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VATTENFALL

Thanet Extension Offshore Wind Farm

Environmental Impact Assessment

Report to Inform Scoping

Author: Royal HaskoningDHV
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TEOW-PLA-DB-0009-Scoping Report

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18 – 11 – 2016	Draft 2	Second draft of Scoping Report	Paolo Pizzolla/Miriam Knollys/ Greg Shaw/Gordon Campbell		
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EXECUTIVE SUMMARY

This document supports a request for an Environmental Impact Assessment (EIA) Scoping Opinion from the Planning Inspectorate (PINS) for the Thanet Extension Offshore Wind Farm (Thanet Extension). Thanet Extension is a Nationally Significant Infrastructure Project (NSIP) and as such an EIA is required as part of a Development Consent Order (DCO) application under the Planning Act 2008.

Thanet Extension is being developed by Vattenfall Wind Power Ltd (Vattenfall) a company which has invested nearly £3bn in the UK, in onshore and offshore wind since 2008 and is expected to have nearly 1GW in operation onshore and offshore by 2017. Vattenfall plans to invest £5bn in renewables, mainly offshore wind, in Northern Europe by 2020. Vattenfall has world leading experience in offshore wind, as owner of Kentish Flats, Kentish Flats Extension, Ormonde, and Thanet Offshore Wind Farms, which are currently operational in the UK, as well as a growing portfolio of wind projects across its European markets.

The key drivers for renewable energy, and therefore the Thanet Extension project are reducing greenhouse gas emissions, providing energy security, and maximising economic opportunities from investment for the UK. In addition, extension projects are considered to represent a significant opportunity for cost reduction in offshore wind, an increasingly important consideration under the highly competitive UK subsidy regime and drive to deliver the best possible value to the consumer. The proposed project would have a generation capacity of up to 340MW and produce enough energy to power over 229,000 homes in the UK.

The Thanet Extension would be located off the south east coast of Kent in the South East of England approximately 8km offshore (at the closest point), in proximity to the operational Thanet Offshore Wind Farm (TOWF). Electricity generated would be transported to the shore by offshore export cables installed within the proposed Thanet Extension Offshore Export Cable Corridor.

The project would also require onshore infrastructure in order to connect the offshore wind farm to the electricity network, which in summary will comprise:

- Landfall and transition pit;
- Underground export cables; and
- Onshore substation;

At the time of writing, Vattenfall are in negotiation with National Grid regarding an agreement for connection to the electricity transmission network at the site of the former Richborough Power Station. A grid connection agreement is expected to be in place in 2017, prior to submission of the application for DCO. The exact location of the landfall and onshore infrastructure are yet to be determined, though a Thanet Extension Onshore Area

of Interest (encompassing areas being considered for siting of the onshore substation, plus landfall and Onshore Cable Route Options) has been defined for consultation purposes and is referred to throughout this document.

Site selection within the Onshore Area of Interest is ongoing and responses to the Scoping Request and associated public consultation will help to inform the development of the Thanet Extension project.

The EIA will be completed by technical specialists using best practice and following appropriate guidance. Early feasibility work and consultation with major stakeholders has determined that key aspects of the EIA are likely to be seascape, landscape and visual, shipping and navigation, ornithology, commercial fisheries, and marine and coastal designated sites. This Report to Inform Scoping outlines all of the receptors that will be considered during the EIA and the planned approach to characterising the existing environment, assessing potential impacts associated with Thanet Extension and developing mitigation measures.

Consultation is already underway and will be ongoing with stakeholders throughout the EIA and DCO application process. Vattenfall is committed to engaging with the community and other stakeholders, and working alongside them to deliver a project of the best possible quality.

Section 4.2 of this Scoping Report provides an outline of the undertaken and planned consultation associated with the project.

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Glossary of acronyms

µg l^{-1}	Microgram per litre
AfL	Agreement for Lease
AIS	Automatic Identification System
ALC	Agricultural Land Classification
AONB	Area of Outstanding Natural Beauty
CAA	Civil Aviation Authority
CD	Chart Datum
CfD	Contracts for Difference
CIA	Cumulative Impact Assessment
COLREGS	International Regulations for Preventing Collisions at Sea
DCO	Development Consent Order
DGC	Defence Geographic Centre
DP	Dynamic Positioning
DWR	Deep Water Routes
EIA	Environmental Impact Assessment
EMF	Electromagnetic Fields
EP	Evidence Plan
EPS	European Protected Species
ES	Environmental Statement
FRA	Flood Risk Assessment
FSA	Formal Safety Assessment
GDP	Gross Domestic Product
GW	Gigawatt
HDD	Horizontal Directional Drilling
HRA	Habitat Regulations Assessment
IMO	International Maritime Organisation
JNCC	Joint Nature Conservation Committee
LEC	Levelised Energy Cost
KFE	Kentish Flats Extension
m	Metres
MCA	Maritime and Coastguard Agency
MCZ	Marine Conservation Zone
MGN 543 (M+F)	MCA Marine Guidance Note 543 (M+F)
MMO	Marine Management Organisation

MSL	Mean sea level
MW	Megawatt
NDC	Nationally Determined Contribution
nm	Nautical Miles (1,852m)
NNRs	National Nature Reserves
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NRA	Navigational Risk Assessment
NSIP	Nationally Significant Infrastructure Project
NUC	Not Under Command
O&G	Oil and Gas
O&M	Operation and Maintenance
OESEA	Offshore Energy Strategic Environmental Assessment
OREI	Offshore Renewable Energy Installation
OSP	Offshore substation platform
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
PEIR	Preliminary Environmental Information Report
PRoW	Public Right of Way
pSAC	Proposed Special Area of Conservation
RNLI	Royal National Lifeboat Institute
RYA	Royal Yachting Association
SAC	Special Area of Conservation
SAR	Search and Rescue
SCI	Site of Community Importance
SPA	Special Protection Area
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
TBT	Tributyltin
TCE	The Crown Estate
TEU	Treaty on European Union
TOWL	Thanet Offshore Wind Limited
TSS	Traffic Separation Scheme
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office

UNECE	United Nations Economic Commission for Europe
UNFCCC	United Nations Framework Convention on Climate Change
Vattenfall	Vattenfall Wind Power Ltd
WFD	Water Framework Directive

Glossary of terminology

TOWF	The existing Thanet Offshore Wind Farm project
Thanet Extension	The entire proposed Thanet Extension project, including offshore and onshore elements (1 - 3 below)
1. Proposed Wind Farm Area	The area proposed for the offshore wind farm itself, comprising wind turbine generators, inter-array cables, and offshore substation infrastructure (if required)
2. Proposed Offshore Export Cable Corridor	Corridor within which offshore export cables would be laid between the wind farm and landfall point
3. Onshore Area of Interest	Area comprising • Landfall Options: two potential landfall options, north option at Pegwell Bay (Option 1), and south option at Sandwich (Option 2) • Onshore Cable Route Options: a 25m corridor from each landfall to the onshore substation Area of Interest at Richborough within which onshore export cables would be laid (note only one route would be utilised, further assessment and consultation are required to determine which option is preferred) • an onshore substation Area of Interest, within which substation infrastructure would be housed. This area encompasses the former Richborough Power Station and some additional land (note this area will reduce significantly when the siting and design of the substation is further developed) • a 1km buffer around the Onshore Cable Route Options and substation Area of Interest, which indicates the extent of survey coverage and allows for post-Scoping re-routing if required
The Applicant	The Swedish state-owned utility Vattenfall is the Applicant for the Development Consent Order

1 PART 1: INTRODUCTION

1.1 Introduction

1. This document supports a request for a formal Environmental Impact Assessment (EIA) Scoping Opinion from the Planning Inspectorate (PINS) for Thanet Extension Offshore Wind Farm (hereafter 'Thanet Extension'). This Scoping Report provides the first stage of the EIA, the process required under the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009, as part of a Development Consent Order (DCO) application under the Planning Act 2008 (see further information on the Scoping process and EIA process in Sections 1.1.5 and 1.3.2.5, respectively).

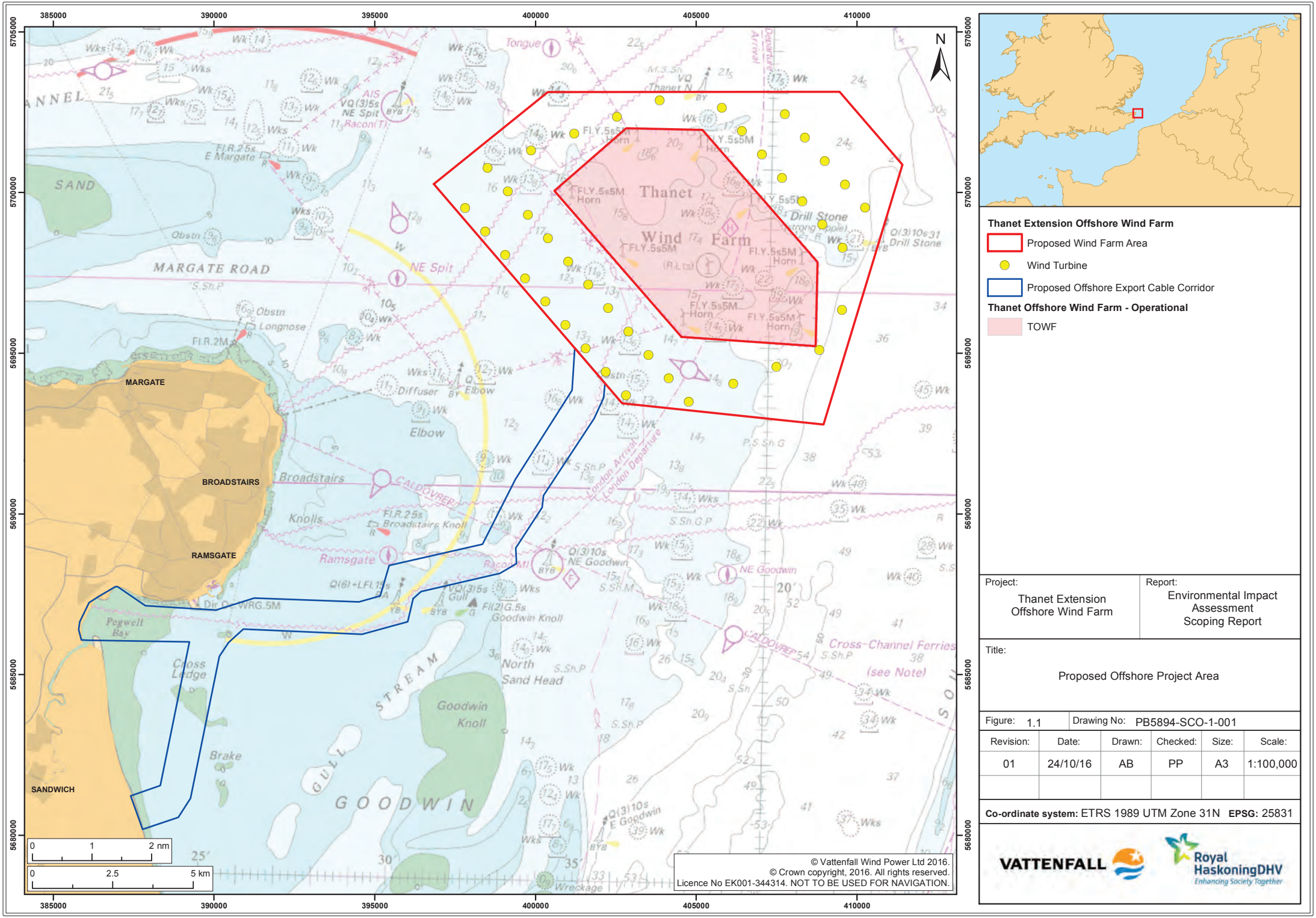
2. The proposed project would have a generation capacity of up to 340MW and produce enough energy to power over 229,000 homes in the UK.[1] The proposed Thanet Extension Windfarm Area would be located approximately 8 km offshore (at the closest point), in proximity to the operational Thanet Offshore Wind Farm (TOWF). The layout of the proposed wind farm area for Scoping comprises areas on all sides of the operational TOWF (Figure 1.1). Electricity generated would be transported to the shore by offshore export cables installed within the proposed offshore export cable corridor (Figure 1.1).

3. The project would also require onshore infrastructure in order to connect the proposed offshore wind farm to the electricity network, which in summary will comprise:

   - Landfall and transition pit;
   - Underground export cables; and
   - Onshore substation.

4. Figure 1.2 shows Thanet Extension Onshore Area of Interest for Scoping. Note that there are currently two options for landfall and Onshore Cable Route, Option 1 making landfall in Pegwell Bay, in proximity to the TOWF export cable landfall, and Option 2 making landfall at Sandwich Bay. Two options have been maintained at this stage to allow more detailed engineering work and responses to the Scoping Request to inform further refinement of project design for the pre-application consultation stages. The Onshore Area of Interest is intended to maintain flexibility for re-routing should this be required post-Scoping. A full description of the project can be found in Section 1.4 Project Description.

