. According to the information received from the EA on 22nd May 2017, further investigations and reporting showed no significant on-going issues and only limited historic impacts. During the April 2017 site walkover, the PFS appeared to be maintained adequately, with some staining around the pumps from spills when vehicles are filled.

6.7.46 Where site access has not been possible for the ES, all infrastructure has been assumed to be *in situ* for the assessment to reflect a worst-case scenario.

6.7.47 On the OS mapping (Envirocheck report (Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1, Appendix A)), a pipeline is present on-site, running along the southern side of the road to the south of the motor vehicle depot associated with Richborough Port. The purpose of the pipeline was likely to transfer oil from the ships at Richborough Port to the former Richborough Power Station. The pipeline used to be present above ground within the power station. Based on a previous report available for the site, it is likely that this part was dismantled during the power station decommissioning. It could have previously been connected to the power station which is located across the road from this point to the west. During the June 2017 walkover, lagging, potentially containing asbestos, was observed in the pipeline at its eastern end, in an area towards the River Stour.

Pollution incident at the Pfizer sports ground (on-site)

6.7.48 A tank spill of oil or a pipe failure occurred at the Pfizer Sports Ground in 1999 (Envirocheck report (Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1 Appendix A)). The EA confirmed that the bulk of the contamination identified had been removed from the site. A remedial plan was being developed by Pfizer following hydrocarbon contamination encountered in shallow groundwater in 2011 (Envirocheck report (Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1, Appendix A)). Additional information received from the EA on 2nd May 2017 confirmed that the spill incident has been closed, following remediation works and groundwater monitoring over time. There are limited residual contaminants, but these are stable and reducing.

[8] http://ramsgatehistory.com/documents/richborough_power_station_print_version.pdf

Historical power station (on-site)

6.7.49 Richborough Power Station was historically located on the proposed location of the cable connection between the wind farm substation and the National Grid substation. The power station was in operation from 1962/ 3. Originally the power station was coal fired but it was converted to burn oil in 1971. Following plant closure, demolition was carried out over a period of time between 1999 and 2017. A pond area, now believed to be infilled, is evident on the historical maps.

6.7.50 Site investigations, a generic risk assessment and a DQRA for controlled waters were carried out at the site (URS, 2009). These studies revealed that contaminants, including polycyclic aromatic hydrocarbons, total petroleum hydrocarbon, heavy metals, polychlorinated biphenyls and sulphates, were present in soil and groundwater at concentrations exceeding the relevant assessment criteria in some places. The assessments concluded that they did not pose a significant risk to human health or controlled waters and that no remediation or further assessment were required. Asbestos fibres were not detected in the soil samples analysed. CO_2 was detected in soil gas at several locations across the site, but it was considered that the negligible borehole gas flow rates suggested that risks resulting from soil gases were in the very low risk to low risk category (as defined by CIRIA C665). However, the site is still listed as potentially contaminated by TDC.

6.7.51 The area could partially be inspected during the June 2017 site walkover, as most of the site is a construction site. Made Ground was observed at the site, notably across the area where the cable would connect to the National Grid substation. According to the Envirocheck historical mapping (Envirocheck report (Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1, Appendix A)), there used to be a railway in this area. Arisings from the demolition of the former towers and other infrastructure were observed to be stockpiled on the ground along the road to the south of the site.

Made Ground (on-site)

6.7.52 The BGS geological mapping available for the area does not record the presence of Made Ground. However, Made Ground was encountered during the SIs carried out at the Richborough substation and off-site. This was confirmed at the former Richborough substation and at the proposed substation area during the walkover undertaken by Amec Foster Wheeler in June 2017. Made Ground is, therefore, anticipated across the site due to the past uses at the proposed location of the substation and alongside Sandwich Road on the proposed cable route.

Landfills (on-site and off-site)

6.7.53 There is one historic landfill located on-site, and a number off-site, and information relating to these features is provided in paragraphs 6.7.10 –6.7.16 earlier.

Areas of infilled ground (on-site and off-site)

6.7.54 According to the OS mapping (Envirocheck report (Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1, Appendix A)), there are seven areas of infilled land on-site. They are located at the former Richborough Power Station, at the Pfizer Sports Ground and at Richborough Port.

6.7.55 There are 18 areas of infilled land off-site, located to the north in Cliffsend and near the hoverport, to the west at Ebbsfleet Farm, within the Ebbsfleet- Ovenden landfill, on the A256, and within the solar farm and south of Richborough Port, where the replacement land for HMRC would be located.

6.7.56 All of these areas with the exception of the hoverport involve the backfilling of a pond, marsh land or stream with unknown material. The infilling of the watercourses is recorded to have taken place at around 1874, and/ or 1908 for the infilled areas to the south of Richborough Port (replacement land for HMRC). The area near the hoverport involves the backfilling of a quarry or a pit with unknown material.

Waste water treatment works (on-site and off-site)

6.7.57 A historical WWTW on-site associated with the former Richborough Power Station was observed during the June 2017 walkover.

6.7.58 There are two WWTWs located off-site, namely Weatherlees Hill WWTW, north-west of the former Richborough Power Station, and North Stonar WWTW, located to the south. Neither WWTWs could be accessed during the April and June 2017 walkovers. However, observations made in the vicinity identified what appeared to be breather pipes to the entrance of the Weatherlees Hill WWTW, to the east, possibly indicating an underground tank.

Maintenance facilities (on-site)

6.7.59 A motor vehicle depot is located adjacent off-site, to the north of Richborough Port. The April 2017 site walkover identified a disused oil/ water interceptor located on the western area of the main buildings. This was previously emptied via tanker, but had not been used in recent times according to the representative who escorted Amec Foster Wheeler around the depot. Storage of diesel, engine oil and new engine oils was observed around the site. The large fuel and oil storage tanks were bunded and appeared to be in good condition. There was no evidence of leaks and spills surrounding the storage areas. Smaller volumes of fuel/ oil were stored in non-bunded areas, and some signs of minor spillages on the tarmac were observed. The Minster Stream flowed to a sluice gate on the bank of the River Stour neighbouring the site.

6.7.60 A truck depot is located on-site at Richborough Port at the proposed substation area. It could not be accessed during the site walkovers of April and June 2017, but Made Ground was observed from the outside. The pipeline is located adjacent to the depot's northern border. According to the Envirocheck report (Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1, Appendix A)), historical mineral railway lines and railway sidings were located in the area. The area was a military port during the First World War (Great War Forum, 2017). The oil-receiving connections to tankers associated with the former Richborough Power Station are located adjacent to the east of the depot.

Fireworks factory (off-site)

6.7.61 Based on the Envirocheck report (Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1, Appendix A)), a fireworks factory is shown adjacent off-site to the west of the replacement land for HMRC on the other side of Ramsgate road, on the Envirocheck historical maps dated 1955 to 1973. The fireworks factory is labelled for the first and only time on the maps from 1977 to 1987 at the location of the replacement land for HMRC. However, no buildings are visible on the maps, presumably because the fireworks factory was only located off-site on the other side of Ramsgate road, and as such it has been assessed as potential off-site source.

Hoverport (off site)

6.7.62 A disused hoverport is located off-site to the north of the proposed cable route. During the April 2017 site walkover, a narrow piezometer borehole was noted on the hoverport tarmac pad area, indicating that SI and monitoring may have taken place. Anecdotal evidence indicates that the platform for the site was created by the placement of colliery spoil material (Royal HaskoningDHV, 2016). Ground contamination had been identified on the site through the ground investigations undertaken by Royal HaskoningDHV using borehole and spike samples. The site was considered likely to meet the definition of Contaminated Land under Part 2a of the EPA, due to the risks associated with groundwater contamination discharging to coastal waters.

Energy Park - Ebbsfleet Solar Farm and Ebbsfleet Farm Biogas (off-site)

6.7.63 The Energy Park could not be accessed during the April 2017 walkover but was observed from the close vicinity. Domed structures which appeared to form part of the anaerobic digestion facility were observed. Fields of solar panels (Ebbsfleet Farm Solar Park) were located on the western and, to a lesser extent, the eastern side of the Richborough Way A256 road. Stockpiles (covered with dark green sheeting) were also noted on the eastern side of Richborough Way (A256), to the east of the Energy Park. These were possibly related to the Energy Park and may be storage for low level fertiliser produced from the anaerobic digestion. Part of the Energy Park is understood to be a waste treatment facility which operates as an A23 activity under Environmental Permit (Ref. 103686), indicated as an anaerobic digestion facility.

Conclusions of the Stage 1 PRA (Volume 5, Annex 6-1: Phase 1 Geo-environmental Desk Study (Document Ref: 6.5.6.1)

6.7.64 The initial conceptual model has identified a number of potential contaminant linkages for receptors including future site users, controlled waters and property.

6.7.65 The risk rating of the potential linkages range from very low to high. The highest risks are associated with maintenance personnel and property in relation to the landfills located on-site (and off-site) and asbestos from the Richborough pipeline and maintenance activities.

Receptors

6.7.66 A range of receptors have been identified that may be affected by Thanet Extension can be seen in Table 6.10.

Table 6.10: Summary of identified receptors

Identified Receptor	Sensitivity	Rationale
WFD Receptors		
Monkton and Minster Marshes; East Kent Tertiaries Groundwater Body.	Low	WFD Status classified as being 'Moderate' and 'Poor' respectively.
Conservation/Protected Sites		
Thanet Coast and Sandwich Bay SPA and Ramsar; Sandwich Bay SAC; Sandwich Bay to Hacklinge Marshes (Stonelees Unit) SSSI; Sandwich and Pegwell Bay NNR; Nitrate Vulnerable Zone.	High	Aquatic ecological receptors have an international or national designation.
Water Resources		
Licensed non-potable surface water and groundwater abstractions.	Medium	Receptors of medium value e.g. licensed non-potable abstractions.
Permitted surface water and groundwater discharges.	Medium	Receptor is small relative to available resource and not associated with public water supply network.
Flood Risk Receptors		
Sandwich Road and Ramsgate Road A256.	High	Transport links classified as 'Essential Infrastructure' in the NPPF flood risk vulnerability classification.
Golf Course Public House in Cliffs End; Dwellings adjacent to Sandwich Road in Stonelees; National Grid Infrastructure at the Energy Park; Historical Cliffsend Landfill.	High	Land use types defined as 'More Vulnerable' in the NPPF flood risk vulnerability classification.
Sports Ground Building adjacent to Ramsgate Road and Richborough Way A256.	Medium	Land use classified as 'Less Vulnerable' in the NPPF flood risk classification, given that it is a non-residential recreational building

Identified Receptor	Sensitivity	Rationale
Land Quality Receptors		
Humans: Site and adjacent site users – construction and decommissioning phase; Future site users (maintenance personnel) and site adjacent users – O&M phase.	High	Receptors of high intrinsic value.
Property (buildings, services, and/ or cable).	Medium	Medium value properties.
Off-site agricultural soils.	High Medium	Grade 2 (very good quality agricultural land). Grade 3a (good quality agricultural land) lands.
Controlled Waters: TAB aquifer.	Medium	Secondary A aquifer.
Controlled Waters: Chalk aquifer; and Coastal water.	High	Chalk Principal Aquifer (KCC data indicate in hydraulic continuity with overlying TAB and not protected by a liner); and Pegwell Bay adjacent to the site.
Controlled waters: River Stour (within and downstream and of RLB) and Minster Stream tributary.	Medium	Site within the catchment and in reasonable proximity (< 500 m) of a moderate quality watercourse. There is potential transmission of pollutants via baseflow.

6.8 Key parameters for assessment

6.8.1 The maximum adverse scenario to be considered by the assessment is fundamentally dependent on the nature of the landfall i.e. the location and means by which the offshore cables are brought ashore and jointed to the onshore cables within the TJBs. The landfall location for Thanet Extension offshore export cables is proposed to be within Pegwell Bay, Kent, just to the north-west of the River Stour. However, there are three options being considered as to how to achieve landfall.

6.8.2 Further details are provided in the ES Volume 2, Chapter 1: Onshore Project Description (Document Ref: 6.3.1), but the key features of each of the three options are summarised below:

- Landfall Option 1: the TJBs would be located below ground within the Country Park 'Zone for Transition Pits area', within an excavated area supported by a cofferdam or suitable alternative and possibly extending to the base of the Cliffsend Landfill, and the offshore cables would be installed by HDD. This approach requires a larger onshore temporary works compound to house the HDD rig and associated equipment compared to the other options, but does not require excavation and reinstatement of the sea wall. HDD would be undertaken from land to sea, from the base of the TJBs and possibly partly within the landfill using the methods described in ES Volume 2, Chapter 1: Onshore Project Description (Document Ref: 6.3.1), or entirely within the superficial deposits and/or solid strata beneath the landfill, thereby avoiding the landfill itself. The HDD ducts would be installed from the TJB locations out to a punch-out location at least 100 m seaward of the existing sea wall. The onshore cable would then extend from the TJBs via surface trenching in the landfill to Stonelees. This option assumes that the future SI works indicate that the TJBs, HDD and surface trench are possible and do not present an unacceptable risk of contamination release from the historic landfill, and that excessive dewatering of the landfill and underlying aquifers for the purpose of the construction of the TJBs and the surface trench is not required.
- Landfall Option 2: the TJBs would be located above ground within the Country Park 'Zone for Transition Pits area' and above the landfill. This approach requires the installation of a temporary cofferdam within the upper intertidal/saltmarsh area before extending the existing sea wall into the saltmarsh and raising the land surface immediately behind. The cables would be trenched through the upper intertidal area to the seawall extension, and once the sea wall cofferdam is established the sea wall would be removed and the cable trenched up to the periphery of the Country Park before transitioning through to the above-ground TJBs. After construction of the seawall extension and installation of the cables the cofferdam would be removed. The onshore cables would then be extended from the TJBs via a surface berm above the landfill to Stonelees. This option assumes that the SI works indicate that trenching within the former landfill is unacceptable and therefore the sea wall cofferdam construction and land raise are required to mitigate the potential unacceptable risk of contamination release from the historic landfill or tidal flooding.
- Landfall Option 3: the TJBs would be located below ground within the 'Zone for Transition Pits area' Country Park, within a cofferdam or suitable alternative in the Cliffsend Landfill. This approach requires the installation of a temporary cofferdam within the upper intertidal/saltmarsh area, but without the sea wall extension and land raise that characterises Option 2. The cables would be trenched through the upper intertidal area to the sea wall extension, and once the sea wall cofferdam is established the sea wall would be broken through and the cable trenched through to the below-ground TJBs or alternative installations. After reconstruction of the sea wall and installation of the cables the sea wall cofferdam would be removed. The onshore cable would then extend from the TJBs via surface trenching in the landfill to Stonelees. This option assumes that the SI works indicate that the sea wall cofferdam construction, TJBs and surface trench are possible and do not present an unacceptable risk of contamination from the historic landfill or result in tidal flooding, and that excessive dewatering of the landfill and underlying aquifers for the purpose of the construction of the TJBs and the surface trench is not required.

6.8.3 Within the three landfall options there are currently other uncertainties that would be resolved following the findings of the future SI and further detailed engineering design, most notable being the location of the TJBs and the exact route of the onshore cabling across the Cliffsend Landfill. Beyond the landfill, the onshore cable would be trenched along a common and more prescribed route, but SI and detailed design would still be required to finalise certain aspects of the works, including the method of crossing the Minster Stream, the nature and depth of the proposed substation foundations, and the route and depth of the HDD beneath the A256 carriageway.

6.8.4 Table 6.11 identifies the maximum adverse scenario that has been defined for the main construction and O&M potential effects on each of the main receptor groups, based on a consideration of the three landfall options, and the variants within each option and the subsequent works described above.

Table 6.11: Design envelope scenario assessed

Potential effect	Maximum design scenario assessed	Justification
Construction		
Effects on human health during construction works through disturbance and mobilisation of existing, contaminated soil and/or groundwater, generation of dust and fibres, and the potential need to remove existing underground tanks and pipeline.	Landfall Options 1 and 3, with deep-piled substation construction and the requirement for any trenching/ excavation works including on the HMRC replacement land.	Excavation works and other ground works could in the worst-case present a potential human health hazard through direct contact with contaminated soil/ groundwater, ingestion and inhalation of dusts, vapours and fibres, and/ or through radiation. The main risks would be to construction workers but there is the potential for other receptors to be affected e.g. adjacent site users from windblown dust or fibres.
Effects on human health from construction activities, particularly at the substation, through spillages of oils and chemicals.	Any landfall option, most relevant being the subsequent substation works.	Chemicals and oils used during construction activities could in the worst-case involve human health hazard through direct contact and inhalation.
Effects on human health and property during construction works through discovery and potential explosion of UXO, ingress of ground and landfill gas, and inflows of groundwater.	Landfall Options 1 and 3, with ground-bearing substation foundations and the requirement any trenching/ excavation works including on the HMRC replacement land.	UXO encounter and explosion during excavation and/ or piling (or blind drilling) works could in the worst-case involve death of human receptors and damage of property. An explosion within the landfill area could also potentially be compounded by the presence of landfill gas. Significant inflows of groundwater could also occur into excavations. Excavation works and the location of some of the infrastructure could in the worst-case involve human health hazard through asphyxiation and potential for explosion and damage to property and infrastructure through gas ingress and drowning, and accumulation in buildings and subsurface excavations/installations
Effects on human health and property during construction works due to existing sea wall removal/ breakthrough and escape of landfill gases.	Landfall Options 2 and 3.	There is a potential that the breakthrough/ removal of the existing sea wall would result in coastal and landfill erosion during the construction phase, creating the potential for landfill gas migration. Human receptors and property therefore have the potential to be exposed through asphyxiation, explosion and/ or electrical spark.

Potential effect	Maximum design scenario assessed	Justification
Pollution of controlled waters, WFD water bodies, designated conservation sites and off-site Grade 2 and Grade 3a soils from construction work through creation of pathways for the migration of potential contamination, soil disturbance and mobilisation of existing potential contamination, sediment laden-runoff and the construction of the Minster Stream crossing.	Landfall Options 1 and 3, with open-cut cable trenching, the Minster Stream crossing, deep-piled substation construction, the requirement for any trenching/ excavation works including on the HMRC replacement land, and HDD to Richborough Energy Park.	Excavation works would in the worst-case involve a potential hazard to controlled waters and soils pollution through surface water run-off, leaching, leachate escape and/ or baseflow migration, and flooding of excavations in the landfill, leading to the requirement for dewatering and management/treatment of the pumped water. The installation of the cable crossing at the Minster Stream could involve the replacement of the existing culvert structure and any associated in-channel works.
Pollution of controlled waters, WFD water bodies, designated conservation sites and off-site Grade 2 and Grade 3a soils during construction works through concrete batching and use of cement products, release of contaminants from backfilling and building materials, spillages of oils and chemicals, and removal of potential existing tanks at the National Grid connection point.	Landfill Option 2, and subsequently at the substation and National Grid connection point.	There is a potential for the materials to be used to contain contaminants that could in the worst-case cause pollution of controlled waters, designated conservation sites and adjacent off-site Grade 2 and Grade 3a soils through leaks and surface water run-off, leaching and/ or baseflow migration. There is potential for underground tanks to be present in areas where the cable is to be buried. Such tanks would potentially need to be removed for the cable installation. Removal of the tanks could in the worst-case result in leaks and surface water run-off, leaching and/ or baseflow migration.
Pollution of controlled waters and designated conservation sites during construction works through existing sea wall amendment/ breakthrough and subsequent escape of landfill contaminants.	Landfall Options 2 and 3.	There is a potential that the temporary removal/ breakthrough of the existing sea defence would result in coastal and landfill erosion during the construction phase, and landfill contaminants subsequently leaching into the sea as a consequence. Controlled waters and adjacent designated receptors therefore have the potential to be exposed to the leaching of landfill contaminants
Changes in the quantity of surface and groundwater abstractions, and flows to watercourses, WFD water bodies and designated conservation sites during construction works through changes in runoff/ infiltration rates and patterns/ new flow pathways associated with ground disturbance, and development of working areas during construction and changes in river baseflow from the dewatering of excavations.	Any landfall option, most relevant works being the subsequent cable route dewatering.	Water management along the cable route has the potential to reduce the quantity of water supporting local surface water and groundwater abstractions, watercourses and designated sites.