[1] http://www.renewableuk.com/page/UKWEDExplained assuming a load factor of 34.88



Thanet Extension Offshore Wind Farm

- Proposed Wind Farm Area
- Wind Turbine
- Proposed Offshore Export Cable Corridor

Thanet Offshore Wind Farm - Operational

- TOWF

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title: Proposed Offshore Project Area

Figure: 1.1 | Drawing No: PB5894-SCO-1-001

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	24/10/16	AB	PP	A3	1:100,000

Co-ordinate system: ETRS 1989 UTM Zone 31N **EPSG:** 25831

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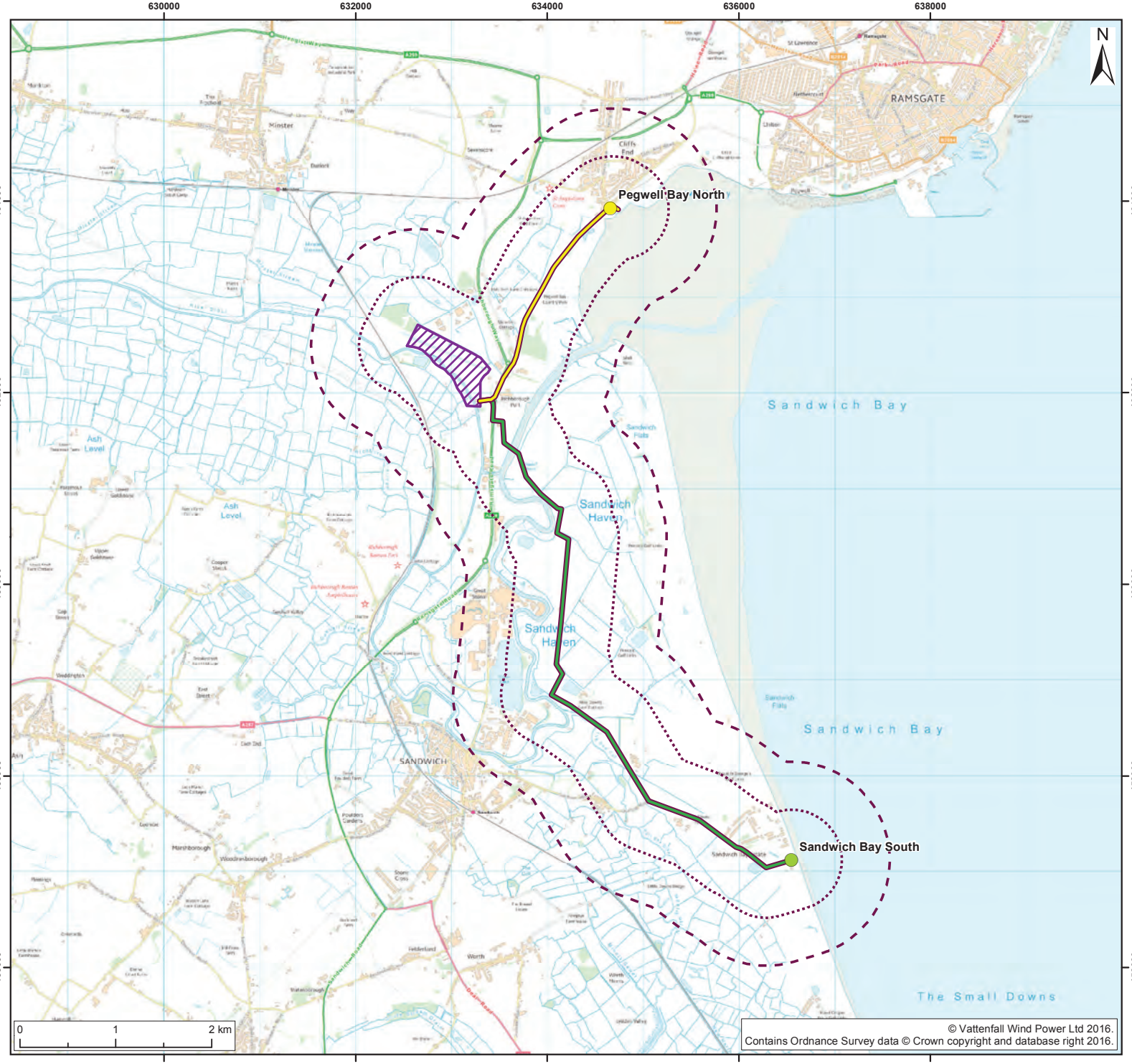

- Landfall Option 1
- Landfall Option 2
- Onshore Cable Route Option 1 (25m Corridor)
- Onshore Cable Route Option 2 (25m Corridor)
- Onshore Substation Area of Interest
- 500m Buffer Around 25m Corridor
- 1000m Buffer Around 25m Corridor

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title: Landfall Options and Onshore Area of Interest

Figure: 1.2 | Drawing No: PB5894-SCO-1-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	24/10/16	AB	PP	A3	1:40,000

Co-ordinate system: British National Grid **EPSG:** 27700

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1.1.1 Description of Thanet Extension Offshore Wind Farm

5. The proposed Thanet Extension Offshore Wind Farm Area lies approximately 8 km from the Isle of Thanet at the closest point to shore. It comprises areas on all sides of the TOWF and has water depths across the site from 13 to 43m. Dependent upon the landfall option and Onshore Cable Route chosen, Thanet Extension proposed Offshore Export Cable Corridor will either make landfall at Pegwell Bay or Sandwich Bay.

1.1.2 Description of Thanet Extension Onshore Area of Interest

6. Thanet Extension Onshore Area of Interest covers the two potential landfall sites at Pegwell Bay and Sandwich Bay, Onshore Cable Route Options from landfall to Richborough substation site and an Area of Interest at Richborough for the substation itself. If the Pegwell Bay landfall option is chosen, it is preferred that the Onshore Cable Route will run parallel to Sandwich Road to connect into Richborough. However, due to space constraints or other potential issues arising during Scoping consultation, it may be necessary to take an alternative route within the Onshore Area of Interest. The Sandwich Bay option is expected to route along Guilford Road before heading north cross country towards the substation at Richborough.

1.1.3 Project Background

7. The TOWF has been operational since 2010, having been acquired by Vattenfall prior to construction in 2008. The site comprises 100 x Vestas V90 3.0 MW turbines and is situated approximately 11 km off the east Kent coast. In 2009, The Crown Estate (TCE) offered Vattenfall the right to extend Kentish Flats and TOWF, however only Kentish Flats Extension (KFE) was taken forward at that point. In 2014, following a wider review of Vattenfall's offshore wind strategy and whilst KFE was under construction, the possibility of extending TOWF was revisited.

8. In early 2015 Vattenfall undertook some initial desk based feasibility work and constraints mapping using existing data and site knowledge, the results of this exercise were used to delineate a preliminary offshore wind farm site boundary and offshore cable corridor Area of Interest. The emphasis at this stage was to determine whether the project was likely to be economically viable, technically feasible and environmentally acceptable.

9. In late 2015, following a favourable outcome to early analyses, Vattenfall took the decision to proceed with early development activity for Thanet Extension, namely;

offshore site characterisation surveys, progressing a grid connection, further cable routing work and initiation of informal engagement with key stakeholders to gain their feedback on the early design.

10. At the current time, no AfL is in place for Thanet Extension.

1.1.4 The Applicant

11. Vattenfall is the Swedish state-owned utility and one of Europe's largest generators of electricity and heat. Vattenfall is also the second largest player in the global offshore wind sector. It is Vattenfall's ambition to be at the forefront of the low carbon transition and the company is strongly committed to significant growth in wind energy, onshore and offshore. Vattenfall has invested nearly £3bn in the UK, in onshore and offshore wind since 2008 and will have nearly 1GW in operation onshore and offshore by 2017. Vattenfall plans to invest £5bn in renewables, mainly offshore wind, in Northern Europe by 2020 and has the ambition that the UK will continue to be a growth market for Vattenfall.

12. Vattenfall has world leading experience in offshore wind, as owner of the Kentish Flats, KFE, Ormonde, and TOWF, which are currently operational in the UK. The Vattenfall owned Aberdeen Offshore Wind Farm received a Final Investment Decision in July 2016 and will shortly enter construction. Vattenfall has started developing plans for the northern half of the former East Anglia Round 3 Zone, which is split into two proposed offshore wind projects. Norfolk Vanguard has received a Scoping Opinion from PINS, and a second project called Norfolk Boreas, is in early stages of development.

13. Vattenfall is also developing a number of European offshore wind farms, including recently announced successes in securing Danish competitive tender projects Kriegers Flak and Danish Nearshore (a total of 950 MW), and is emerging as a global leader in delivering offshore wind cost reductions. In addition, Vattenfall has recently undertaken the world's first decommissioning of an offshore wind farm, Yttre Stengrund in Kalmar Sound, Sweden.

1.1.5 The Scoping Report

14. This Scoping Report supports a request for a formal EIA Scoping Opinion from PINS. The Scoping Opinion will contain a compilation of responses to this document from statutory and other key stakeholders, which will help to guide the Applicant in progressing an EIA for the project. This Scoping Report presents an initial review of the potential issues associated with the construction, operation and maintenance (O&M) and eventual decommissioning of the Thanet Extension.

15. The report has been prepared in accordance with Regulation 8 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (as amended), which enables an applicant to seek a Scoping Opinion from PINS on the information to be included in an Environmental Statement (ES).

16. The overall objectives of the EIA for the project are to minimise potential impacts and to meet the requirements of the Planning Act 2008 and associated EIA Regulations (see Section 1.3 Policy and Legislative context). This Scoping Report therefore aims to identify the relevant potential impacts ad their likely significant effects associated with the physical, human and biological environments for the project and sets out the proposed approach to addressing those environmental issues through the EIA process. The report provides an overview of all potential issues and will make a case for focusing the EIA on those issues which have the potential to lead to a significant effect, reducing the emphasis on those issues which are increasingly shown (from repeated assessment in offshore wind and professional judgement) to be non-significant. The EIA for Thanet Extension will take into account the lessons learnt on those offshore wind farm projects that have gone through the consenting, construction, operation and decommissioning processes already. In line with this approach, the Scoping Report will make robust recommendations, supported by evidence, regarding the issues that the Applicant proposes to exclude (scope out) of the EIA. This allows more effort to be focused on the key issues. Each section of this report summarises potential impacts on a receptor and whether this will be considered further as part of the EIA (scoped in).

17. The outputs of the EIA process will be a Preliminary Environmental Information Report (PEIR), which will be the focus of formal pre-application consultation, and a final ES to be submitted in support of the DCO application.

1.1.6 Scoping Report Structure

18. The Scoping Report has the following structure:

- Part 1
    - Introduction – this section introduces the Scoping Report;
    - Need for the Project – a discussion of the key drivers for offshore wind and the Thanet Extension project itself;
    - Policy and Legislative context – a high-level overview of where Thanet Extension sits within policy and legislative context and how this project aims to fulfil policy needs and meet all environmental requirements;
    - Project Description – an overview of the Offshore Wind Farm, Offshore Export Cable Corridor and Onshore Area of Interest, including a high-

level description of the key elements of the project both offshore and onshore through construction, operation and decommissioning phases;
- Site Selection and Outline Assessment of Alternatives – an outline of the site selection process to date and the further assessment that will be undertaken in order to define the final project description for the EIA; and
- Environmental Impact Assessment Methodology – a description of how the EIA will be undertaken, the philosophy behind the assessment and key areas of consideration.

- Part 2 – Offshore
  - Offshore Environmental Baseline and Potential Impacts – a discussion of baseline conditions under each offshore topic area, potential impacts for consideration, and proposed approach to EIA, data sourcing, and mitigation for each relevant receptor, covering the physical, biological and human environment.
  - Summary of offshore designated sites – an overview of the relevant sites designated under the national and international legislation described in Part 1 and referred to in each relevant receptor section; and,
  - Summary of potential offshore cumulative and transboundary impacts for consideration.
- Part 3 – Onshore
  - Onshore Environmental Baseline and Potential Impacts – a discussion of baseline conditions under each onshore topic area, potential impacts for consideration, and proposed approach to the EIA, data sourcing, and mitigation for each relevant receptor, covering the physical, biological and human environment.
  - Summary of onshore and intertidal designated sites – an overview of the relevant sites designated under the national and international legislation described in Part 1 and referred to in each relevant receptor section; and,
  - Summary of potential onshore cumulative impacts for consideration.
- Part 4 – Wider Scheme Aspects
  - This section considers aspects that are relevant for both the onshore and offshore assessments.
- Part 5 – Consultation
- Part 6 – Summary and Conclusions

1.1.7 Project Programme

19. The following table shows the key milestones in the development process for Thanet Extension together with an indicative timeline.

Table 1.1 Indicative Project Programme

Milestone	Indicative Date
Informal consultation	Throughout 2016
Scoping Report submission	January 2017
PEIR submission	Q3 2017
DCO submission	Q1 2018
Consent	Q2 2019
Final Investment Decision	Q1 2020
Construction start (onshore)	Q4 2020
Construction start (offshore)	Q1 2021
Grid connection date	Tbc
Commissioning complete	Q4 2021

1.2 Need for the Project

20. The key drivers underpinning the need for renewable energy are:

- The need to reduce greenhouse gas emissions, including increasing energy generation from low carbon sources to replace high carbon energy sources such as burning coal and oil;
- The need for energy security, including:
    - The need to secure safe, affordable, reliable and preferably local energy generation for the UK market;
    - The need to replace existing old energy generation infrastructure;
    - The need to support expected electricity demand whilst meeting climate change commitments; and
- The need to maximise economic opportunities from energy infrastructure investment for the UK.

21. In a post-Brexit speech at the Utility Week Energy Summit in July 2016, the UK Secretary of State for Environment, Food and Rural Affairs confirmed the importance of these key drivers to the UK and that offshore wind has strategic importance in achieving these. The UK government has committed to support up to 10GW of new projects in the 2020s (HM Government, 2016).

22. In addition to the drivers for offshore wind there are additional drivers specific to extension projects, these include:

- Greater certainty regarding site conditions and suitability of the area for offshore wind generation;
- Established O&M strategies and potential for operational synergies with existing sites; and
- Established relationships with local stakeholders which can be built upon during the development of the extension.