Potential effect	Maximum design scenario assessed	Justification
Effects on surface waters during construction works through the proposed watercourse crossing and changes in flow volumes associated with the discharge of dewatered groundwater.	Any landfall option, most relevant works being the subsequent Minster Stream crossing (replacement of the existing culvert).	Flow impedance could potentially be associated with the construction of the permanent watercourse crossing. If the culvert or the pump for dewatering has insufficient capacity or becomes blocked, then it is possible that backwater effects could propagate upstream. Also, at the substation location dewatering would take place during the excavation of the base, and discharge would be directed towards the River Stour. Uncontrolled discharges could also result in backwater effects if the discharge point is constrained or if there is unmanaged run-off without attenuation.
Increased risk of coastal flooding towards historic landfill due to temporary sea wall works.	Landfall Options 2 and 3.	There is a potential that the temporary removal/ breakthrough of the existing sea defence would result in sea water reaching the landfill at the edge of the Pegwell Bay Country Park through the temporarily weakened sea wall.
Volumetric displacement of flood water during construction works through the placement of temporary spoil mounds, construction compounds and hardstanding in flood plain areas.	Any landfall options, most relevant works being the subsequent temporary spoil mounds and construction compounds.	The location of infrastructure within floodplains could potentially cause the displacement of flood waters downstream. The temporary spoil mounds associated with the cable route would be situated in small areas of tidal Flood Zone 3. In the event of tidal flooding the spoil mounds would be washed out into the sea. The temporary construction compound associated with proposed substation area has been located outside the Flood Zone 3 envelope, within Flood Zones 2 and 1.
O&M		
Effects on human health during maintenance works through disturbance of any residual contamination, spillages of oils and chemicals, and previous inappropriate reuse/ use of contaminated fills and soils.	Landfall Options 1 and 3 and other areas of contaminated soils, such as the onshore cable route, substation and between the substation and the National Grid connection point. Also, locations of occasional hazardous activities, such as transformer oil filling.	The worst-case scenario involves human health hazard through direct contact with contaminated soil/ groundwater, ingestion and inhalation of dusts, vapours, ground gas, and fibres, and/ or through radiation. Chemicals and oils used during maintenance activities could in the worst-case involve human health hazard through direct contact and inhalation.
Effects on human health during maintenance works through ingress and accumulation of ground and landfill gas in buildings and facilities.	Landfall Option 1 and to a lesser extent Options 2 and 3, and other proposed development on Made Ground or areas of infill.	The worst-case scenario involves human health hazard through asphyxiation and potential for explosion.
Effects on property from location of infrastructure and maintenance works through ground and landfill gas ingress and accumulation in buildings.	Landfall Options 1 and to a lesser extent Options 2 and 3, but soils and Made Ground elsewhere in the proposed development also have the potential to generate ground gases.	The worst-case scenario involves damage to property and infrastructure through ingress and accumulation in buildings and subsurface installations.

Potential effect	Maximum design scenario assessed	Justification
Effect on property from location of infrastructure and maintenance works through previous inappropriate reuse/ use of contaminated fills and soils, aggressive ground conditions and settlement of infrastructure.	Any landfall option and other infrastructure, but settlement of soils above HDD is of most relevance with respect to Option 1.	Aggressive ground (elevated levels of sulphate, sulphide, acidic conditions) can have a deleterious effect on concrete, whilst structures can also be affected by total, differential and collapse settlement.
Pollution of controlled waters, WFD water bodies, designated conservation sites and off-site Grade 2 and Grade 3a soils during maintenance works through spillages of oils and chemicals, landfill leakage and previous inappropriate reuse/ use of contaminated fills and soils.	Any landfall option, and other parts of the proposed development, including locations of occasional hazardous activities, such as transformer oil filling.	The worst-case scenario could involve pollution of controlled waters, designated conservation sites and adjacent off-site Grade 2 and Grade 3a soils pollution through leaks and surface water run-off, leaching and/ or baseflow migration.
Effects on surface waters associated with the proposed watercourse crossing.	Culverting of Minster Stream.	If there was a replacement to the Minster Stream crossing there could be potential for blockages and adverse effects on flow conveyance if the culvert was not designed properly.
Changes in patterns and rates of infiltration and run-off arising from development of a below ground earth grid, substation support structures and working areas.	Substation foundations.	The presence of these infrastructure elements have the potential to alter flow patterns.
Volumetric displacement of flood water associated with the increase in impermeable footprint in the vicinity of the substation.	Proposed substation area.	An increase in impermeable land-take at the proposed substation area could increase surface run-off rates at this location.
Decommissioning		
Similar effects to those identified during construction phase.		

6.9 Embedded mitigation

6.9.1 Mitigation measures that were identified and adopted as part of the evolution of the project design (embedded into the project design) and that are relevant to ground conditions, flood risk and land use are summarised in the CoCP (generic) or Table 6.12 (Thanet Extension-, CEMP- or O&M-dependent). In Table 6.12, general mitigation measures, which would apply to all parts of the electrical transmission works, are set out first, followed by those measures specifically relevant to the construction, O&M and decommissioning phases. Thereafter, mitigation measures that would apply specifically to ground conditions, flood risk and land use issues associated with the landfall, cable route and substation are then described.

Table 6.12: Embedded mitigation relating to ground conditions, flood risk and land use and outwith the CoCP

Parameter	Mitigation measures embedded into the project design but outwith the CoCP
General	
Project design	• SI works will be undertaken to inform final design and mitigation, e.g. remediation works of potential hazards, such as landfill, ground gas, known/ suspected areas of contamination, including contamination resulting from historical leaks from the on-site pipeline, and leachate/ groundwater levels, and would allow an assessment of the likely settlement to be caused by the installation of cable ducts to be undertaken; • HDD associated with Landfall Option 1 would be achieved as per the description presented in Project Description (onshore) (Document Ref: 6.3.1). Specifically of relevance for ground conditions the HDD works will be undertaken: o Within the superficial deposits and/or solid strata beneath the landfill, and avoiding the landfill itself, where practicable; or o Within the landfill by casing and excavating down through the landfill, lining it with plastic or other material (depending on depth) and replacing with clean inert fill (disposing of the excavated material appropriately), and installing a casing through the zone of the HDD bore and sealing in the underlying layers to avoid leachate ingress, if completion entirely within the underlying deposits and strata is not possible; potential for gas movement, gas migration and gas explosion in the landfill would be assessed following the results of the SI and additional mitigation put in place; • The cable trough would have cable ducts installed to house the cables and would be backfilled with suitable material and then buried and reseeded to create a berm across the country park for Landfall Option 2; • Other project design measures such as storage and or reuse of excavated material are provided within the Code of Construction Practice (Document Ref: 8.1)
Construction	
Landfall, onshore cable and substation	• Construction phase mitigation measures such as surveys, adherence to Control of Substances Hazardous to Health (COSHH) and Health and Safety Regulations, dust management, drainage strategies, (inclusive of emergency response plan which would identify responsible persons and roles, lines of communication, site evacuation procedures and exclusion zones; Emergency Flood Response strategies; and a pollution response plan) are provided in detail within the Code of Construction Practice (Document Ref: 8.1) • The contaminated management plan (CLGP) will be drafted following SI works and measures applied as appropriate and agreed with the relevant authorities. Indicative measures are provided within the Code of Construction Practice (Document Ref: 8.1). • A detailed UXO threat and risk assessment would be carried out in accordance with CIRIA C681 Chapter 5 on managing UXO risks, prior to any intrusive works in order to determine any mitigation required to address this risk;
O&M	
Onshore cable and substation	Further project design measures relating to drainage at the onshore substation to be implemented during the O&M phase will be submitted as required under the DCO • If any permanent crossings (for the cable) over existing watercourses are required, the relevant flood management agencies (EA and KCC) would be consulted on the principles of their design and the appropriate permits or consents would be applied for. This is discussed further in the FRA (Volume 5, Annex 6-2: Flood Risk Assessment (Document Ref: 6.5.6.2)) and considered in other consents and licences (Document Ref: 5.4);

Parameter	Mitigation measures embedded into the project design but outwith the CoCP
	• Appropriate ventilation and monitoring protocols would be developed in line with the Working in Confined Spaces Regulations (1997) for any confined spaces, e.g. cable inspection chambers/ test pits; • The construction health and safety file would include information of ground contamination, and would be kept and used to develop risk assessment and method statements, including mitigation measures to address these risks in line with health and safety legislation during the O&M phase; • The risks from accidental spillages/ leaks during handling and storage of chemicals, oils, including transformer oil, and fuels would be mitigated by the COSHH Regulations 2002 and the Management of Health and Safety at Work Regulations 1999, and for Controlled Waters by pollution prevention measures and good working practices in accordance with the Guidance for Pollution Prevention (GPPs) guidelines (EA, 2017); • Fuel, oils, including transformer oil, and chemical storage and handling would be minimised in the design of the works, and safe working procedures/ method statements for handling fuel and minimising the potential for spillage would be put in place e.g. emptying and properly decommissioning fuel tanks prior to removal; • The construction development would implement a mostly impermeable cover, as necessary, based on the findings of the SI on the proposed substation area. O&M plans would be prepared post-DCO covering, as a minimum, details of how blockages would be prevented/ minimised/ detected/ removed, periodic inspection schedules, roles and responsibilities, and details of associated FRAP.
Decommissioning	
Similar mitigation measures are anticipated to those embedded into the project design for the construction phase.	

6.10 Environmental assessment: construction phase

Effects on human health during construction works through disturbance and mobilisation of existing contaminated soil and/or groundwater, generation of dust and fibres, and the potential need to remove existing underground tanks and pipeline

6.10.1 Landfall Option 1 would require the excavation of material, including ageing putrescible, hazardous and household waste from the historic Cliffsend Landfill in order to construct a TJB possibly down to the base of the landfill and an open-cut trench in the landfill towards Stonelees. Leachate is likely to be encountered during these works, and the HDD within/beneath the landfill from Pegwell Bay would potentially also encounter groundwater contaminated by the landfill. Option 3 would require similar works, but the TJB would potentially be less deep and the HDD would be substituted by open-cut trenching through the landfill and extending out and beyond the sea wall. These Options represent the likely worst-case for potential effects. The predominantly open-cut trenching beyond the landfill to the south would involve disturbance of potentially contaminated soils and superficial deposits, as would the deep-piled substation construction and any excavation works including on the HMRC replacement land. Dismantling of an underground pipeline with potential asbestos lagging at Richborough Port, HDD beneath the A256 and the removal of tanks at Richborough Power Station would also present risks to construction workers and adjacent site users through direct contact with contaminated soil/ groundwater, ingestion and inhalation of dusts, vapours and fibres. These human receptors have been assessed as being of High sensitivity, using the criteria within Table 6.4 and as determined in Table 6.10.

6.10.2 The works within the Cliffsend Landfill are of particular concern, and further SI would be undertaken pre-construction to determine details of the local geology, the type, location and amount of waste deposited and the engineering of the landfill. The sea wall cofferdam would be sealed around piling sheets, the TJB excavation itself would take place within its own cofferdam or suitable alternative, and the trenches and HDD would be sealed in order to prevent the cable routes acting as a preferential leachate and/or contaminated groundwater pathway. Any landfill leachate and contaminated water encountered would be pumped, tankered and disposed of off-site in a controlled manner to reduce potential for groundwater leachates. Elsewhere, embedded mitigation measures at Richborough Port and Power Station would include a SI to determine if there is any evidence of contamination, and to identify a process to prevent mobilisation of fuel during tank removal. A pre-site preparation asbestos survey as defined by the HSE would be required, with removal of asbestos-containing materials, and other materials and structures contaminated with asbestos fibres, to be performed by a competent/ licensed contractor prior to any demolition works. For site workers and visitors at all locations, construction good practices to control exposure to contamination (compliant with COSHH Regulations 2002 and the Management of Health and Safety at Work Regulations 1999) would be implemented, such as site induction, good hygiene practices, dust suppression, requirement for PPE suitable to prevent exposure and/ or restricted access during higher risk activities. These measures would be incorporated into the site's CEMP and project design (Table 6.12).

6.10.3 Subject to the incorporation of good working practices and confirmation of the detailed design of Options 1 and 3, these and other mitigation measures are considered to be sufficient to manage the potential (post-embedded mitigation) impact to Negligible magnitude and the potential effect to **Minor** adverse significance. Therefore, there is not a requirement for any additional mitigation measures, and the effect will also be of **Minor** adverse significance, which is not significant in EIA terms.

Effects on human health from construction activities, particularly at the substation, through spillages of oils and chemicals

6.10.4 These effects are not related to the landfill works but more associated with construction activities for the substation, such as transformer oil filling and processing, and during piling. Human receptors have the potential to be exposed through inhalation of, and direct contact with, any accidental spillages/ leaks during handling and storage of chemicals, transformer oil and fuels.

6.10.5 Human receptors have been assessed as being of High sensitivity. Mitigation measures including construction good practices to control exposure to contamination would be developed within the site's CEMP and project design (Table 6.12).

6.10.6 With all these measures in place the potential (post-embedded mitigation) magnitude of impact is assessed as Negligible, and the potential effect is of **Minor** adverse significance. Therefore, there is not a requirement for any additional mitigation measures, and the effect will also be of **Minor** adverse significance, which is not considered to be significant in EIA terms.

Effects on human health and property during construction works through discovery and potential explosion of UXO, ingress of ground and landfill gas, and inflows of groundwater

6.10.7 Landfall Option 1 would require the most excavation of waste material, whilst the placement of ground-bearing substation foundations and any excavation works relating to utilities and fencing on the HMRC replacement land would also result in ground disturbance. There is potential for generation of ground and landfill gases (hydrogen sulphide (H_2S), CH_4, and CO_2) from the deposits of the historic Cliffsend Landfill, in particular CH4 and CO_2 according to KCC data, and also gases from Made Ground and/ or areas of potentially infilled ground across the whole site. The discovery and potential for explosion of UXO could also occur during these construction activities, as could significant inflows of leachate and groundwater.

6.10.8 Human receptors have the potential to be affected by explosions caused by UXO and ground and landfill gas, by asphyxiation from ground and landfill gas or drowning as a result of major water ingress. Property would also be exposed through gas ingress and accumulation in buildings/ infrastructure and subsurface installations and potential for explosion, and as a result of high groundwater levels could experience hydrostatic uplift. Human receptors have been assessed as being of High sensitivity, whilst property has been assessed as Medium sensitivity. Embedded mitigation serves to reduce these potential effects. For example, a detailed UXO threat and risk assessment would be undertaken prior to any ground works, and the findings of the risk assessment implemented to ensure all risks are reduced to acceptable levels. A SI is proposed to be across the whole site pre-construction. With respect to landfill gas and major groundwater inflows, the works within the Cliffsend Landfill and at the substation are of particular concern, and the SI would be undertaken to determine details of the local geology, the type, location and amount of waste deposited and the engineering and hydrogeology (such as leachate levels) of the landfill and so better understand the associated risks. SI is also required at the substation for the same reasons. The cable route within the landfill beyond the TJB and in the remainder of the site would be installed below ground within a concrete trough, with the cables housed in cable ducts and the trough backfilled with suitable material. Gas monitoring is proposed to be carried out pre-construction as part of the SI to determine if there is any evidence of contamination and potential for ground gas generation, migration and / or explosion in particular within the historic landfill but also in the other areas through which the cable route passes. The findings would inform additional mitigation measures to be embedded into the project design, which would include the implementation of appropriate working methods, ventilation in confined spaces, and gas monitoring installation and the provision of personal gas alarms and RPE for work when in the landfill area and within the buildings/ compounds at the substation (Table 6.12) where necessary.

6.10.9 Human receptors have been assessed as being of High sensitivity, whilst property has been assessed as Medium sensitivity. Subject to incorporation of good working practices and confirmation of the detailed design of Option 1, these and other mitigation measures are considered to be sufficient to reduce the potential (post-embedded mitigation) impact to Negligible magnitude and the potential effect to **Minor** adverse significance. Therefore, there is not a requirement for any additional mitigation measures, and the effect will also be of **Minor** adverse significance, which is not significant in EIA terms.

Effects on human health and property during construction works due to existing sea wall amendment/ breakthrough and escape of landfill gases

6.10.10 Landfall Options 2 and 3 include the temporary removal of the sea wall. There is a potential that the amendment/ breakthrough of the existing sea defence would result in coastal and landfill erosion during the construction phase, creating the potential for landfill gas migration. Human receptors and property therefore have the potential to be exposed through asphyxiation, explosion and/ or electrical spark. The human receptors have been assessed as being of High sensitivity, whilst property has been assessed as being of Medium sensitivity.

6.10.11 Subject to successful installation of a temporary cofferdam and incorporation of good working practices (Table 6.12), and confirmation of the detailed design, this is considered sufficient to manage the potential (post-embedded mitigation) impact to Negligible magnitude and the potential effect to **Minor** adverse significance. Therefore, there is not a requirement for any additional mitigation measures, and the effect will also be of **Minor** adverse significance, which is not significant in EIA terms.

Pollution of controlled waters, WFD water bodies, designated conservation sites and off-site Grade 2 and Grade 3a soils from construction works through creation of pathways for the migration of potential contamination, soil disturbance and mobilisation of existing potential contamination, sediment laden-runoff and the construction of the Minster Stream crossing

6.10.12 Landfall Options 1 and 3 would both involve disturbance of the Cliffsend Landfill by excavation and trenching, and therefore the potential to create pathways for the migration of leachate and contaminated groundwater into controlled waters (surface water and groundwater), WFD water bodies and the nearby conservation sites. Option 1 has the disadvantage that it would require the deepest TJB and also HDD possibly within or beneath the landfill, but Option 3 would involve breaking through the sea wall, thereby potentially making it easier for contaminants to escape into Pegwell Bay. The predominantly open-cut trenching beyond the landfill to the south would involve disturbance and potential mobilisation of potentially contaminated soils and superficial deposits, and sediment-laden runoff could occur from the associated spoil heaps and especially the Minster Stream crossing. Such risks would also arise as a result of the deep-piled substation construction and any excavation works including on the HMRC replacement land, dismantling of the underground pipeline at Richborough Port, HDD beneath the A256 and the removal of tanks at Richborough Power Station. The designated sites, the Chalk aquifer, Pegwell Bay and site-adjacent Grade 2 soils have been assessed as being of High sensitivity, whilst other controlled waters, site-adjacent Grade 3a soils have been assessed as being of Medium sensitivity, and WFD water bodies have assessed as being of Low sensitivity.

6.10.13 The works within the Cliffsend Landfill are of particular concern, and, as mentioned earlier, further SI would be undertaken pre-construction to determine details of the local geology, the type, location and amount of waste deposited and the engineering of the landfill. The sea wall cofferdam would be sealed around piling sheets, the TJB excavation itself would take place within a cofferdam or suitable alternative, and the trenches and HDD would be sealed in order to prevent the cable route acting as a preferential leachate and/or contaminated groundwater pathway. Any landfill leachate and contaminated water encountered would be pumped, tankered and disposed of off-site in a controlled manner to reduce potential for groundwater leachates. Along the cable route, soil stockpiles would be located at least 8 m from surface watercourses, and water management measures (e.g. cut-off trenches, silt fences, settlement ponds etc.) would be implemented to prevent potential polluted run-off to enter any watercourses. Elsewhere, embedded mitigation measures at Richborough Port and Power Station would include a SI to determine if there is any evidence of contamination, and to identify a process to prevent mobilisation of fuel during tank removal. The programme and scope of the proposed pre-construction SI would be agreed with the EA, TDC Environmental Health Officer and other stakeholders as appropriate. There would also be a suitable foundation design for the substation, and construction good practices would be embedded into the site's CEMP and pollution response strategies defined within it, and project design (Table 6.12).