1.2.1 The need to reduce greenhouse emissions

23. On current predictions, a continuation of global emission trends, including emissions of greenhouse gases such as carbon dioxide, could lead average global temperatures to rise by up to 6°C by the end of this century (Department of Energy and Climate Change (DECC), 2011). The potential impacts associated with such a global temperature rise include (DECC, 2014):

- Increased frequency of extreme weather events such as floods and drought;
- Reduced food supplies;
- Impacts on human health;
- Increased poverty; and
- Ecosystem impacts, including species extinction.

24. Commitment was made during the 21st Conference of the Parties (COP) in Paris in 2015 (Section 1.3.1.1) to pursue efforts to limit the global temperature increase to within 2°C of the pre-industrial average temperature, with an aspiration for an improved limit of 1.5°C.

25. Between 2009 and 2014 power sector emissions declined by an average of 4% per annum, with a record 18% fall during 2014 as a result of moving to low carbon sources. In order to achieve necessary ongoing reductions in emissions, the Committee on Climate Change recommended that the UK government should support 1-2GW of offshore wind per year until subsidies can be removed in the 2020s. (Committee on Climate Change (undated)).

26. The European Union (EU) and UK legislation that has been put in place to secure a reduction in emissions is outlined in Section 1.3.1.

1.2.2 The need for energy security

27. Net import of electricity to the UK in the first quarter of 2016 was at a record high of 6.1% of electricity supply (DECC, 2016). Electricity generated in the UK during this period fell by 3.4%, however the share of electricity generated from renewable

sources increased by 2.3%. Key issues associated with energy security in the UK are the decline in fossil fuel reserves (in particular North Sea oil and gas (O&G)) as well as the ongoing decommissioning of existing fossil fuel and nuclear electricity generating infrastructure and the need for replacement sources. These plants have either reached the end of their operational life span, are no longer economical to run, and/or do not meet legal emissions levels. Around a fifth of the energy capacity available in 2011 will close within this decade (DECC, 2012).

28. As heating, transport and industry become increasingly electrified, the electricity demand is very likely to increase (HM Government, 2011). The National Policy Statement (NPS) for Energy (see Section 1.3.2.4) estimates that additional electricity generating infrastructure to ensure adequate supplies will require net new capacity of approximately 59GW by 2025, of which, 33GW will need to be from renewable sources (DECC, 2011).

29. The former Secretary of State for Energy and Climate Change outlined that energy security is the number one priority for the government, whilst also seeking to achieve a supply that is affordable and clean. It was confirmed that offshore wind is expected to be a significant component of the UK's energy security (HM Government, 2015).

30. Reliance on global markets for imported energy leaves the UK vulnerable to spikes in world energy market prices and potentially, to physical supply disruptions. The DECC (2012) Energy Security Strategy outlines the approach to ensuring that consumers have access to energy to meet the demand (physical security) at prices which are resilient to volatile prices such as those experienced for fossil fuels (price security).

1.2.3 The need to maximise economic opportunities

31. A key commitment within the UK's Low Carbon Transition Plan was to assist in making the UK a centre of green industry by supporting the development and use of clean technologies (HM Government, 2009). The energy sector in the UK plays a central role in the economy and renewable energy can play a major part in boosting the economy and providing new jobs and skills.

32. The Centre for Economics and Business Research (CEBR, 2012) estimates that by 2030, offshore wind could increase the Gross Domestic Product (GDP) value by 0.6% and support 173,000 jobs. In contrast, The Stern Report (Stern, 2006) concludes that if no action is taken to prevent climate change, the economic impacts could be equivalent to losing at least 5% of global GDP each year.

33. The offshore wind industry presents an opportunity to utilise, and further develop the UK's maritime engineering skills as other industries decline (such as shipbuilding

and North Sea O&G) in order to secure supply chain and other employment opportunities in the UK. The importance of maximising opportunities for the involvement of local businesses and communities in offshore wind has been highlighted as a key success factor for the sector in the UK (Crown Estate 2014).

34. The replacement of existing infrastructure with new technologies also represents significant investment in the UK economy.

1.3 Policy and Legislative context

35. This section presents a summary of the key legislative and policy drivers that underpin and support development of Thanet Extension.

36. UK legislation is underpinned by a number of international (e.g. EU and United Nations (UN)) agreements, which are outlined in this section. Following the 2016 referendum on UK withdrawal from the EU, the UK will continue to be committed to all EU treaties until finalisation of the withdrawal agreement and/or until two years after initiation of Article 50 of the Treaty on European Union (TEU). At the time of writing, Article 50 has not yet been initiated. Following withdrawal, the exact nature of amendments to UK legislation which had an origin in EU law will depend on the agreements made with the EU and the extent to which EU measures continue to apply (e.g. in order to achieve trading agreements) as well as the ongoing political agendas of the UK government. The key drivers regarding the need for offshore wind (discussed in Section 1.2 Need for the Project) will continue to be important in the UK following withdrawal from the EU.

1.3.1 Climate Change and Renewable Energy Policy and Legislation

1.3.1.1 United Nations Framework Convention on Climate Change

37. The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change (UNFCCC), which commits its parties to setting internationally binding emission reduction targets as well as monitoring and reporting emissions. The protocol was agreed in 1997 and was ratified by the United Kingdom (UK) in 2002.

38. During the latest annual United Nations Climate Change Conference in Paris in 2015 (known as 'COP21') the following key areas of agreement were achieved (UNFCCC, 2016):

- Limit global temperature increase to below 2^{o}C, while pursuing efforts to limit the increase to 1.5^{o}C above the pre-industrial average temperature;
- Parties aim to reach global peaking of greenhouse gas emissions as soon as possible in order to achieve the temperature goal;

- Commitments by all Parties to prepare, communicate and maintain a nationally determined contribution (NDC);
- Contribute to the mitigation of greenhouse gas emissions and support sustainable development;
- Enhance adaptive capacity, strengthen resilience and reduce vulnerability to climate change;
- Help vulnerable countries cope with the adverse effects of climate change, including extreme weather events and slow-onset events such as sea-level rise;
- Support the efforts of developing countries to build clean, climate-resilient futures;
- Transparent reporting of information on mitigation, adaptation and support which undergoes international review; and
- In 2023 and every 5 years thereafter, a global stocktake will assess collective progress toward meeting the purpose of the Agreement.

1.3.1.2 European Union Renewables Directive / Renewable Energy Directive

39. In September 2001, the EU adopted its first renewable energy Directive (2001/77/EC) on the 'Promotion of Electricity Produced from Renewable Energy Sources in the Internal Electricity Market'. In April 2009, this was replaced with the Renewables Directive (2009/28/EC). The two key targets this Directive proposed to achieve were:

- A reduction of 20% in greenhouse gases by 2020 (below 1990 levels); and
- 20% of the total EU energy (electricity, heat and fuel) consumption to come from renewable sources by 2020.

40. In order to achieve the required reduction in emissions there is a target for the UK to produce 15% of its energy consumption from renewables (DECC, 2011b). Around 6.5% of the UK electricity requirement in October to December 2015 was provided by offshore wind (DECC, 2016).

1.3.1.3 The UK Climate Change Act (2008)

41. The Climate Change Act sets the framework for the UK to transition to a low-carbon economy and exceeds the targets set out in the EU Renewables Directives with the following:

- A reduction of 34% in greenhouse gases by 2020 (below 1990 levels); and
- A reduction of 80% in greenhouse gases by 2050

42. The Department for Energy and Climate Change (DECC) UK Renewable Energy Roadmap (DECC, 2013a) sets out in detail how the UK plans to reach its renewable energy targets, with strong emphasis on offshore wind.

43. The UK's fifth carbon budget was approved by the UK Government in July 2016. This provides a commitment to reducing emissions by 57% by 2030 to work towards achieving the 80% target by 2050. Offshore wind represents an important contribution to these targets by providing low-carbon energy generation (Committee on Climate Change, 2015).

1.3.1.4 The UK Energy Act (2013)

44. The Electricity Market Reform policy and Energy Act 2013 introduced Contracts for Difference (CfD) to provide incentives in the form of revenue stabilisation for new low carbon initiatives, replacing the previous Renewable Obligation system. CfD is driven to ensure Levelised Energy Cost (LEC) to the consumer. However, in 2015 the UK Government announced cuts to the CfD subsidies for renewable energy with the focus being to deliver UK energy security through a sustainable electricity market with minimal government intervention, whilst maintaining relatively consistent costs for consumers. If Government conditions on cost reductions are met by developers, budget is expected to be made available for three further CfD auctions pre-2020. Vattenfall is focusing on lowest cost of energy during the development of Thanet Extension in order to increase the viability of the project and the chance of success in line with current government policies.

1.3.2 Planning Legislation

1.3.2.1 The Planning Act 2008

45. The Planning Act 2008 (as amended by the Marine and Coastal Access Act (MCAA) 2009, the Localism Act 2011, the Growth and Infrastructure Act 2013, and the Infrastructure Act 2015) is the primary legislation that established the legal framework for applying for, examining and determining applications for Nationally Significant Infrastructure Projects (NSIPs) taking into account the guidance in National Policy Statements (NPSs).

46. NSIPs are usually large scale, nationally significant developments such as new ports, airports, major road and rail schemes or power generating stations. As NSIPs they, require a permission to construct and operate known as a DCO, under procedures governed by the Planning Act 2008. The DCO is a statutory instrument which must be drafted and submitted, alongside all supporting documentation (including the ES), by the Applicant for consideration by PINS and the relevant governmental department. The 2008 Act sets out thresholds above which certain types of infrastructure development are considered to be nationally significant and require a DCO. For offshore energy developments the threshold is a generating capacity of

over 100 MW. Thanet Extension is expected to have a generating capacity of up to 340 MW and is therefore classified as an NSIP.

47. As part of its application for a DCO, the Applicant will seek other relevant permissions, consents and licences. Powers to compulsorily acquire land or rights, either permanently or temporarily may also be sought as part of the DCO. Where considered appropriate, other consents or powers necessary to construct or operate the proposed project may be sought. These may include (but are not limited to) the following:

- Marine works under a Deemed Marine Licence (DML);
- Powers to compulsorily acquire land (if necessary); and
- Powers to divert or stop public rights of way.

48. Secondary legislation and guidance relevant to DCO applications have also been taken into account in planning the approach to the Thanet Extension EIA. A full list of these can be found on PINS website:

http://infrastructure.planningportal.gov.uk/legislation-and-advice/legislation/

1.3.2.2 Localism Act 2011

49. Under the Localism Act 2011, PINS became the agency responsible for operating the planning process for NSIPs. As discussed above, any developer wishing to construct a NSIP must obtain a DCO. For such projects, PINS examines the application and will make a recommendation to the relevant Secretary of State, who will make the decision on whether to grant or to refuse development consent.

1.3.2.3 Marine and Coastal Access Act 2009

50. The Marine and Coastal Access Act (MCAA) 2009 sets out improved management and protection of the marine and coastal environment. The MCAA established the Marine Management Organisation (MMO), the authority tasked with ensuring the delivery of sustainable development in the marine area.

51. The MCAA also adds a new section to the Planning Act 2008, enabling a DCO applicant to apply for a DML as part of the DCO process.

52. Through the MCAA, the UK Government introduced a marine planning system. The Marine Policy Statement (MPS) adopted by all UK administrations in March 2011 provides the policy framework for the preparation of marine plans, establishing how decisions affecting the marine area should be made in order to enable sustainable development. The South East Marine Plan is in the early stages of development with consultation on a draft plan expected in 2019 (MMO, 2016).

53. The MCAA enables the designation of Marine Conservation Zones (MCZs) in England and Wales as well as UK offshore areas (see Section 1.3.3.5).

1.3.2.4 National Policy Statements

54. NPSs are produced by the UK Government and set out national policy against which proposals for major infrastructure projects will be assessed and decided on by the PINS. Planning decisions will be taken within the clear policy framework set out in the NPSs, making these decisions as transparent as possible. PINS will have regard to NPSs in its examination of applications for development consent, and Ministers will have regard to them when making decisions. NPSs include the Government's objectives for the development of nationally significant infrastructure in a particular sector and state:

- How these objectives will contribute to sustainable development;
- How these objectives have been integrated with other Government policies;
- How actual and projected capacity and demand have been taken into account;
- Relevant issues in relation to safety or technology;
- Circumstances where it would be particularly important to address the adverse impacts of development; and
- A clear framework for investment and planning decisions.

55. There are twelve NPS in total, of which six are relevant to energy and were produced by the then Department for Energy and Climate Change (DECC). The energy NPS received designation by the former Secretary of State for Energy and Climate Change on 19 July 2011. The three NPS of relevance to Thanet Extension are:

- EN-1 Overarching Energy;
- EN-3 Renewable Energy Infrastructure, which identifies the construction of offshore generating stations in excess of 100MW as NSIPs; and
- EN-5 Electricity Networks, which covers the electrical infrastructure in conjunction with EN-1.

1.3.2.5 Requirement for EIA and the EIA Process

56. EIA is a tool for systematically examining and assessing the impacts of a development on the physical, biological and human environment. This process allows management and mitigation measures to be identified to ensure the development is sustainable. The ES, which documents the EIA process, will contain the following information:

- A description of the development comprising information on the site, design and size of the development;

- A description of the mitigation measures envisaged in order to avoid, reduce and, if possible, offset significant adverse impacts;
- The data required to identify and assess the main impacts which the development is likely to have on the environment;
- An outline of the main alternatives studied by the applicant and an indication of the main reasons for the applicant's choice, taking into account the environmental impacts; and
- A non-technical summary (NTS).

57. EIA was introduced under the EU EIA Directive 85/337/EEC (as amended by Directives 97/11/EC, 2003/35/EC and 2009/31/EC). The EIA Directive is transposed into English law for NSIPs by the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (the EIA Regulations). In 2011, the original EIA Directive and amendments were translated into EIA Directive 2011/92/EU (as amended by Directive 2014/52/EU).