6.10.14 Subject to incorporation of good working practices and confirmation of the detailed design of Options 1 and 3, these and other mitigation measures are considered sufficient to manage the potential (post-embedded mitigation) impact to Negligible magnitude and the potential effect to **Minor** to **Negligible** adverse significance. Therefore, there is not a requirement for any additional mitigation measures, and the effect will also be of **Minor** to **Negligible** adverse significance, which is not significant in EIA terms.

Pollution of controlled waters, WFD water bodies, designated conservation sites and off-site Grade 2 and Grade 3a soils during construction works through concrete batching and use of cement products, release of contaminants from backfilling and building materials, spillages of oils and chemicals, and removal of potential existing tanks at the National Grid connection point

6.10.15 Concrete bound sand (CBS) would be used for backfilling of the TJBs and the trench of the onshore cable that would be located within Cliffsend Landfill (Landfall Options 1 and 3), and elsewhere in the proposed development, but of most concern would be the potential release of contaminants associated with the fill material used to construct the land raise of Option 2, extending up to 18.5 m east of the current landform. Other potentially polluting activities include works at the substation such as transformer oil filling and processing, and spillages of oils and chemicals could also occur. Tanks may also need to be decommissioned at the former Richborough Power Station.

6.10.16 Controlled waters, WFD water bodies, designated sites and Grade 2 and 3a soils receptors have the potential to be exposed through leaching, surface water run-off and/ or baseflow migration from these materials and activities. The designated sites, the Chalk aquifer, Pegwell Bay and site adjacent Grade 2 soils have been assessed as being of High sensitivity, whilst other controlled waters and site adjacent Grade 3a soils have been assessed as being of Medium sensitivity. WFD water bodies have been assessed as being of Low sensitivity.

6.10.17 Mitigation measures such as pollution prevention measures, a process to prevent mobilisation of fuel during tank removal, use of clean and inert imported material, and designating specific areas for activities associated with cement or concrete processes have been embedded into the CoCP and project design. In addition, a SI including soil testing would be carried out before construction to determine if there is any evidence of contamination, and excavated materials to be re-used on-site would be controlled in accordance with the CL:AIRE Definition of Waste: Development Industry Code of Practice (version 2) (Table 6.12).

6.10.18 With all these measures in place the potential (post-embedded mitigation) magnitude of impact is assessed as Negligible, and the significance of the potential effects is deemed to be **Minor** to **Negligible** adverse. Therefore, there is not a requirement for any additional mitigation measures, and the effect will also be of **Minor** to **Negligible** adverse significance, which is not considered to be significant in EIA terms.

Pollution of controlled waters and designated conservation sites during construction works through existing sea wall amendment/ breakthrough and subsequent escape of landfill contaminants

6.10.19 Landfall Options 2 and 3 include the removal and reworking of the sea wall. There is a potential that the temporary removal/ breakthrough of the existing sea defence would result in coastal and landfill erosion during the construction phase, and landfill contaminants subsequently leaching into the sea as a consequence. Controlled waters and adjacent designated sites therefore have the potential to be exposed to the leaching of landfill contaminants. All the designated sites have been assessed as being of High sensitivity. Controlled waters have also been assessed as being of High sensitivity at the landfill and Medium sensitivity at River Stour.

6.10.20 A temporary cofferdam structure or suitable alternative would be installed to form an enclosed area around the existing sea wall. The cofferdam would be formed from sheet piles that would be sealed, and between approximately 1 m – 5 m in height to mitigate against coastal overtopping and facilitate a dry working area. Contaminated water would also be pumped, tankered and disposed of off-site in a controlled manner to reduce the potential for leachate escape.

6.10.21 Subject to incorporation of good working practices (Table 6.12) and confirmation of the detailed design, mitigation measures would be sufficient to manage the potential (post-embedded mitigation)impact to Negligible magnitude and the potential effect to **Minor** adverse significance. Therefore, there is not a requirement for any additional mitigation measures, and the effect will also be of **Minor** adverse significance which is not significant in EIA terms.

Changes in the quantity of surface and groundwater abstractions, and flows to watercourses, WFD water bodies and designated conservation sites during construction works through changes in runoff/ infiltration rates and patterns/ new flow pathways associated with ground disturbance, and development of working areas during construction and changes in river baseflow from the dewatering of excavations

6.10.22 The construction phase would involve the excavation of the cable route which would temporarily result in the disruption of flow pathways due to the interception of any shallow water table. This water would be subsequently pumped and dewatered, and these activities have the potential to reduce the quantity of water serving local surface and groundwater abstractions, watercourses, WFD water bodies and the adjacent designated sites.

6.10.23 These receptors have been assessed as being of Low – High sensitivity, with the lowest sensitivity ascribed to the WFD water bodies and the highest sensitivity ascribed to the adjacent designated sites. The changes in infiltration and run-off pathways are likely to be localised and short lived due to the small temporary footprint of the construction works.

6.10.24 A range of mitigation measures would be implemented as part of the CEMP to ensure that the natural hydrological regime is closely replicated (Table 6.12). This would include the provision of dewatering onto adjacent vegetated areas away from watercourses where possible in areas of uncontaminated land. It is considered that this would be feasible along the remainder of the onshore cable route located away from Cliffsend Landfill. The excavated areas would be reinstated carefully and in a timely manner, and areas which have not been reinstated within three months would be reseeded. The cable route would also be reinstated with earth and potentially crushed chalk to recreate a chalk grassland effect. At the substation location drainage schemes would utilise SuDS principles where new systems are required.

6.10.25 With all these measures in place the potential (post-embedded mitigation) magnitude of impact is assessed as Negligible, and the significance of the potential effects is deemed to be **Minor** to **Negligible** adverse. As such there is not a requirement for any additional mitigation measures, and the effects will also be of **Minor** to **Negligible** adverse significance, which is not considered to be significant in EIA terms.

Effects on surface waters during construction works through the proposed watercourse crossing and changes in flow volumes associated with the discharge of dewatered groundwater

6.10.26 There is a proposed watercourse crossing across the EA 'Main River', Minster Stream, which under a worst-case scenario would have its existing culvert replaced below ground level (in the worst-case assessment). Flow impedance could potentially be associated with the construction of the permanent watercourse crossing. If the culvert or the pump for dewatering has insufficient capacity or becomes blocked, then it is possible that backwater effects could propagate upstream. Also, at the substation location dewatering would take place during the excavation of the base, and discharge would be directed towards the River Stour. Uncontrolled discharges could also result in backwater effects if the discharge point is constrained or if there is unmanaged run-off without attenuation. These receptors are assessed as being of Medium sensitivity.

Mitigation would be incorporated into the design envelope and embedded mitigation through the implementation of the CoCP and development of the CEMP (Table 6.12). The replacement culvert would be designed appropriately to ensure that flow is unimpeded based on a design flow criteria including a climate change allowance factor. Dewatering would also be managed in a controlled manner to mimic greenfield run-off rates using SuDS principles and avoiding any constrictions within channel. This would help ensure that as a minimum first 5 mm of rainfall events would be controlled. A FRAP would be required for the Minster Stream proposed culvert crossing, and for any ground investigation works within the Minster Stream channel. The damming and over pumping of water in the Minster Stream channel would take place during low flow conditions at a controlled rate, and the replacement culvert would be appropriately sized to at least convey the same volume of water as the existing culvert.

6.10.27 With all these measures in place the potential (post-embedded mitigation) magnitude of impact is assessed as Negligible, and the significance of the potential effects is deemed to be **Minor** adverse. As such there is not a requirement for any additional mitigation measures, and the effects will also be of **Minor** adverse significance, which is not considered to be significant in EIA terms.

Increased risk of coastal flooding towards historic landfill due to temporary sea wall works

6.10.28 Landfall Options 2 and 3 include the removal and reworking of the sea wall. There is a potential that the temporary removal/ breakthrough of the existing sea wall would provide a pathway for sea water to reach the historic landfill. The historic Cliffsend Landfill at the edge of Pegwell Bay is a flood risk receptor which is assessed of High sensitivity.

6.10.29 A temporary cofferdam structure or suitable alternative would be installed to form an enclosed area around the existing sea wall. The cofferdam would be formed from sheet piles that would be sealed, and between approximately 1 m – 5 m in height, and water ingress would be pumped and tankered offsite to help reduce the risk of flooding of the historic landfill during the construction works.

6.10.30 With these measures in place the potential (post-embedded mitigation) magnitude of impact is assessed as being Negligible, and the significance of the potential effects is therefore deemed to be **Minor** adverse. As such there is not a requirement for any additional mitigation measures, and the effects will also be of **Minor** adverse significance, which is not considered to be significant in EIA terms.

Volumetric displacement of flood water during construction works through the placement of temporary spoil mounds, construction compounds and hardstanding in flood plain areas

6.10.31 The location of infrastructure within floodplains could potentially cause the displacement of flood waters downstream. The temporary spoil mounds associated with the cable route would be situated in small areas of tidal Flood Zone 3, adjacent to the slipway adjacent to the Sports Ground and at the junction of the existing paths within Stonelees Nature Reserve. In the event of tidal flooding the spoil mounds would be washed out into the sea. The temporary construction compound associated with substation location has been located outside the Flood Zone 3 envelope, within Flood Zones 2 and 1. There are adjacent flood risk receptors within the River Stour floodplain which have been assigned a Medium sensitivity.