58. The amendments made by EIA Directive 2014/52/EU are due to be transposed into UK legislation in May 2017. Key features of the forthcoming amendment to the EIA Regulations will relate to:

- Requirement to provide an assessment of how climate change, human health and natural resources would be affected by the development;
- An enhanced Screening and Scoping processes to ensure EIAs are focused on developments that are likely to cause significant effects and that the EIA is targeted on those potentially significant effects;
- Ensuring EIA quality by requiring that those who undertake the work have competent expertise to do so;
- More detailed demonstration of the consideration of alternatives to the proposed development;
- Further consideration of how to avoid, prevent, reduce and/or off-set significant adverse effects where possible and develop monitoring strategies; and
- The ES will be re-named the EIA report.

59. The Directive must be implemented in the UK by May 2017 and consultation on proposed new regulations is under way in Wales and Scotland, with England expected to follow shortly. Projects which enter the planning system (e.g. submit a request for EIA Screening or a Scoping Opinion) prior to May 2017 fall within the transitional provisions set out in the Directive and remain within the existing EIA procedure. In carrying out the EIA, Vattenfall will have regard to the implementation of the Directive (including any transitional arrangements) and in particular the terms of the domestic legislation that is expected to be consulted upon shortly.

60. The EIA process will take account of guidance provided by PINS in the form of the non-statutory National Infrastructure Advice Notes. These are published to provide advice and information on a range of issues arising throughout the whole life of the application process. Although in many cases they include recommendations from PINS about the approach to particular matters of process, which developers and others are encouraged to consider carefully, it is not a requirement for developers or others to have regard to the content of advice notes. Of particular interest for the current process are the following Advice notes:

- Advice Note Three: EIA consultation and notification (the Planning Inspectorate, 2015a);
- Advice Note Seven: Environmental Impact Assessment, Preliminary Environmental Information, Screening and Scoping (the Planning Inspectorate, 2015b);
- Advice Note Nine: Rochdale Envelope (the Planning Inspectorate, 2012);
- Advice Note Ten: Habitat Regulations Assessment (the Planning Inspectorate, 2016); and
- Advice Note Twelve: Transboundary Impacts (the Planning Inspectorate, 2015c).

1.3.2.6 The Project Design Envelope principle

61. The Thanet Extension EIA will be based on a 'Rochdale Envelope' approach. PINS Advice Note Nine (the Planning Inspectorate, 2012) recognises that, at the time of submitting an application, offshore wind developers may not know the precise nature and arrangement of infrastructure and associated infrastructure that make up the proposed development. This is due to a number of factors such as the evolution of technology, the need for flexibility in key commercial project decisions and the need for further detailed surveys (especially geotechnical surveys) which are required before a final design and layout can be determined. It is therefore important that a design envelope is used to provide flexibility. Where necessary, a range of parameters for each aspect of the project will be defined in the ES and the worst case scenario will be used in each impact assessment. This principle is referred to as the 'Rochdale Envelope' and it allows confidence that the EIA process is robustly considering the likely impact of the project while allowing the project to be optimised and refined by the time of construction, which may be several years after the DCO application is made. The project design envelope therefore provides the maximum extent of the consent sought. The detailed design of the project can then be developed, refined and procured within this consented 'envelope' prior to construction.

62. The general principle of the assessment is that for each receptor and potential impact, the impact assessment will be based on assessing a range of project design

parameters, whilst ensuring that all project scenarios from which the parameters are derived are realistic and buildable. If a combination of design parameters leads to a scenario that cannot realistically occur then the worst case scenario will be reconsidered and a realistic set of worst case parameters will be assessed. The end result will be an EIA based on clearly defined environmental parameters that will govern or define the full range of development possibilities and hence the likely environmental impacts that could result from the grant of development consent.

1.3.2.7 Transboundary Considerations

63. The United Nations Economic Commission for Europe (UNECE) convention (the 'Espoo Convention') sets out the obligations of States to notify and consult each other on all major projects under consideration that are likely to have a significant adverse environmental effect across international boundaries (transboundary effects). The Espoo Convention has been implemented by the EC Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment (known as the EIA Directive) as amended by Directives 97/11/EC, 2003/35/EC and 2009/31/EC. It is transposed into UK law for NSIPs by way of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (the EIA Regulations)., specifically under regulation 24. This requires that, where the application is for EIA development, and where PINS is of a view that it will have significant effects on the environment of another member state or receives a request for involvement from another European Economic Area (EEA)[2] member state, it must undertake a prescribed process of consultation and notification.

64. PINS published Advice Note 12: Development with significant transboundary impacts consultation (Planning Inspectorate, 2015c) setting out the procedures for consultation in association with an application for a DCO to PINS, where such development may have significant transboundary impacts. The advice note sets out the roles of PINS, UK Government departments and developers. Developers are advised to identify the possible significant transboundary effects or why they consider that there would not be any significant effects on another EEA State.

1.3.3 Environmental Legislation

1.3.3.1 The OSPAR Convention

65. International cooperation to protect the marine environment (including biodiversity) of the north-east Atlantic is achieved through the OSPAR Convention.

[2] The EEA comprises the countries of the European Union (EU) plus Iceland, Liechtenstein and Norway

66. A key part of OSPAR's biodiversity strategy is to establish a network of Marine Protected Areas (MPAs). The UK has currently identified 244 OSPAR MPAs, many of which are Natura 2000 sites (see Section 1.3.3.4) that also meet the relevant OSPAR selection criteria (OSPAR, 2003).

1.3.3.2 The Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention)

67. Ramsar Sites are designated under the Convention on Wetlands of International Importance, agreed in Ramsar, Iran in 1971 and ratified by the UK in 1976. The criteria for assessing a site for designation as a Ramsar site include whether or not the wetland supports 20,000 water birds and/or supports 1% of the individuals in a population of one species or subspecies of water bird. UK Government policy affords the same protection to Ramsar sites as European designations such as SPAs and SACs. The UK has generally chosen to underpin the designation of its Ramsar sites through prior notification of these areas as Sites of Special Scientific Interest (SSSI).

1.3.3.3 The Convention on Biological Diversity

68. The Convention on Biological Diversity is a legally binding treaty, which came into force in December 1993 with 168 signatories, of which the UK is one. It has three main objectives:

- The conservation of biological diversity;
- The sustainable use of the components of biological diversity; and
- The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources.

69. The Convention recognised for the first time in international law that the conservation of biological diversity is "a common concern of humankind" and is an integral part of the development process. The Convention covers all ecosystems, species, and genetic resources.

1.3.3.4 European Union Directives

Water Framework Directive (WFD)

70. The WFD (2000/60/EEC) addresses the quality of inland, estuarine and groundwater bodies including coastal surface waters up to an offshore limit of one nautical mile. Monitoring of the aquatic environment in relation to physical, chemical and biological parameters started in 2006 with a view to ensuring a 'good ecological status' of all surface water bodies. Chemical and biological Environmental Quality Indicators (EQI) are used and a programme of measures is implemented in order to improve surface waters that do not meet the required status.

Marine Strategy Framework Directive (MSFD)

71. The MSFD (European Council Directive 2008/56/EC) aims to establish a framework within which Member States will take measures to maintain or achieve 'good environmental status' (GES) in the marine environment by 2020.

72. The MSFD aims to be complementary to, and provide the overarching framework for a number of other key Directives and legislation at the European and UK level, such as the Habitats Directive, the Birds Directive, the WFD, the Common Fisheries Policy and the UK Marine and Coastal Access Act.

Habitats Directive and Birds Directive

73. EC Directive 92/43/EEC implements the Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention) and The Convention on the Conservation of Migratory Species of Wild Animals (the Bonn Convention) and is known as the Habitats Directive. The directive aims to conserve natural habitats of wild fauna and flora and is intended to protect biodiversity by requiring Member States to take measures to maintain or restore natural habitats and wild species, including protection for specific habitats listed in Annex I and species listed in Annex II of the Directive.

74. The Habitats Directive provides for robust protection for those habitats and species of European importance. A key element of this protection is the establishment under Article 3 of the Directive of a European wide network of protected sites, known as Special Areas of Conservation (SACs).

75. EC Directive 2009/147/EC on the conservation of wild birds (known as the Birds Directive) provides a framework for the conservation and management of wild birds in Europe. It sets broad objectives for a wide range of activities. The directive also resulted in the establishment under Article 4 of the Directive of a network of Special Protection Areas (SPAs) for rare or vulnerable species listed in Annex I of the Directive and for all regularly occurring migratory species. It also establishes a general scheme of protection for all wild birds (required by Article 5). The Directive requires national Governments to establish SPAs and to have in place mechanisms to protect and manage them. The SPA protection procedures originally set out in Article 4 of the Birds Directive have been replaced by the Article 6 provisions of the Habitats Directive.

76. Natura 2000 is an EC term that incorporates both SPA and SAC designated sites. SACs and SPAs form the Natura 2000 network of important high-quality conservation sites that are intended to significantly contribute to the conservation of habitats and species listed in the EU Birds and Habitats Directives.

77. European Protected Species (EPS) are those listed in Annexes II and IV of the Habitats Directive. These species include both animals and plants in marine and terrestrial environments.

1.3.3.5 UK Legislation

Marine Coastal and Access Act 2009

78. As discussed in Section 1.3.2.3, the MCAA enables the designation of MCZs in England, Wales and UK offshore waters. MCZs are intended to conserve a functioning marine ecosystem without a specific bias towards any particular species or habitat. The primary aim of MCZs is to deliver the government's vision for an 'ecologically coherent network of MPAs' across the UK and to ensure the health of the wider UK marine environment. These sites are intended to protect habitats and species not necessarily covered by existing mechanisms and complement the existing MPA network of SACs and SPAs.

79. The Act includes provisions for the coastal environment including improving access to the coast and undertaking Integrated Coastal Zone Management (ICZM), which brings policy makers, decision makers and stakeholders together to manage coastal and estuarine areas.

Wildlife and Countryside Act, Habitats Regulations and Offshore Marine Regulations

80. The Wildlife and Countryside Act 1981 enables the designation of Site of Special Scientific Interest (SSSI) to provide statutory protection to the best examples of flora, fauna, geological and physio-geological features. Improved provisions for the protection and management of SSSIs were also introduced by the Countryside and Rights of Way Act 2000. SSSIs are often designated for very specific areas, and the presence of several SSSIs in one region has, in many cases, formed the basis of SPA and SAC boundary classification. Natural England has overall responsibility for the management of the SSSI network in England.

81. The Wildlife and Countryside Act 1981 also enables Statutory Nature Conservation Bodies to declare sites which are considered to be of national importance as National Nature Reserves (NNRs). NNRs also provide additional statutory protection to the finest SSSIs in England and Wales. Natural England is the body responsible for the designation of NNRs under the legislation previously mentioned for SSSIs as all NNRs must be within a designated SSSI. Natural England manages the majority of English NNRs, with the remaining sites managed by other approved organisations such as the National Trust, the Forestry Commission, the RSPB, local Wildlife Trusts, and Local Authorities.

82. The Wildlife and Countryside Act makes it an offence (with exception to species listed in Schedule 2 and with additional penalties for species listed in Schedule 1) to intentionally: kill, injure, or take any wild bird; take, damage or destroy the nest of any wild bird while that nest is in use or being built; and take or destroy an egg of any wild bird. The Act makes it an offence to intentionally kill, injure or take any animal listed in Schedule 5 of the Act and protects occupied and unoccupied places used for shelter or protection. The Act also makes it an offence (subject to exceptions) to intentionally pick, uproot or destroy any wild plant listed in Schedule 8 and it is a criminal offence to plant or otherwise cause to grow any non-native, invasive species listed under Schedule 9 of the Act.

83. In England and Wales the Habitats Directive is implemented under the Conservation of Habitats and Species Regulations 2010 (the 'Habitats Regulations'). For UK offshore waters (i.e. 12nm from the coast out to 200nm or to the limit of the UK Continental Shelf Designated Area), the Habitats Directive is transposed into UK law by the Offshore Marine Conservation (Natural Habitats & c.) Regulations 2007 (as amended) (the 'Offshore Marine Regulations').

84. The Habitat Regulations and the Offshore Marine Conservation (Natural Habitats, & c.) Regulations 2007 (as amended), make it an offence to kill, injure, capture or disturb EPS. Where appropriate, licences can be obtained to allow persons to carry out activities that would otherwise be prohibited, without committing an offence. Licences for actions which may affect marine EPS are issued by the MMO beyond 12nm and for action up to 12nm can be obtained from Natural England. Licences required for terrestrial species would be obtained from Natural England. The Habitats Regulations make it an offence (subject to exceptions) to deliberately capture, kill, disturb, or trade in the animals listed in Schedule 2, or pick, collect, cut, uproot, destroy, or trade in the plants listed in Schedule 4. The Regulations require competent authorities to consider or review planning permission, applied for or granted, affecting a European site, and, subject to certain exceptions, restrict or revoke permission where the integrity of the site would be adversely affected.

85. The provisions of the Birds Directive are implemented through the Wildlife and Countryside Act 1981 (as amended), the Habitats Regulations (2010) as well as other legislation related to the use of land and sea.

86. Natural England is responsible for identifying sites suitable for SPA or SAC designation and for conducting public consultation on those sites in English inshore waters (0-12 nm). The Joint Nature Conservation Committee (JNCC) leads on the selection of SPAs and SACs within the UK offshore area (i.e. those beyond 12nm). Sites that span inshore and offshore waters are progressed jointly by Natural England and JNCC.

87. Once a site has been identified, it becomes a draft SPA or SAC and then undergoes consultation within the UK to become a possible SPA/SAC. Following consultation and assignment of conservation objectives, it is submitted for approval to the EC (becoming a candidate SPA/SAC) and must receive protection that is equivalent to a fully designated SPA/SAC. Once approved by the EC, it becomes a Site of Community Importance (SCI) and then the UK government designates the site as an SPA (under the Birds Directive) or SAC (under the Habitats Directive).

Habitat Regulations Assessment

88. Under the Habitats and Species Regulations (2010) the relevant Secretary of State must consider whether a plan or project has the potential to have an adverse effect on the integrity and features of a Natura 2000 site. This process is known as Habitat Regulations Assessment (HRA). Under Regulation 61 of the Habitats and Species Regulations, appropriate assessment is required for a plan or project, which either alone or in combination with other plans or projects, is likely to have a significant effect on a Natura 2000 site and is not directly connected with or necessary for the management of the site.

89. HRA generally follows a four stage process (Defra, 2010):

- Stage 1: Screening is the process which initially identifies the likely impacts upon a Natura 2000 site of a project or plan, either alone or in combination with other projects or plans, and considers whether these impacts may be significant. It is important to note that the burden of evidence is to show, on the basis of objective information, that there will be no significant effect; if the effect may be significant, or is not known, that would trigger the need for an appropriate assessment;
- Stage 2: Appropriate assessment is the detailed consideration of the impact on the integrity of the Natura 2000 of the project or plan, either alone or in combination with other projects or plans, with respect to the site's conservation objectives and its structure and function. This is to determine whether there is objective evidence that adverse effects on the integrity of the site can be excluded. This stage also includes the development of mitigation measures to avoid or reduce any possible impacts;
- Stage 3: Assessment of alternative solutions is the process which examines alternative ways of achieving the objectives of the project or plan that would avoid adverse impacts on the integrity of the Natura 2000, should avoidance or mitigation measures be unable to prevent adverse effects; and
- Stage 4: Assessment where no alternative solutions exist and where adverse impacts remain. At Stage 4 an assessment is made as to whether or not the development is necessary for imperative reasons of overriding public interest (IROPI) and, if so, of

the compensatory measures needed to maintain the overall coherence of the Natura 2000 network.

90. It is important to note that where priority habitats or species are present, the imperative reasons need to be "*…reasons relating to human health, public safety or beneficial consequences of primary importance to the environment, or other reasons which in the opinion of the European Commission are imperative reasons of overriding public interest*", whereas for non-priority habitats and species, imperative reasons of a social or economic nature may be acceptable, as long as they are "*considered to be sufficient to override the harm to the site*."

91. The requirement for an appropriate assessment will be determined by the competent authority following consideration of the information presented in the ES and the information to support an appropriate assessment report. The information to support an appropriate assessment report will also contain sufficient information to enable the competent authority to carry out an appropriate assessment should it determine that one is required.

Countryside and Rights of Way Act 2000

92. Under the Countryside and Rights of Way Act 2000, Natural England has the power to designate Areas of Outstanding Natural Beauty (AONBs) in England that are outside national parks and that are considered to have significant landscape value. The Act amends the law relating to public rights of way including making provision for public access on foot to certain types of land. Amendments are made in relation to SSSIs to improve their management and protection, as well as to the Wildlife and Countryside Act 1981, to strengthen the legal protection for threatened species. Provision is also made for AONBs to improve their management.

The Protection of Badgers Act 1992

93. The Act makes it an offence to wilfully kill, injure or take, or attempt to kill, injure or take a badger; and to cruelly ill-treat a badger. The Act also makes it an offence to intentionally or recklessly damage, destroy or obstruct a badger sett, or to disturb a badger whilst in a sett.

Natural Environment and Rural Communities Act 2006 (NERC)

94. Section 41 of the Act requires the relevant Secretary of State to compile a list of habitats and species of principal importance for the conservation of biodiversity in England (herein 'S41 species'). Decision makers of public bodies, in the execution of their duties, must have regard to the conservation of biodiversity in England, and the list is intended to guide them.

The Commons Act 2006

95. The Act aims to protect areas of common land, in a sustainable manner delivering benefits for farming, public access and biodiversity.

1.4 Project Description

96. This section provides an overview of the likely key parameters and description of the project design (Sections 0 to 1.4.3), indicative construction sequencing (Section 1.4.4), the possible construction methodologies (Section 1.4.5) and the decommissioning options (Section 1.4.6). The parameters provided are indicative in order to inform the Scoping process and will be further refined and detailed in the ES to provide the design envelope (see Section 1.3.2.6) for the DCO application. The key offshore components of the wind farm are likely to comprise:

- Wind turbine generators (WTGs) and their associated foundations;
- Offshore substation platform (OSP) (if required);
- Inter-array subsea cables between the WTGs;
- Subsea export cables between WTGs and the shore;
- Mattresses or other protective substrate associated with cable crossings (if required);
- Scour protection around foundations and on array and export cables (if required).

97. The key onshore components of the wind farm are likely to comprise the following:

- Landfall site with associated transition bays to connect the offshore and onshore cables;
- Onshore underground cables with jointing bays situated at intervals along the Onshore Cable Route as necessary;
- Temporary construction areas; and
- Onshore substation in proximity to the grid connection location at Richborough.

98. Table 1.2 provides an overview of the indicative project parameters.

Table 1.2 Indicative project characteristics for base case project design

Feature	Indicative Parameters
Offshore	
Maximum capacity	340MW
Number of turbines	Up to 34
Wind farm area	Approximately 70km^2
Distance from wind farm to shore (closest distance)	Landward row of turbines ~8km from the coast at the Isle of Thanet. The red line boundary will extend slightly closer to shore to allow additional vessel room during construction.
Approximate Offshore Export Cable Corridor	~20 km (Option 1 - Pegwell Bay)

Feature	Indicative Parameters
length from wind farm to shore	~23 km (Option 2 - Sandwich Bay)
Maximum number of export cables	4
WTG capacity	8 – 10MW
Maximum WTG rotor diameter	180m
Maximum hub height	125m
Maximum tip height	210m*
Minimum clearance above sea level	22m above MHWS
Indicative separation between turbines	960m in each row
	1350m between rows
Water depth over wind farm site	13 – 43m
Maximum length of array cabling	80km
OSP (if required – estimate of max dimensions)	90m x 60m x 40m (topside)
Onshore	
Landfall location	Pegwell Bay or Sandwich Bay
Onshore cable corridor length	~2.5km (Pegwell Bay)
	~7km (Sandwich Bay)
Maximum number of onshore cables	12 (3 per circuit) in up to 4 trenches
Grid connection location	Expected to be at Richborough
Maximum substation compound footprint (estimate)	200 x 130m
Maximum substation building footprint (estimate)	30 x 30m
Substation buildings maximum height	16m
Outdoor compound maximum height	13m

*maximum tip height is not equal to rotor diameter plus tip height as there is some degree of overlap.

1.4.1 Offshore

1.4.1.1 Wind Turbine Generators

99. The preferred size for WTG is 8 – 10MW. Based on this WTG capacity range and the total site capacity of 340 MW, Thanet Extension is likely to consist of up to 34 WTGs.

100. It is estimated that the maximum turbine hub height used would be 125m with maximum rotor diameter of up to 180m. The WTGs will incorporate tapered tubular towers and three blades attached to a nacelle housing mechanical and electrical generating equipment.

101. It is anticipated the layout of WTGs would be regular in plan (i.e. turbines would be set out in rows) and aligned with the NW to SE alignment of the existing WTGs at TOWF. Turbine spacing is constrained by the need to optimise wind resource conditions and maintain lines of orientation relative to the existing operational wind farm for navigational purposes.

1.4.1.2 Foundations

102. The design of foundations for the WTGs and an offshore substation platform (OSP) will be informed by engineering feasibility study, site investigation and procurement activity, both pre and post consent. A number of factors will influence the choice of foundation and the parameters of each foundation option (e.g. the type and size of WTG selected, the nature of the ground conditions, the water depth, metocean characteristics and supply chain constraints). It is possible that more than one type of foundation would be used across the project area. The following foundation design options are currently being considered at the Scoping stage:

- Monopiles;
- 3 legged jackets on either pin piles or suction caisson anchoring; and
- 4 legged jackets on pin piles or suction caisson anchoring.

103. The design options will be defined for the EIA based on initial geophysical and geotechnical survey results and ongoing engineering feasibility studies. Indicative dimensions and construction materials are outlined in Table 1.3 below.

Table 1.3 Foundation descriptions

Foundation type	Description
Monopile	Cylindrical steel pile with conical transitions - up to 10m diameter Penetration could be 30 to 60m depth below seabed level
3 legged jackets on either pin piles or suction caisson anchoring	Typically single large diameter vertical column supported by three braces Steel pin piles - diameter approximately 3m Seabed penetration of up to 60m Spacing between legs is a maximum of approximately 60m
4 legged jackets on pin piles or suction caisson anchoring	Steel pin pile - diameter approximately 3m Numerous design variants available, typically, lattice structure comprising steel tubular sections Seabed penetration of up to 60m Spacing between legs is approximately 40m

104. A number of options will be considered to protect the foundations and cable crossings from scour[3] if required, including rock dumping and mattressing. If monopile foundations are selected, the area required for scour protection is expected to be 10 x diameter (i.e. 10m monopile may require 100m diameter scour protection). Alternative foundation options being considered are likely to require smaller areas of scour protection.

[3] Scour: sediment eroded away from the base of the foundations as a result of the flow of water.

1.4.1.3 Offshore Electrical Infrastructure

105. Offshore electrical infrastructure will include the following components:

- Array cabling;
- Export cabling to transport the electricity generated at the wind farm to shore; and,
- It may include an OSP (if required).

106. Two different high voltage alternating current (HVAC) electrical export options are being considered for Thanet Extension:

    - The use of 66kV cables for export, removing the need for an offshore transformer (and associated OSP) to step up the voltage, but increasing the number of export cables to a maximum of four; and
    - The use of 132kV or 220kV export cables, transformed offshore at an OSP. This option would likely reduce the number of export cables to a maximum of two.

107. Cable voltage determines the generated capacity which can be accommodated by each individual cable. The higher the voltage, the greater generated capacity which can be exported by a single cable circuit, therefore if lower voltage cabling is deployed the total number of export cables required on and offshore will be greater. Export cable diameters are expected to be up to 300mm for both solutions. The decision as to which option will be used for the project will depend on a technical assessment of the route and a review of what is most practical given the onshore constraints.

108. Regardless of the eventual export solution, 66kV inter-array array cables will be used to connect the WTGs within the wind farm. Array cables will be 3-core HVAC cables with a diameter of approximately 160mm. The maximum length of array cabling for Thanet Extension will be 80km. The location of the array cabling will be determined post consent, subject to the final layout of the WTGs.

109. Fibre optic communications cables (either inside the electrical transmission cables or laid alongside) will also be required to allow for System Control And Data Acquisition (SCADA).

1.4.2 Landfall

110. Cable landfall, where the export cables are brought onshore, would be achieved either by open trenching or techniques such as Horizontal Directional Drilling (HDD) beneath the intertidal area (see Section 1.4.5.4).

111. If HDD is used, on the landward side of the HDD, up to 12 ducts in four trenches would be required to transfer the offshore export cables to the transition pits where they would be joined to the onshore export cables.

112. The length of cables required will be dependent upon which landfall option is taken forward. The indicative Onshore Cable Route Options for scoping are approximately 2.5km (Pegwell Bay) and 7km (Sandwich Bay). Onshore Cable Route selection will take place post Scoping and a single route option is expected to be presented in the PEIR. Route refinement within the Onshore Area of Interest will take place following receipt of the Scoping Opinion and further detailed design works.

113. Transition pits are below-ground structures that house the joints between the offshore export cables and the onshore export cables. There would be up to four transition pits located within the Thanet Extension Onshore Area of Interest. Typical dimensions for each pit would be 10m (width) x 15m (length) x 5m (depth). Each transition pit will comprise a buried concrete structure with access by a manhole cover. These transition pits may also house the required SCADA equipment or alternatively a second set of smaller jointing pits would be provided.

1.4.3 Onshore

114. The onshore export cable will connect to the offshore export cable within a transition joint bay at the landfall point, and export electricity to the onshore substation at Richborough. Onshore export cables will be either 66kV, 132kV or 220kV, in line with the chosen offshore export solution. The onshore substation would be connected to the National Grid GSP (the Point of Connection) via a 400kV interconnecting cable. There are currently two landfall sites being considered for the Thanet Extension Project.

1.4.3.1 Onshore Cable Corridor

115. All cables will be laid in trenches within individual ducts. There will either be:

- A maximum of four separate trenches (with indicative dimensions of 1.2 m deep and 1 m wide). In this case, each trench would contain a maximum of three one-core cables laid in separate ducts and one fibre optic cable contained within its own duct; or,
- One larger trench (with indicative dimensions of 2 m deep and 2 m wide). In this case, the trench would contain a maximum of four cables, laid in trefoil formation, each within its own duct, and more stabilised backfill.

Option 1 - Pegwell Bay landfall

116. The proposed landfall site for the Pegwell Bay option is located in the north western corner of the bay, to the south of the disused hoverport. It is expected that the Option 1 Onshore Cable Route would run from the transition pit up the A256 Sandwich Road and along the carriageway to a substation at Richborough. The onshore cables would be installed via an open cut method in up to four trenches with each trench being approximately 1.5m deep and 1m wide. The total length of this Option 1 Onshore Cable Route option is approximately 2.5km.

Option 2 - Sandwich Bay Landfall

117. There is a gap between Royal St. George's Golf Links and Royal Cinque Ports Golf Links, within the boundary of the Sandwich Bay Estate, where the cables would make landfall. From there, the route would follow Guilford Road to Tollgate Cottages and then cut across agricultural fields in a north and north-westerly direction for about 6km to the River Stour. From there HDD of about 600-800m is likely necessary to cross underneath the River Stour, the wharf and Richborough Port, reaching fields on the western side of the A256. From there the substation Area of Interest is approximately 200 – 300m to the north across fields. The total length of this Option 2 Onshore Cable Route option is approximately 7km.