6.10.32 The EA Product 4 flood risk information indicates that the substation location would remain dry during 1% AEP fluvial flood risk events and 0.5% tidal flood risk events, during the planned construction programme. The volumetric displacement of flood water related to surface water flood risk at the temporary construction compound location is therefore temporary Negligible adverse in magnitude post-embedded mitigation. The potential effect significance is therefore deemed to be **Minor** adverse significance. As such there is not a requirement for any additional mitigation measures, and the effect will also be of **Minor** adverse significance, and therefore not significant in EIA terms.

6.11 Environmental assessment: O&M phase

Effects on human health during maintenance works through disturbance of any residual contamination, spillages of oils and chemicals, and previous inappropriate reuse/ use of contaminated fills and soils

6.11.1 There are potentially contaminated soils and/ or groundwater at the landfall (most notably Options 1 and 3), and other locations, including the onshore cable, the substation and between the substation and the National Grid connection point. The maintenance works may involve disturbance of these soils that have the potential to contain concentrations of various contaminants, including asbestos, and would include occasional hazardous activities on site, such as transformer oil filling. The TJBs and the onshore cable corridor would contain backfilled material (such as CBS) that could contain contaminants if there were not appropriate mitigation measures in place during the construction phase. Human receptors have the potential to be exposed through direct contact with contaminants, ingestion and inhalation of dusts, vapours and fibres, and have been assessed as High sensitivity.

6.11.2 In addition to method statements and good working practices, the SI that would be carried out prior to construction would identify any remediation and design requirements, which includes use of soil in accordance with the CL:AIRE Definition of Waste (see Table 6.12).

6.11.3 With all these measures in place the potential (post-embedded mitigation) magnitude of impact is assessed as Negligible, and the significance of potential effect is therefore deemed to be **Minor** adverse. As such there is not a requirement for any additional mitigation measures, and the effect will also be of Minor adverse significance, which is not considered to be significant in EIA terms.

Effects on human health during maintenance works through ingress and accumulation of ground and landfill gas in buildings and facilities

6.11.4 There is potential for generation of ground and landfill gases (H_2S, CH_4, and CO_2) from the deposits of the historic Cliffsend Landfill, and also from Made Ground and/ or areas of potentially infilled ground across the whole site. Landfall Option 1 would require most disturbance of the waste material, and therefore is the landfall option with most potential for a landfill gas issue, but all of the options have a potential for ground and landfill gas ingress. Human receptors such as site maintenance staff have the potential to be exposed through asphyxiation and potential explosion due to ground and landfill gas ingress and accumulation, and are assessed as High sensitivity.

6.11.5 In addition to method statements and a continuation of the good working practices established during construction, the proposed SI would be carried out prior to construction to identify any remediation and design requirements. These would include use of defined service corridors, ground gas membranes and monitoring of ground gas before entering any inspection chambers/test pits (Table 6.12).

6.11.6 Subject to incorporation of good working practices and confirmation of the detailed design of Option 1, these and other mitigation measures are considered to be sufficient to manage the potential (post-embedded mitigation) impact to Negligible magnitude and the potential effect to **Minor** adverse significance. Therefore, there is not a requirement for any additional mitigation measures, and the effect will also be of Minor adverse significance, which is not significant in EIA terms.

Effects on property from location of infrastructure and maintenance works through ground and landfill gas ingress and accumulation in buildings

6.11.7 Landfall Option 1 would be most prone to the release of landfill gas, also Options 2 and 3 to a lesser extent, but soils and Made Ground elsewhere in the proposed development also have the potential to generate ground gases. Backfill sands in the cable trenches could facilitate the movement of such gases, and property has the potential to be exposed through electrical spark and potential explosion due to ground gas ingress and accumulation, and has been assessed as being of Medium sensitivity.

6.11.8 A SI including gas monitoring would be carried out prior to construction to identify if there is any evidence of contamination and potential for ground gases generation and ingress. The findings would inform the mitigation measures to be embedded into the project design, and would include the implementation of appropriate design measures such as sealing of the chambers, test pits and cable trenches, ventilation in confined spaces and/ or gas resistant membranes at the landfill and within the buildings/ compounds at the location of the substation, and ongoing gas monitoring (Table 6.12).

6.11.9 Subject to incorporation of good working practices and confirmation of the detailed design of Options 1 and 3, these and other mitigation measures are considered to be sufficient to manage the potential (post-embedded mitigation) impact to Negligible magnitude and the potential effect to **Minor** adverse significance. Therefore there is not a requirement for any additional mitigation measures, and the effect will also be of **Minor** adverse significance, which is not significant in EIA terms.

Effects on property from location of infrastructure and maintenance works through previous inappropriate reuse/ use of contaminated fills and soils, aggressive ground conditions and settlement of infrastructure

6.11.10 Such potential risks on property as chemical attack on concrete and settlement of infrastructure are associated with all the landfall options and other infrastructure, but settlement of soils above HDD is of most relevance with respect to Option 1.

6.11.11 Elevated concentrations of sulphates that could attack concrete foundations were detected during the previous intrusive SI carried out at the substation site, whilst it is recognised that the cable route would run over or into landfill and areas of very soft and compressible beach deposits, which are liable to gross settlement under low applied loads. As such the cable ducts may be susceptible to gross total and differential settlement, and potentially collapse settlement due to the degradation of putrescible materials. The HDD works could also lead to settlement of the overlying soils and landfill. Property has been assessed as being of Medium sensitivity.

6.11.12 The SI that is proposed would provide more detailed information on the geotechnical ground conditions and help to identify hazards and any remediation and design requirements which include foundation design requirements, settlement calculations, specification of construction material resistant to contaminants, ground gas membranes, and re-use of soil in accordance with the CL:AIRE Definition of Waste or use of barrier pipe (Table 6.12).

6.11.13 With all these measures in place throughout the O&M phase the potential (post-embedded mitigation) magnitude of impact is assessed as Negligible. The potential effect is therefore deemed to be of **Minor** adverse significance. As such there is not a requirement for any additional mitigation measures, and the effect will also be of **Minor** adverse significance, which is not considered to be significant in EIA terms.

Pollution of controlled waters, WFD water bodies, designated conservation sites and off-site Grade 2 and Grade 3a soils during maintenance works through spillages of oils and chemicals, landfill leakage and previous inappropriate reuse/ use of contaminated fills and soils

6.11.14 Whilst ongoing consequences of construction disturbance of the Cliffsend Landfill would be most likely with Landfall Options 1 and 3, Option 2 would have employed potentially polluting CBS and other fills during its land raise. Controlled waters, WFD water bodies and adjacent designated sites and Grade 2 and 3a soils receptors also have the potential to be exposed through leaching, surface water run-off and/ or baseflow migration from any accidental spillages/ leaks during handling and storage of chemicals, transformer oil and fuels, on the landfill and elsewhere.

6.11.15 The adjacent designated sites, the Chalk aquifer, Pegwell Bay and site adjacent Grade 2 soils have been assessed as being of High sensitivity, whilst other controlled waters and site adjacent Grade 3a soils have been assessed as being of Medium sensitivity. The WFD waterbodies have been assessed as being of Low Sensitivity.

6.11.16 Mitigation measures such as pollution prevention measures, use of impermeable cover at the substation where necessary (based on the findings of the SI), implementation of good working practices in any O&M plan (similar to those within the site CoCP and CEMP), construction of a new landfill sea wall and the pollution response plan would be anticipated (Table 6.12).

6.11.17 With all these measures in place the potential (post-embedded mitigation) magnitude of impact is assessed as Negligible. The potential effect is therefore deemed to be of **Minor** to **Negligible** adverse significance. As such there is not a requirement for any additional mitigation measures, and the effect will also be of **Minor** to **Negligible** adverse significance, which is not considered to be significant in EIA terms.

Effects on surface waters associated with the proposed watercourse crossing

6.11.18 If the proposed culvert crossing of the Minster Stream was designed with insufficient capacity or became blocked, then it is possible that backwater effects may propagate upstream. The Minster Stream has been classified as having a Medium sensitivity.

6.11.19 The culvert would be adequately designed to convey the 1% AEP flow plus allowance of climate change for fluvial crossings (+ 20%) as agreed with the EA. Following construction, reinstatement would replace bed and bank material in the same general profile as the pre-installation state. Robust O&M plans would be prepared post-DCO providing details on how blockages can be prevented and addressed, including inspection schedules and outlining key responsibilities (Table 6.12).

6.11.20 With all these measures in place the potential (post-embedded mitigation) magnitude of impact is assessed as Negligible. The significance of the potential effect is therefore deemed to be **Minor** adverse. As such there is not a requirement for any additional mitigation measures, and the effect will also be of **Minor** adverse significance, which is not considered to be significant in EIA terms.

Changes in patterns and rates of infiltration and run-off arising from development of a below ground earth grid, and substation support structures and working areas

6.11.21 The presence of the substation earth grid and support structures could potentially provide a source of obstruction which may disrupt groundwater infiltration and surface water run-off pathways towards receiving watercourses. The highest receptor sensitivity has been assessed as High for the Chalk aquifer, whilst the lowest sensitivity has been assessed as Medium for the River Stour watercourse.

6.11.22 To help mitigate effects, the substation earth grid would be surfaced with material which is at least as permeable as the topsoil which was removed during construction. Where this is not practical, SuDS measures would be implemented during the operation of the scheme. The type of measures would be commensurate with local conditions, and the scale/ duration of the substation building. A detailed drainage strategy would be prepared for the substation building prior to development (Table 6.12).

6.11.23 With all these measures in place the potential (post-embedded mitigation) magnitude of impact is assessed as Negligible. The significance of the potential effect is therefore deemed to be **Minor** adverse**.** As such there is not a requirement for any additional mitigation measures, and the effect will also be of **Minor** adverse significance which is not considered to be significant in EIA terms.