1.4.3.2 Cable Installation

118. The cable would be transported to the site on a drum in sections and laid in trenches. The length of each section (and therefore the size of the drum) would be subject to constraints, such as available access and procurement but would be a maximum of 1km section lengths.

119. The jointing bays would be underground concrete structures of approximately 15m (length) x 6m (width) x 2m (depth). The jointing bays would be constructed at regular intervals along the cable route (500 - 1000m) to facilitate installation of the cables (see Section 1.4.5.5), with up to four bays at each location, one for each cable trench. The precise location of the jointing bays would be determined during detailed design, however wherever possible the jointing bays would be located at the edge of field boundaries or roads to facilitate future access and minimise any potential impacts.

120. Cross bonded link boxes may be required at a number of locations along the cable corridor for the HVAC solution to maintain power rating. Where cross bonded Link boxes are installed in the ground the length of the bonding leads which connect the joints to the link boxes shall not exceed 8m. This means that where the circuit is laid in the carriageway then the cross bonding link boxes can be installed off the

carriageway; this will allow future maintenance on the link boxes without the need for a lane closure. The structures are made of concrete, metal or a composite material dependent on location. There would be small markers at each link box.

121. Temporary mobilisation areas would be required for welfare, parking and storage. Additional working areas would be required at crossing sites. The location and size of all areas required for construction will be defined in the EIA, based on the final cable route selection.

122. A stabilised backfill such as Cement Bound Sand (CBS) will be installed at the base of the trench and following cable duct laying a further covering of CBS will be installed to a depth of 100mm. There will then be High Voltage Warning stockboards laid on top of the CBS followed by a small layer of suitable excavated material then High Voltage Warning marker tape. Above the warning tape the reinstatement, whether it is 'permanent' or 'interim', should meet the requirements as set out in the Department for Transport Specification for the Reinstatement of Openings in Highways April 2010. The jointing bays would be reinstated in a similar manner once the cables have been installed and the joints have been completed and tested.

1.4.3.3 Substation

123. There are two potential designs for the substation; one layout based on two transformers with a 400kV GIS switchyard. In this scenario, the majority of the electrical infrastructure would be housed outdoors (i.e. air-insulated). This provides the worst case for the overall substation compound footprint of 200m by 130m. The substation building dimensions are 30 by 30m not including the car park or concrete plinths by the access doors. The maximum height of the outdoor compound is estimated to be about 13 m, with the substation building at 13.5 m.

124. The second substation layout is based on two transformers with a 400kV GIS switch room. In this scenario, the majority of the electrical infrastructure would be housed indoors. (i.e. gas-insulated). The dimensions of the substation compound footprint in this case are 170 m by 105 m, with substation building dimensions at 50 by 30 m. The maximum height of the outdoor compound is estimated to be about 13 m, with the substation building at 16 m.

1.4.4 Construction Sequencing

1.4.4.1 Offshore

125. It is envisaged that Thanet Extension will be built out offshore in one phase with a total capacity of up to 340MW. Construction offshore is expected to commence in 2021.

1.4.4.2 Landfall

126. Installation of the landfall ducts is expected to commence in 2021.

1.4.4.3 Onshore

127. Onshore substation infrastructure (e.g. groundworks, roads and services, some plant and buildings) and ducting for the onshore cables would be established prior to commissioning of the wind farm. The overall programme of onshore activities is likely to be as follows:

- Onshore enabling works – 2020 onwards;
- Installation of cables and substation plant – 2021.

1.4.5 Construction Methods

1.4.5.1 WTG installation

128. The WTGs (including foundations, nacelles and blades) and substations are likely to be installed using specialist installation vessels (e.g. jack-up or dynamic positioning (DP) technology).

129. Different methods would be required for installation of foundations dependent upon the type(s) chosen. Some of these methods may first require seabed preparation (e.g. dredging) to level the area, before placement of foundations or grouting and ballasting post-placement. An overview of the installation sequence for each foundation type is provided in Table 1.4.

Table 1.4 Foundation installation overview

Foundation type	Description
Monopile	• Seabed preparation (dredging) as necessary • Piles and transition pieces transported to site • Piles sequentially up-ended and lowered to sea bed • Piles sequentially driven • Transition pieces sequentially installed • Scour protection (if required) • Towers and nacelles pre-erected or erected individually at site using suitable installation vessel • Blades fitted to the tower/nacelle structure as individual components or in a part assembled state.
3 legged jackets on pin piles or suction caissons	• Seabed preparation (dredging) as necessary • Tripods and piles / caissons transported to site • Installation template set down on seabed • Piles stabbed and driven / suction caissons sunk • Tripods lifted and set down on piles / caissons • Tripods levelled and pile connections grouted • Scour protection (if required)

Foundation type	Description
	• Towers and nacelles pre-erected or erected individually at site using suitable installation vessel • Blades fitted to the tower/nacelle structure as individual components or in a part assembled state.
4 legged jackets on pin piles or suction caissons	• Seabed preparation (dredging) as necessary • Jackets and piles transported to site • Installation template set down on seabed • Piles stabbed and driven • Jackets lifted and set down on piles • Jackets levelled and pile connections grouted • Scour protection (if required) • Towers and nacelles pre-erected or erected individually at site using suitable installation vessel • Blades fitted to the tower/nacelle structure as individual components or in a part assembled state.

1.4.5.2 Offshore Cable Installation

130. Array cables are likely to be installed using either a water jetting or ploughing technique. Water jetting, ploughing, trenching and/or cable injector would be used for the export cable installation.

131. Burial depths for the offshore cables would be subject to a detailed burial risk assessment but is likely to be in the range of 1-3m below seabed. Burial provides protection to the cables, however additional protection (rock dumping, frond mats or grout bags) would be required at key locations (e.g. where cable ends enter WTG or platform foundations and when ground conditions or crossings result in the cable being laid near to or on the seabed surface).

132. Where cable crossings are required, the design of these crossings would be agreed with the owner/operator to ensure that integrity of all the assets is maintained.

1.4.5.3 Offshore Safety Zones

133. During offshore construction activities, the Applicant will apply for safety zones[4] around WTG, platforms and installation vessels as appropriate. These safety zones would be based on an appropriate Navigational Risk Assessment (NRA) and applied for to the relevant authorities and in consultation with relevant consultees.

1.4.5.4 Landfall

134. Cable landfall, where the export cables are brought ashore, will be achieved either by Horizontal Directional Drilling (HDD) or open-cut trenching techniques.

[4] Safety Zones are set out in the Energy Act 2004 and the Electricity (Offshore Generating Stations) (Safety Zones) (Applications Procedures and Control of Access) Regulations 2007)

135. Open-cut techniques involve mechanical excavation of trenches within the intertidal area, into which cables can then be laid directly or within ducts. Trenches are then backfilled with excavated material and the area reinstated.

136. HDD is a trenchless method of cable installation used to pre-install ducts, allowing cables to be pulled through at a later date. The offshore cables may be required to be installed under existing sea defences to be jointed to the onshore cables at the transition pits on the landward side of the landfall site. To enable this installation, HDD is one option being considered. HDD refers to a drilling method which facilitates the installation of HDPE ducts (through which cables are pulled) using a surface to surface drilling profile. The typical works for HDD installation per duct include:

- Instatement of temporary construction compound to accommodate the drilling rig, ducting and associated materials and welfare facilities. The expected dimensions of the landfall temporary construction compounds are in the range of 60m x 50m dimensions. The land will be levelled, topsoil removed and stored within the construction compound and, if necessary, dependant on ground conditions, bog mats or geotextile and hard standing may be laid to protect the subsoil during the drilling operations. The compound will be securely fenced and accessed from a suitable route for haulage equipment along the Onshore Cable Route to the drilling site.
- A pilot hole will be drilled from the entry pit and advanced in stages until the required length is reached and the boring head emerges at the exit point. The drill head will be guided by sensors, potentially tracking a cable placed above ground. Drilling fluid (a combination of water and natural clays such as bentonite) will be employed to lubricate the drilling process and cool the drill head. Fluid pressures will be monitored throughout the process to minimise the potential for breakout of the drilling fluid. An action plan will be developed and procedures adopted during the drilling activity to respond to any drilling fluid breakout.
- Once the pilot hole is completed, it is enlarged through several passes with reamers until the necessary diameter for duct installation is achieved.
- The HDD will either exit on the beach (above the level of mean low water spring), a ‘short HDD’, or at an offshore location, a ‘long HDD’. The former minimises offshore works associated with the HDD, however requires suitable access to the beach for excavators and associated equipment. For a short HDD, temporary beach closures may be required during drilling exit and duct installation. Beach access would be required for an excavator and support vehicles. Beach closures would be restricted to the area between the drill exit and vehicle access point to maintain general public safety separations. At this time it is assumed that beach closures will be required throughout the HDD works, however further assessment may allow for the beach to be reopened between each drill exit and duct installation.

- The ducts are typically floated into position at the offshore exit point via barges, the ducts are then flooded with water and pulled into the reamed drill hole from the entry pit. Alternatively the ducts can be welded in sections onshore and pulled from the offshore side.
- Once the duct has been installed, the offshore cables can be installed when convenient by positioning the cables at the offshore exit point and pulling through the ducts to the transition joint pit."

137. Full details of each method will be included in the Project Description within the PEIR and ES.

1.4.5.5 Onshore construction

Pre-construction Work

138. Pre-construction activities for cabling may include topographic surveys, ecological pre-construction work, archaeological pre-construction work, drainage surveys, geotechnical, ground stability surveys and modifications to field drains (as required).

139. At the substation, pre-construction activities may include topographic surveys, ecological pre-construction work, archaeological pre-construction work, drainage surveys, geotechnical and ground stability surveys.

Installation of the Onshore Cables

140. Temporary fencing would be installed around the cable corridor. The working width will then be cleared of vegetation, and the topsoil stripped and stored locally (on mats to the side of the cable trench). Each cable trench would be excavated and the material stored locally before installing the cables and infilling the trench. As discussed in Section 114, the cables would be delivered on drums. Following installation of the cables, the cable corridor would be reinstated including removal and appropriate disposal of excess material; removal of any haul road/running track materials and mats where appropriate; replacement of topsoil and re-seed if required; and removal of fencing.

141. HDD may also be required at the landfall and certain onshore crossing locations. During refinement of the engineering design, other installation methods (e.g. auger boring) may be considered.

142. The installation of the transition pits and jointing bays would require:

- Mechanical excavation to the required depth;
- Placement of precast components or construction of reinforced concrete base slab, walls and cover *in situ*; and

- Backfilling and reinstatement.

Construction of the Substation

143. Construction of access roads to the substation would be undertaken, followed by grading, earthworks and drainage of the substation site.

144. The foundations would be either concrete foundation plinths or piled for heavy items (such as transformers) subject to the prevailing ground conditions.

145. Once the foundation works are complete, the electrical plant would be delivered and installed, and buildings would be erected. Heavy items such as transformers would be delivered to site using multi-axle vehicles, and off-loaded with the use of a mobile crane. The majority of the remaining equipment would be erected with the use of small mobile plant and lifting apparatus.

146. The proposed building structures are typically composed of a steel framework and lightweight cladding materials. The structural steelwork would be fabricated and prepared off site and delivered to site for erection activities. The steelwork would be erected with the use of cranes. Cladding panels (typically composite) would also be delivered to site ready to erect and be fixed to the steelwork.

147. Working hours would normally be 7am to 7pm Monday to Friday, and 7am to 1pm Saturday, however there may be certain exceptions, which will be discussed with relevant stakeholders and required permissions, obtained as necessary.

1.4.5.6 Operations and Maintenance Strategy

Offshore

148. All offshore infrastructure, including WTGs, foundations and cables would be monitored and maintained during the operational life. The established O&M facility at Ramsgate, which currently services the operational TOWF, Kentish Flats and KFE sites is the expected base for servicing Thanet Extension.

149. The operation and control of the wind farm would be managed by a SCADA system, connecting each turbine to one or more off-site control rooms at the control centre in Esbjerg, Denmark. The SCADA system will enable remote control of the wind farm (e.g. shutdown/start-up of individual WTGs and information management).

150. The wind farm would be operated and maintained via O&M vessels (e.g. crew transfer vessels, supply vessels) to transfer from shore direct to the wind farm.

151. A number of vessel visits to each turbine would be required each year to allow for scheduled and unscheduled maintenance. This will mean small crew vessels sailing

to and from the wind farm on a daily basis from shore. Although it is not anticipated that large components (e.g. turbine blades or substation transformers) will require replacement during the operational phase, it is a possibility. Should this be required large jack-up or heavy lift vessels may need to operate continuously for significant periods to carry out these major maintenance activities.

152. During the operational phase of the project there would be no planned maintenance or replacement of the subsea cables, however repairs could be required should the cable fail or be damaged. Periodic surveys would be required to ensure the cables remain buried and if they do become exposed, re-burial works or additional cable protection would be undertaken.

153. During O&M activities, the Applicant will seek to establish advisory safety zones around turbines where appropriate whilst works are ongoing. These advisory safety zones would be based on an appropriate safety assessment and appropriate permissions sought in consultation with relevant consultees.

1.4.5.7 Landfall

154. Once the cables are in place, no routine maintenance at the landfall is expected, however access is required to allow any unplanned works.

1.4.5.8 Onshore

155. The substation will not be permanently manned. O&M staff will visit on a regular basis (e.g. monthly) to carry out routine checks and maintenance. Key maintenance campaigns will take place every summer, during which time there would be teams working 24/7 in order to complete the tasks quickly and return any affected equipment to service. Most annual maintenance campaigns would be short (approximately 1 week), but if required some campaigns may be longer (e.g. 1-2 months).