Volumetric displacement of flood water associated with the increase in impermeable footprint in the vicinity of the substation

6.11.24 The substation would be situated in close proximity to the River Stour. The EA Product 4 flood risk information indicates that the area is within Flood Zone 1 and that it would remain unaffected by fluvial and tidal flooding during the lifespan of Thanet Extension up to 2060, taking into account a 20% climate change allowance. Thanet Extension could, however, result in the potential displacement of surface floodwaters. This adjacent A256 flood risk receptor is assessed as being of a High sensitivity.

6.11.25 To help mitigate against effects, a detailed drainage strategy would be prepared for the substation building prior to the development (Table 6.12). This would include SuDS measures, which would be commensurate with local conditions.

6.11.26 With these measures in place the potential (post-embedded mitigation) magnitude of impact on this receptor would be Negligible and the resulting potential significance in the worst-case scenario would be **Minor** adverse. As such, there is not a requirement for any additional mitigation measures, and the effect will also be of **Minor** adverse significance, which is not considered to be significant in EIA terms.

6.12 Environmental assessment: decommissioning phase

6.12.1 It is understood that should Thanet Extension be decommissioned; the substation electrical infrastructure and the building foundations would be removed. No decision has been made regarding the final decommissioning for other onshore components of Thanet Extension. However, at the end of the operational life of the project, it is likely that onshore cables would be removed from the ducts and recycled, with TJBs capped, sealed and left *in situ*. Where it is preferable to do so, cables could be cut and left *in situ*, if it is deemed closer to the time that removing would have a greater impact than leaving *in situ*.

6.12.2 As such, it is expected that decommissioning phase effects would, at worst, be similar to construction phase effects. Good practice methods similar to those identified for construction would ensure that there are no potentially significant effects in the decommissioning phase.

6.13 Environmental assessment: cumulative effects

6.13.1 Cumulative effects refer to effects upon receptors arising from the Thanet Extension Offshore Wind Farm when considered alongside other proposed developments and activities and any other *reasonably foreseeable project(s)* proposals. In this context the term *projects* is considered to refer to any project with comparable effects and is not limited to offshore wind projects.

6.13.2 The approach to cumulative assessment for the Thanet Extension Offshore Wind Farm takes into account the Cumulative Impact Assessment Guidelines issued by RenewableUK in June 2013, together with comments made in response to other renewable energy developments within the Southern North Sea, and the Planning Inspectorate (PINS) 'Advice Note 9: Rochdale Approach'. The renewable energy developments that have informed this approach have been agreed within the Scoping Opinion in Volume 6 (Document Ref: 6.8.1), the suggested tiers, and the Cumulative Impact Assessment conducted for Thanet Extension .

6.13.3 In assessing the potential cumulative impact(s) for Thanet Extension Offshore Wind Farm, it is important to bear in mind that for some projects, predominantly those 'proposed' or identified in development plans etc., may or may not actually be taken forward. There is thus a need to build in some consideration of certainty (or uncertainty) with respect to the potential impacts which might arise from such proposals. For example, relevant projects/ plans that are already under construction are likely to contribute to cumulative impact with Thanet Extension Offshore Wind Farm (providing effect or spatial pathways exist), whereas projects/ plans not yet approved or not yet submitted are less certain to contribute to such an impact, as some may not achieve approval or may not ultimately be built due to other factors.

6.13.4 For this reason, all relevant projects/ plans considered cumulatively alongside Thanet Extension Offshore Wind Farm have been allocated into 'Tiers', reflecting their current stage within the planning and development process. This allows the cumulative impact assessment to present several future development scenarios, each with a differing potential for being ultimately built out. Appropriate weight may therefore be given to each scenario (Tier) in the decision making process when considering the potential cumulative impact associated with Thanet Extension Offshore Wind Farm (e.g. it may be considered that greater weight can be placed on the Tier 1 assessment relative to Tier 2).

6.13.5 The projects and plans selected as relevant to the assessment of impacts to ground conditions, flood risk and land use are based upon an initial screening exercise undertaken on a long list. Each project, plan or activity has been considered and scoped in or out on the basis of effect–receptor pathway, data confidence and the temporal and spatial scales involved. For the purposes of assessing the impact of the Thanet Extension Offshore Wind Farm on ground conditions, flood risk and land use in the region the Cumulative Impact Assessment - Methodology and Project List presented in Document 6.1.3.1 of Environmental Statement Volume 1 screens in the projects and activities identified in Table 6.13.

6.13.6 The proposed tier structure that is intended to ensure that there is a clear understanding of the level of confidence in the cumulative assessments provided in the Thanet Extension Offshore Wind Farm Environmental Statement is as indicated below.

Tier 1

6.13.7 Tier 1 comprises other projects/ plans currently under construction and/ or those consented but not yet implemented, and/ or those submitted but not yet determined where data confidence for the projects falling within this category is high.

6.13.8 Built and operational projects are included within the cumulative assessment where they have not been included within the environmental characterisation survey, i.e. they were not operational when baseline surveys were undertaken, and/ or any residual impact may not have yet fed through to and been captured in estimates of 'baseline' conditions or there is an ongoing effect.

Tier 2

6.13.9 Tier 2 comprises all projects included in Tier 1 plus other projects/ plans consented but not yet implemented and/ or submitted applications not yet determined, where data confidence for the projects falling into this category is medium.

Tier 3

6.13.10 Tier 3 comprises the above plus projects on relevant plans and programmes (the PINS Programme of Projects and MMO 'Marine Case Management System' being the source most relevant for this assessment); specifically, all projects where the developer has advised PINS in writing that they intend to submit an application in the future were considered. This includes, for example, East Anglia (Three and Four) for which scoping reports have been submitted and data availability is limited and/ or data confidence is low.

6.13.11 The specific projects scoped into this cumulative impact assessment, and the tiers into which they have been allocated, are presented in Table 6.13 below. The operational projects included within the table are included due to their completion/ commission subsequent to the data collection process for the Thanet Extension Offshore Wind Farm, and as such not included within the baseline characterisation.

6.13.12 A spatial Onshore Zone of Influence (ZoI) of 1 km has been considered to assess the potential cumulative effects on/ from ground conditions (Table 6.13). For flood risk and water resource receptors the ZoI has taken into account other developments that are located within the same WFD waterbody catchments as the RLB.

Table 6.13: Projects for cumulative assessment

Development type	Project	Status	Data confidence assessment/ phase	Tier
Sub-sea interconnector cable	Nemo Link	Under Construction	High – Consented by Applicant.	Tier 1
Solar Farm	Richborough Solar Farm (south of River Stour)	Consented	High – Consented by Applicant.	Tier 1
Biomass Combined Heat and Power (CHP) Plant	Biomass CHP Plant	Consented/ Under Construction	High – Consented by Applicant.	Tier 1
Redevelopment of Site including demolition to existing buildings, and land use change	Discovery Park and Discovery Park Site North-East	Consented	High – Consented by Applicant.	Tier 1
Grid connection Project	Richborough Connection	Consented	High – Consented by Applicant.	Tier 1
Residential Development	Southhall Close Minster	Consented	High – Consented by Applicant	Tier 1
Residential Development	Monkton Street, Monkton	Planning Application Submitted - Awaiting Decision	Medium – Awaiting decision on planning permission	Tier 1

6.13.13 The cumulative Rochdale Envelope is described in Table 6.14 with a column for impact, a column for the scenario and then a scenario for justification/ notes/ assumptions.

Table 6.14: Cumulative Rochdale Envelope

Impact	Scenario	Cumulative Assessment
Impacts to Human Health and Controlled Waters	Nemo Link cable route and substation installation acting as potential contamination migration pathway	It is assumed the cumulative scheme would be required to undertake investigation, remediation and groundwater protection measures to avoid creation of pathways. It is also assumed these would be in line with the Draft Thanet Local Plan to 2031 and comply with all statutory processes for managing the decontamination of land. Collectively, the cumulative scheme would therefore lead to a reduced level of contamination risk presently associated with the development, which would be a Minor beneficial effect to all receptors.
Impacts to Changes in Watercourse Conveyance and Floodplain Storage	Richborough Solar Farm could potentially provide a pathway of flooding towards Thanet Extension	These potential effects identified in section 6.10 and 6.11 could be relevant as a result of construction and operation activities within the same catchment as Thanet Extension. It is assumed the cumulative scheme would be required to undertake investigation, remediation and groundwater protection measures to avoid creation of pathways. It is also assumed these would be in line with the Draft Thanet Local Plan to 2031 and comply with all statutory processes for managing the decontamination of land. Collectively, the cumulative scheme would therefore lead to a reduced level of contamination risk presently associated with the development which would be a Minor beneficial effect to all receptors.
Impacts to Water Environment, including Water Resources and Flood Risk	Biomass CHP Plant is upstream of Thanet Extension and could provide a pathway for changes in water quantity or quality	Potential effects identified in section 6.10 and 6.11 could be relevant as a result of construction and operation activities within the same catchment as Thanet Extension. It is assumed that the scheme would carry out mitigation practices in line with PPGs and SuDS principles and that this scheme would therefore not result in cumulative changes in water quantity or quality.
Impacts to Water Environment, including Water Resources and Flood Risk	The Discovery Park and Site North-East are upstream of Thanet Extension and could provide a pathway for changes in water quantity or quality	Potential effects identified in section 6.10 and 6.11 could be relevant as a result of construction and operation activities within the same catchment as Thanet Extension. It is assumed that the scheme would carry out mitigation practices in line with PPGs and SuDS principles and that this scheme would therefore not result in cumulative changes in water quantity or quality.
Impacts to Water Environment, including Water Resources and Flood Risk	The Richborough Energy Park is within the same catchment as Thanet Extension and could provide a pathway for changes in water quantity or quality	Potential effects identified in section 6.10 and 6.11 could be relevant as a result of construction and operation activities within the same catchment as Thanet Extension. It is assumed that the scheme would carry out mitigation practices in line with PPGs and SuDS principles and that this scheme would therefore not result in cumulative changes in water quantity or quality.
Impacts to Water Environment, including Water Resources and Flood Risk	The Southhall Close residential development is within the same catchment as Thanet Extension and could provide a pathway for changes in water quantity or quality	Potential effects identified in section 6.10 and 6.11 could be relevant as a result of construction and operation activities within the same catchment as Thanet Extension. It is assumed that the scheme would carry out mitigation practices in line with PPGs and SuDS principles and that this scheme would therefore not result in cumulative changes in water quantity or quality.