156. Security at the substation would be provided using perimeter fencing and gates, plus intruder detection and CCTV systems.

157. Occasional access would be required at those joint bays with link boxes; access would be via the link box access hatch.

1.4.6 Decommissioning

158. At the end of offshore wind farm's operational life, it is a statutory requirement (through the provisions of the Energy Act 2004 (as amended)) that Thanet Extension would be decommissioned. As an alternative to decommissioning, the Applicant may

wish to consider re-powering the wind farm, however this would be subject to a new consent application.

159. Vattenfall has first-hand experience of decommissioning offshore wind farms; Yttre Stengrund has been operational since 2001 and owned by Vattenfall since 2006. The five turbine offshore wind farm was decommissioned in 2015/2016. The rotor blades and nacelles have been removed, the towers dismantled and the foundations cut at the level of the seabed. Underwater cables were removed in summer 2016.

160. Offshore decommissioning may include the removal of all of the turbine components, part of the foundations (those above seabed level), the inter-array cables, and the export cables subject to agreement with the regulator.

161. The substation would likely be removed and reused or recycled. The building may be reused for a future development or demolished. If removing the building, the foundations would be removed to below ground level and the ground covered in topsoil and re-vegetated to return the site to its initial state. The jointing pits and transition pits would also be reinstated to ground level. It is expected that the onshore cables jointing pits and transition pits would be left *in situ*.

162. The detail and scope of the decommissioning works would be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator.

163. Under the statutory process, the Applicant is required to prepare a decommissioning plan at the request of the relevant Secretary of State and, prior to construction, funds must be set aside for the purposes of decommissioning.

1.5 Site Selection and Outline Assessment of Alternatives

164. This section provides an overview of the main site selection activities undertaken to determine the Scoping project design for Thanet Extension and an assessment of alternatives considered.

1.5.1 Site Selection Process

165. Section1.5.2 describes early desk based investigations conducted to inform the preliminary design of Thanet Extension. Further to this, internal and external engineering and environmental feasibility studies were conducted in 2015 in key technical areas

1.5.2 Wind farm

166. Initial delineation of the wind farm site boundary was conducted using existing GIS constraints data. The preliminary site boundary was considered the maximum buildable area for placement of turbines, pending further survey and consultation.

167. Key constraints are shipping activity on approach to the Thames Estuary, in particular to the north and west, the presence of a deep water channel to the east, and maintaining a minimum distance of 8km from nearest coast for visual reasons.

168. Consideration was also given to the presence of statutory designated sites in proximity to the proposed wind farm area. The proposed wind farm area does not overlap with any currently designated sites, however the Outer Thames Estuary SPA is located approximately 2.5km from the north western most extent of the initial site boundary[5].

169. Once the preliminary site boundary was outlined, Vattenfall commissioned a number of desk-based feasibility reviews in areas expected to be key to the EIA process:

- Shipping and Navigation
- Seascape, Landscape and Visual
- Ornithological Data Review

170. In addition, Vattenfall has conducted informal consultation on the preliminary site boundary with a number of key statutory and non-statutory stakeholders (see Section 5.2 Statutory and Prescribed Bodies Consultation).

171. Feedback from the feasibility reviews and early stakeholder consultation resulted in a number of changes to the proposed offshore wind farm area pre-Scoping.

1.5.3 Landfall and provisional Thanet Extension Offshore Export Cable Corridor

172. In the early stages of the project, uncertainties regarding grid connection point and electrical design required a degree of flexibility be maintained in relation to cable routing. Therefore, an Offshore Cable Route Area of Interest was delineated alongside the wind farm boundary, and this incorporated options for cable routing and landfall at various locations along the Kent coast from Joss Bay in the north, to Sandwich Bay in the south.

173. Following a grid connection application, further onshore cable routing work, site walkover and input from electrical design and construction specialists, it was

[5] The proposed wind farm area does overlap with the Southern North Sea proposed Special Area of Conservation (pSAC). This is discussed in Section 2.15 Offshore Designated Sites Summary and will be given due consideration as part of the EIA and HRA if required.

determined that the preferred option for offshore routing would be to follow the existing TOWF cable route to the north (thereby avoiding the need to cross the TOWF export cables or the Belgian Interconnector (NEMO Link) once constructed) and make landfall in Pegwell Bay.

174. Due to the potential for space constraints onshore at Pegwell Bay, a second option has been maintained for landfall at Sandwich Bay. The cable routing work determined this as the second preference in terms of landfall technical feasibility.

1.5.4 Onshore Cable Route

175. As described in Section 1.5.3, two options have been defined for onshore cable routing from landfall to Richborough. The Pegwell Bay option (Option 1) is preferred in terms of avoidance of offshore cable crossings and length of Onshore Cable Route (~2.5km), however may be subject to space constraints along Sandwich Road. The Sandwich Bay option is likely to be less constrained in terms of space, however is a longer cable route (~7km) and requires crossing of the River Stour on approach to the substation. Further engineering study and Scoping consultation is required to determine the significance of constraints to each route before a final route selection is made.

1.5.5 Substation

176. At the current time, only the location of the expected grid connection point and a high level overview of the infrastructure required is known. The Substation Area of Interest shown in Figure 1.2has been kept deliberately wide at the time being and encompasses land occupied by the existing UK Power Networks BSP substation (where TOWF connects to the electricity distribution network), where the NEMO Link converter station is currently under construction, and where the new National Grid GSP substation would be constructed.

177. Once a grid connection offer has been received and negotiated, and detailed plans for NEMO Link and National Grid infrastructure have been studied, the siting of substation infrastructure will be determined and assessed as part of the EIA.

1.6 EIA methodology

1.6.1 Introduction

178. The EIA will consider all relevant topics covered under the three general areas of physical environment, biological environment and human environment.

179. The EIA will be carried out in accordance with the Planning Act 2008 (see Section 1.3.2.1) and the EIA regulations (see Section 1.3.2.5). Furthermore, the approach to

the EIA and the production of the resulting ES document will closely follow relevant guidance including:

- National Infrastructure advice notes in relation to the Planning Act 2008 process (as amended);
- Assessment of the environmental impact of offshore wind-farms (OSPAR Commission, 2008);
- Planning Inspectorate Advice Notes (the Planning Inspectorate, 2012; 2015a; 2015b; 2015c; 2016);
- Overarching National Policy Statements for Energy EN-1, Renewable Energy Infrastructure EN-3, and Electricity Networks Infrastructure EN-5 (DECC, 2011);
- Relevant guidance issued by other government and non-governmental organisations; and,
- Receptor specific guidance documents.

180. It will also give due regard to the requirements of the Habitats and Species Regulations 2010, The Offshore Marine Conservation (Natural Habitats, &c.) (Amendment) Regulations 2010 and the Marine and Coastal Access Act 2009.

1.6.2 Stakeholder Consultation

181. Stakeholder Consultation is discussed in Part 5 Consultation.

1.6.3 Characterisation of the Existing Environment

182. The characterisation (description) of the existing environment will be undertaken in order to determine the baseline conditions in the area covered by Thanet Extension and relevant surrounding study areas. This will require the following steps:

- Study areas defined for each receptor based on the relevant characteristics of the receptor (e.g. mobility/range);
- Review available information;
- Review likely or potential impacts that might be expected to arise from the development;
- Determine if sufficient data to make the EIA judgements with sufficient confidence;
- If further data required, ensure data gathered are targeted and directed at answering the key question and filling key data gaps; and
- Review information gathered to ensure the environment can be sufficiently characterised in sufficient detail.

183. Vattenfall has collated a significant amount of existing data from a number of sources including the surveys undertaken to support the EIA for the TOWF project as well as subsequent studies undertaken for pre-construction and construction

monitoring and operational monitoring. In addition, Vattenfall will also undertake new surveys both offshore and onshore to ensure that the baseline is up to date. Where further survey will be undertaken, this is covered in more detail in the receptor topic sections in Parts 2 and 3 of this report.

184. The specific approach to establishing a robust baseline (upon which impacts can be assessed) is set out under each parameter within this Scoping Report (Sections 2 to 4). It is envisaged that this approach will be subject to review following the receipt of the Scoping Opinion from PINS and subsequent consultation with statutory bodies. It is also recognised that this approach may evolve over time with the collection of new data from the study area and as the design of the project advances.

1.6.4 Assessment of Impacts

185. The approach the EIA team will take to making balanced assessments will be guided by both EIA specialists and technical specialists using available data, new data, experience and expert judgement. In order to provide a consistent framework and system of common tools and terms, where appropriate, a matrix approach will be used to frame and present the judgements made. However, it should be noted that for each topic of the EIA the latest guidance or best practice will be used and therefore definitions of sensitivity and magnitude of impact will be tailored to each receptor. The impact assessment will consider the potential for impacts during the construction, operation and decommissioning of Thanet Extension.

1.6.4.1 Determining receptor sensitivity and value

186. The characterisation of the existing environment will help to determine the receptor sensitivity in order to assess the potential impacts upon it.

187. Receptor value considers whether, for example, the receptor is rare, has protected or threatened status, importance at local, regional, national or international scale, and in the case of biological receptors whether the receptor has a key role in the ecosystem function. These considerations are balanced against the properties of the receptor under consideration.

188. The ability of a receptor to adapt to change, tolerate, and/or recover from potential impacts will be key in assessing its sensitivity to the impact under consideration. For ecological receptors tolerance could relate to short term changes in the physical environment, for human environment receptors tolerance could relate to displacement effects and therefore impacts upon economics or safety. It also follows that the time required for recovery will be key considerations in determining receptor sensitivity.

189. The overall receptor sensitivity is determined therefore by considering a combination of value, adaptability, tolerance and recoverability and applying professional judgement and/or past experience.

190. Note that expert judgement is particularly important when determining the sensitivity of receptors. For instance, an Annex II species (under the Habitats Directive) would have a high value, but if it was highly tolerant of an impact or had high recoverability it would follow that the sensitivity in this instance should reflect the ecology rather than default to protected status taking precedence.

1.6.4.2 Predicting the Magnitude of Impacts

191. In order to predict the significance of an impact it is fundamental to establish the magnitude and probability of impact occurring through a consideration of:

- Scale or spatial extent (small scale to large scale or most of the population or a few individuals);
- Duration (short term to long term);
- Frequency; and
- Nature of change relative to the baseline.

1.6.4.3 Evaluation of Significance

192. Subsequent to establishing the sensitivity and magnitude, the impact significance will be predicted by using quantitative or qualitative criteria, as appropriate to ensure a robust assessment. Where possible a matrix such as the one presented in Table 1.5 will be used to aid assessment of impact significance based on expert judgement. For each section of the ES, the best methodology (based on the latest available guidance) will be followed and, when more appropriate, another approach than the matrix may be used.

193. Table 1.6 provides an indication of the significance definitions that the Applicant proposes to use in the assessment process for the majority of parameters. Note that these are generic, and specific definitions will be used for each receptor topic.

194. A description of the approach to impact assessment and the interpretation of significance levels will be provided within each section of the ES to determine what is considered a likely significant effect for each topic. This approach will ensure that the definition of impacts is transparent and relevant to each topic under consideration.

Table 1.5 Significance of an impact resulting from each combination of receptor sensitivity and the magnitude of the effect upon it

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

Table 1.6 Generic Impact Significance Definitions

Impact Significance	Definition
Major adverse	Very large or large change in receptor condition, which is likely to be important at a regional or district level because it contributes to achieving national, regional or local objectives, or, could result in breaches of legislation.
Moderate adverse	Intermediate change in receptor condition, which are likely to be important considerations at a local level.
Minor adverse	Small change in receptor condition, which may be raised as local issues but are unlikely to be important in the decision making process.
Negligible	No discernible change in receptor condition.
Minor beneficial	The impact is of minor significance, but has been assessed as having some environmental benefit
Moderate beneficial	The impact is assessed as providing a moderate gain to the environment
Major beneficial	The impact is assessed as providing a significant positive gain to the environment with a large or very large change in receptor condition which is likely to be important at a regional or district level because it contributes to achieving national, regional or local objectives, or, could result in an exceedance of statutory objectives.

1.6.4.4 Confidence

195. Once an assessment of a potential impact has been made, it is necessary to assign a confidence value to the assessment to assist in the understanding of the judgment. This is undertaken on a simple scale of high-medium-low, where high confidence assessments are made on the basis of robust evidence, with lower confidence assessments being based, for example on extrapolation and use of proxies.

1.6.4.5 Mitigation

196. Where impact assessment identifies that an aspect of the development is likely to give rise to significant environmental impacts, mitigation measures will be proposed and discussed with the relevant authorities to avoid impacts or reduce them to acceptable levels and, if possible, to enhance the environment.

197. For the purposes of the EIA, two types of mitigation have been defined and these will be identified in the ES:

- Embedded mitigation, consisting of mitigation measures that are identified and adopted as part of the evolution of the project design and will be included in the Project Design Statement that describes the project as assessed in the EIA; and

- Additional mitigation, consisting of mitigation measures that are identified during the EIA process to reduce or eliminate any predicted impacts, which are subsequently adopted by the Applicant as project commitments.

1.6.4.6 Assessing Residual Impacts

198. Following identification of mitigation measures, impacts will be re-assessed and all residual impacts will be described. Where no mitigation measure is proposed, a discussion will explain why the impact cannot be reduced.

1.6.4.7 Inter-relationships

199. The impact assessment will include inter-relationships in order to consider the impacts of the project as a whole, in accordance with the EIA Regulations.

200. It need not necessarily follow that the maximum adverse impact in terms of any one topic impact would automatically result in the maximum potential impact when a number of topic impacts are considered collectively. In addition, individual impacts may not be significant but could become significant when their inter-relationship is assessed (the Planning Inspectorate, 2012).