Impact	Scenario	Cumulative Assessment
Impacts to Water Environment, including Water Resources and Flood Risk	The Monkton Street residential development is within the same catchment as Thanet Extension and could provide a pathway for changes in water quantity or quality	Potential effects identified in section 6.10 and 6.11 could be relevant as a result of construction and operation activities within the same catchment as Thanet Extension. It is assumed that the scheme would carry out mitigation practices in line with PPGs and SuDS principles and that this scheme would therefore not result in cumulative changes in water quantity or quality.

6.14 Inter-relationships

6.14.1 It is anticipated that there would not be any significant inter-related impacts on receptors considered in this chapter, providing each source is addressed appropriately, and that environmental measures to mitigate the effects with respect to onshore ecology, air quality, odours, noise and vibration that could affect the same receptors as considered here would be identified in the CoCP and incorporated in the CEMP.

6.15 Mitigation

6.15.1 There is currently a lack of baseline information regarding the landfill engineering, contaminants' leaching potential and groundwater levels. A site-wide SI is necessary and is proposed to take place pre-construction. It will include gas and groundwater monitoring and soil and groundwater sampling, especially within and in the immediate vicinity of the Cliffsend Landfill. The scope and design of the investigation will be discussed with KCC, TDC and the EA, and other stakeholders as appropriate. The landfall option should be finalised and the design of the mitigation measures adjusted based on the investigation results, and discussed and agreed with TDC, KCC and the EA, and other stakeholders as appropriate, prior to the construction phase.

6.16 Summary of effects

6.16.1 Table 6.15 provides a summary of the residual effects resulting from construction, O&M and decommissioning with regard to ground conditions, flood risk and land use.

Table 6.15: Summary of effects

Description of effect	Potential effect	Additional mitigation measures	Residual effect
Construction			
Effects on human health during construction works through disturbance and mobilisation of existing, contaminated soil and/or groundwater, generation of dust and fibres, and the potential need to remove existing underground tanks and pipeline.	Subject to the incorporation of good working practices and confirmation of the detailed design, embedded mitigation measures are sufficient to reduce the potential effect to **Minor** adverse significance.	No additional mitigation measures are required given that the potential (post-embedded mitigation) effect is not significant in EIA terms.	**Minor** adverse significance (not significant).
Effects on human health from construction activities, particularly at the substation, through spillages of oils and chemicals.	With embedded mitigation in place the potential effect is of **Minor** adverse significance.	No additional mitigation measures are required given that the potential (post-embedded mitigation) effect is not significant in EIA terms.	**Minor** adverse significance (not significant).
Effects on human health and property during construction works through discovery and potential explosion of UXO, ingress of ground and landfill gas, and inflows of groundwater.	Subject to incorporation of good working practices and confirmation of the detailed design, embedded mitigation measures are sufficient to manage the potential effect to **Minor** adverse significance.	No additional mitigation measures are required given that the potential (post-embedded mitigation) effect is not significant in EIA terms.	**Minor** adverse significance (not significant).
Effects on human health and property during construction works due to existing sea wall amendment/ breakthrough and escape of landfill gases.	Subject to successful installation of a temporary cofferdam and incorporation of good working practices, and confirmation of the detailed design, embedded mitigation measures are sufficient to manage the potential effect to **Minor** adverse significance.	No additional mitigation measures are required given that the potential (post-embedded mitigation) effect is not significant in EIA terms.	**Minor** adverse significance (not significant).
Pollution of controlled waters, WFD water bodies, designated conservation sites and off-site Grade 2 and Grade 3a soils from construction work through creation of pathways for the migration of potential contamination, soil disturbance and mobilisation of existing potential contamination, sediment laden-runoff and the construction of the Minster Stream crossing.	Subject to incorporation of good working practices and confirmation of the detailed design, embedded mitigation measures are sufficient to manage the potential effect to **Minor** to **Negligible** adverse significance.	No additional mitigation measures are required given that the potential (post-embedded mitigation) effect is not significant in EIA terms.	**Minor** to **Negligible** adverse significance (not significant).
Pollution of controlled waters, WFD water bodies, designated conservation sites and off-site Grade 2 and Grade 3a soils during construction works through concrete batching and use of cement products, release of contaminants from backfilling and building materials, spillages of oils and chemicals, and removal of potential existing tanks at the National Grid connection point.	With embedded mitigation measures in place, the significance of the potential effects is **Minor** to **Negligible** adverse significance.	No additional mitigation measures are required given that the potential (post-embedded mitigation) effect is not significant in EIA terms.	**Minor** to **Negligible** adverse significance (not significant).

Description of effect	Potential effect	Additional mitigation measures	Residual effect
Pollution of controlled waters and designated conservation sites during construction works through existing sea wall amendment/ breakthrough and subsequent escape of landfill contaminants.	Subject to incorporation of good working practices and confirmation of the detailed design, embedded mitigation measures are sufficient to manage the potential effect to **Minor** adverse significance.	No additional mitigation measures are required given that the potential (post-embedded mitigation) effect is not significant in EIA terms.	**Minor** adverse significance (not significant).
Changes in the quantity of surface and groundwater abstractions, and flows to watercourses, WFD water bodies and designated conservation sites during construction works through changes in runoff/ infiltration rates and patterns/ new flow pathways associated with ground disturbance, and development of working areas during construction and changes in river baseflow from the dewatering of excavations.	With embedded mitigation measures in place, the significance of the potential effect is **Minor** to **Negligible** adverse significance.	No additional mitigation measures are required given that the potential (post-embedded mitigation) effect is not significant in EIA terms.	**Minor** to **Negligible** adverse significance (not significant).
Effects on surface waters during construction works through the proposed watercourse crossing and changes in flow volumes associated with the discharge of dewatered groundwater.	With embedded mitigation measures in place, the significance of the potential effect is **Minor** adverse significance.	No additional mitigation measures are required given that the potential (post-embedded mitigation) effect is not significant in EIA terms.	**Minor** adverse significance (not significant).
Increased risk of coastal flooding towards historic landfill due to temporary sea wall works.	With embedded mitigation measures in place, the significance of the potential effect is **Minor** adverse significance**.**	No additional mitigation measures are required given that the potential (post-embedded mitigation) effect is not significant in EIA terms.	**Minor** adverse significance (not significant).
Volumetric displacement of flood water during construction works through the placement of temporary spoil mounds, construction compounds and hardstanding in flood plain areas.	Given the absence of flood risk, the significance of the potential effect is **Minor** adverse significance.	No additional mitigation measures are required given that the potential (post-embedded mitigation) effect is not significant in EIA terms.	**Minor** adverse significance (not significant).
O&M			
Effects on human health during maintenance works through disturbance of any residual contamination, spillages of oils and chemicals, and previous inappropriate reuse/ use of contaminated fills and soils.	With embedded measures in place the magnitude of impact is **Minor** adverse significance.	No additional mitigation measures are required given that the potential (post-embedded mitigation) effect is not significant in EIA terms.	**Minor** adverse significance (not significant).
Effects on human health during maintenance works through ingress and accumulation of ground and landfill gas in buildings and facilities.	Subject to incorporation of good working practices and confirmation of the detailed design, embedded mitigation measures are sufficient to manage the potential effect to **Minor** adverse significance.	No additional mitigation measures are required given that the potential (post-embedded mitigation) effect is not significant in EIA terms.	**Minor** adverse significance (not significant).
Effects on property from location of infrastructure and maintenance works through ground and landfill gas ingress and accumulation in buildings.	Subject to incorporation of good working practices and confirmation of the detailed design, embedded mitigation measures are sufficient to manage the potential effect to **Minor** adverse significance.	No additional mitigation measures are required given that the potential (post-embedded mitigation) effect is not significant in EIA terms.	**Minor** adverse significance (not significant).

Description of effect	Potential effect	Additional mitigation measures	Residual effect
Effect on property from location of infrastructure and maintenance works through previous inappropriate reuse/ use of contaminated fills and soils, aggressive ground conditions and settlement of infrastructure.	With embedded mitigation measures in place the potential effect is of **Minor** adverse significance.	No additional mitigation measures are required given that the potential (post-embedded mitigation) effect is not significant in EIA terms.	**Minor** adverse significance (not significant).
Pollution of controlled waters, WFD water bodies, designated conservation sites and off-site Grade 2 and Grade 3a soils during maintenance works through spillages of oils and chemicals, landfill leakage and previous inappropriate reuse/ use of contaminated fills and soils.	With embedded mitigation measures in place the potential effect is of **Minor** to **Negligible** adverse significance.	No additional mitigation measures are required given that the potential (post-embedded mitigation) effect is not significant in EIA terms.	**Minor** to **Negligible** adverse significance (not significant).
Effects on surface waters associated with the proposed watercourse crossing.	With embedded mitigation measures in place the significance of potential effects is **Minor** adverse significance	No additional mitigation measures are required given that the potential (post-embedded mitigation) effect is not significant in EIA terms.	**Minor** adverse significance (not significant).
Changes in patterns and rates of infiltration and run-off arising from development of a below ground earth grid, substation support structures and working areas.	With embedded mitigation measures in place the significance of potential effects is **Minor** adverse significance.	No additional mitigation measures are required given that the potential (post-embedded mitigation) effect is not significant in EIA terms.	**Minor** adverse significance (not significant).
Volumetric displacement of flood water associated with the increase in impermeable footprint in the vicinity of the substation.	With embedded mitigation measures in place the significance of potential effects is **Minor** adverse significance.	No additional mitigation measures are required given that the potential (post-embedded mitigation) effect is not significant in EIA terms.	**Minor** adverse significance (not significant).
Decommissioning			
It is expected that decommissioning phase effects would, at worst, be similar to construction phase effects.			

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