201. Offshore, onshore and wider-scheme inter-relationships are discussed in Sections 2.16, 993 and 4.4.

1.6.4.8 Cumulative Impacts

202. Cumulative impact assessment (CIA) forms part of the EIA process. The scope of the CIA (in terms of relevant issues and projects) will be established with consultees (including other developers) as the EIA progresses. In addition, the Applicant will look at the experience from other UK projects as well as incorporate continuing work from industry-wide initiatives with regard to cumulative impact. Sections 2.17, 3.14 and 4.5 of this Scoping Report provide a high-level discussion of potential cumulative considerations that are believed to require inclusion within the EIA.

203. PINS Advice Note 9 provides guidance on plans and projects that should be considered in the CIA including:

- Projects that are under construction;
- Permitted applications, not yet implemented;
- Submitted applications not yet determined;
- Projects on PINS Programme of Projects;
- Development identified in relevant Development Plans, with weight being given as they move closer to adoption and recognising that much information on any relevant proposals will be limited; and

- Sites identified in other policy documents as development reasonably likely to come forward.

204. Only projects which are reasonably well described and sufficiently advanced to provide information on which to base a meaningful and robust assessment will be included in the CIA.

205. Offshore cumulative impacts may come from interactions with the following activities and industries:

- Other wind farms;
- Aggregate extraction and dredging;
- Licensed disposal sites;
- Navigation and shipping;
- Commercial fisheries;
- Sub-sea cables and pipelines;
- Potential port / harbour development; and
- O&G activities.

206. Onshore plans or projects that may be considered include (but not limited to):

- Other energy generation infrastructure;
- Building/housing developments;
- Installation or upgrade of roads;
- Installation or upgrade of cables and pipelines;
- Coastal protection works; and
- National Grid enabling works.

207. The full list of plans or projects to be included in the CIAs will be developed as part of on-going consultation with technical consultees.

1.6.4.9 Transboundary Impacts

208. Regulation 24 of the EIA regulations sets procedures to address issues associated with a development that might have significant impact on the environment in another European Member State.

209. The procedures involve providing information to the Member State and for PINS to enter into consultation with that State regarding the significant impacts of the development and the associated mitigation measures. Further advice on transboundary issues, in particular with regard to consultation is given in PINS Advice Note Twelve.

210. The Applicant has provided an outline of the key transboundary considerations that are believed to require inclusion within the assessment (Section 2.17 Cumulative and Transboundary Impacts Summary).

1.6.5 Draft Outline of the Environmental Statement

211. The ES will document the EIA process and will describe the project and the EIA process with regard to the latest legislation, policy and guidance. Subject to the outcomes of the Scoping process, the ES may comprise the following documents, parts and chapters:

- Volume 1 Non-Technical Summary
- Volume 2 Environmental Statement
    - Part 1: Introductory chapters
        - Introduction
        - Need for the Project
        - Policy and Legislative Context
        - Site Selection and Assessment of Alternatives
        - Project Description
        - EIA Methodology
    - Part 2: Offshore environment
        - Marine Geology, Oceanography and Physical Processes
        - Marine Water and Sediment Quality
        - Benthic and Intertidal Ecology
        - Fish and Shellfish Ecology
        - Marine Mammal Ecology
        - Offshore Ornithology
        - Commercial Fisheries
        - Shipping and Navigation
        - Offshore Archaeology and Cultural Heritage
        - Offshore Landscape, Seascape and Visual Impacts
        - Aviation and Radar
        - Infrastructure and Other Users
    - Part 3: Onshore environment
        - Ground Condition and Contamination
        - Air Quality
        - Water Resources and Flood Risk
        - Land Use
        - Onshore Ecology

        - Onshore Ornithology
        - Onshore Archaeology and Cultural Heritage
        - Onshore Landscape and Visual Impacts
        - Noise and Vibration
        - Traffic and Transport
        - Health

    - Part 4: Wider Scheme Aspects
        - Socio-economics
        - Tourism and Recreation

    - Part 5: Cumulative and Transboundary Impacts
        - Offshore CIA
        - Transboundary Impacts
        - Onshore CIA

    - Summary of Impacts

- Volume 3: Technical appendices
    - Appendix A: Seascape, Landscape and Visual Impacts

2 PART 2: OFFSHORE

2.1 Introduction

212. This section presents the main baseline characteristics of the offshore environment within the proposed Wind Farm Area and Offshore Export Cable Corridor area, (and the surrounding area, where relevant). The potential impacts of Thanet Extension during construction, O&M, and decommissioning are considered. Where there is no pathway for a potential impact, each section outlines impacts that are proposed to be scoped out of the EIA. Where topics are proposed to be scoped in, an overview of the approach to the EIA is provided.

213. The following questions are suggested for consideration while reviewing each offshore section and providing responses for inclusion in the Scoping Opinion:

Q1. Please tell us about further data sources that could be reviewed as part of the site characterisation for each topic?

Q2. Tell us about any other relevant potential impacts for each topic?

Q3. Do you agree with the potential impacts that have been scoped out for each topic? If not, please provide details.

Q4. Have the relevant potential cumulative impacts been identified? If not, please provide details

Q5. Have the relevant potential transboundary impacts been identified? If not, please provide details

Q6. Do you agree that the proposed approach to assessing each impact is appropriate? If not, please provide details.

Q7. Is there any further guidance relating to each topic that we should be aware of? If so, please provide details.

2.2 Marine Geology, Oceanography and Physical Processes

2.2.1 Baseline

2.2.1.1 Data sources

214. The primary sources of information for this section of the Scoping Report are provided by studies undertaken as part of the EIA and subsequent environmental assessment of the construction of TOWF (see Table 2.1).

Table 2.1 Available and planned site-specific hydrodynamics and geomorphology datasets

Data	Coverage	Date
TOWF ES	TOWF, including Offshore Export Cable Corridor	2005
Pre-construction survey	TOWF including Offshore Export Cable Corridor	2007
Post-construction swath bathymetry and side scan sonar	TOWF including Offshore Export Cable Corridor	2012
Post-construction scour survey	TOWF including cable crossings	2012, 2013
Thanet Extension surveys (geophysical and geotechnical)	Area proposed for Thanet Extension – including Wind Farm Area and Offshore Export Cable Corridor	2016/2017

2.2.1.2 Geology and geomorphology

215. The Isle of Thanet is underlain by Upper Chalk, which is a soft white limestone formed in tropical seas and largely composed of the remains of microscopic planktonic algae (Royal Haskoning, 2005). To the north of the Isle of Thanet, it is underlain by deposits of Brickearth, which are largely derived from loamy parent rock of the Thanet Beds. To the west and south of a line from Monkton to Cliffs End, the chalk is in uncomfortable contact with the overlying Thanet Sand Formation, which comprises fine-grained grey and brown sands with local silty clays and abundant marine shells. The Thanet Sand Formation is then itself overlain by alluvial deposits in the old Wantsum Channel and the River Stour floodplain. The geology around the proposed Thanet Extension Wind Farm Area is shown in Figure 2.1.

216. The near surface geology within the proposed Wind Farm Area and Offshore Export Cable Corridor can be divided into three main units:

- Cretaceous chalk bedrock to the south, exposed in places, but dipping towards the north;
- Tertiary units, overlying the chalk, including Thanet Sand, Woolwich Beds and Harwich Formation exposed at the Drill Stone Reef and in several other places across the site; and
- Sand and gravel lag, including deposits in paleo-channels cut into the Tertiary units and chalk

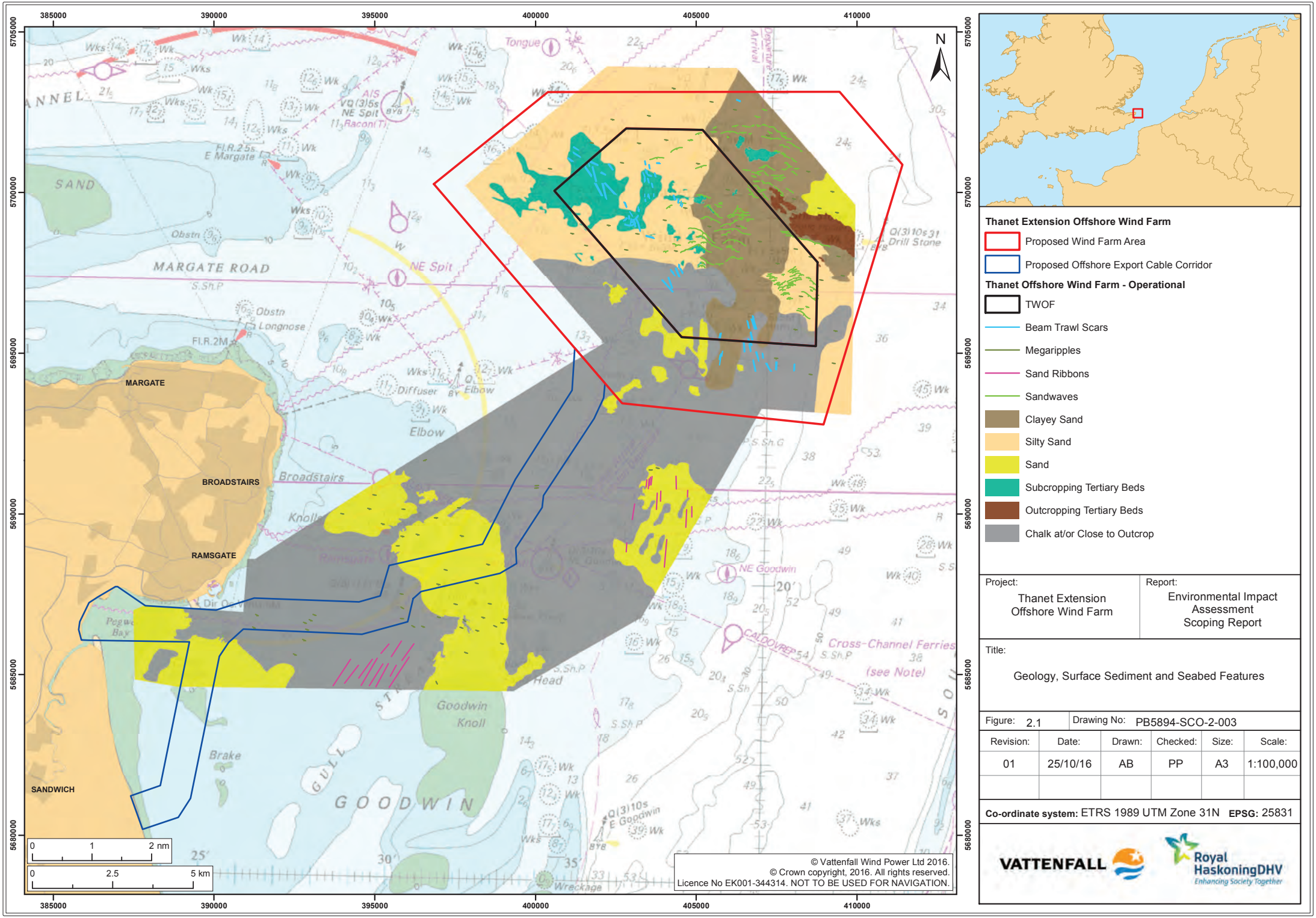
217. The seabed sediment around the proposed Wind Farm Area can be divided into four distinct regions (Royal Haskoning, 2005):

- The southern part of the site comprises chalk bedrock, covered in patches by a veneer of sand, generally less than 1m thick, but with a deeper infilled channel of up to 6m, running south from the centre of the site;

- The western part of the site is characterised by loose, clayey sand with mega-ripples that have wavelengths in the region of 5 – 7m and are less than 1m high. In the middle of this region there is a very thin layer of loose gravely sand overlying the Tertiary beds;
- In the central and northern parts of the site is an area of mega-ripples and 2 – 5m high sand waves, with asymmetry indicating north to south transport. Marine sediment thickness over the Tertiary beds reaches as much as 10m to the north of the site and in occasional pockets elsewhere; and
- The south-eastern part of the site comprises mainly loose silty sand over the Tertiary beds with a further area of 2 – 4m high sand waves.

218. Immediately to the east of TOWF and within the proposed Thanet Extension Wind Farm Area is a sandstone outcrop, known as the Drill Stone Reef, which rises from -24mCD to -13mCD. Along the northeast boundary of the site are further mega-ripples and sand waves of up to 7m in height, and greater depths of marine sand deposits overlying the Tertiary beds, providing a sediment source for southerly transport. The underlying geology of the proposed Offshore Export Cable Corridor comprises chalk, which is exposed over large areas (Royal Haskoning, 2005). The seabed surface conditions are shown in Figure 2.1.

219. Inshore of the proposed Wind Farm Area, the seabed rises gently to the broad, shallow wave-cut chalk platform that extends from North Foreland south to Ramsgate. Further north and west is the complex banks of the outer Thames Estuary, while to the south are the drying banks of the Goodwin Sands. The TOWF export cable runs in a south-westerly direction across the gently rising slope, continuing inshore on a westerly track along the south side of the Ramsgate Harbour channel into Pegwell Bay.



Thanet Extension Offshore Wind Farm

- Proposed Wind Farm Area
- Proposed Offshore Export Cable Corridor

Thanet Offshore Wind Farm - Operational

- TWOF
- Beam Trawl Scars
- Megaripples
- Sand Ribbons
- Sandwaves
- Clayey Sand
- Silty Sand
- Sand
- Subcropping Tertiary Beds
- Outcropping Tertiary Beds
- Chalk at/or Close to Outcrop

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title:

Geology, Surface Sediment and Seabed Features

Figure: 2.1 | Drawing No: PB5894-SCO-2-003

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	25/10/16	AB	PP	A3	1:100,000

Co-ordinate system: ETRS 1989 UTM Zone 31N **EPSG:** 25831

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2.2.1.3 Tidal Currents

220. Tidal currents within TOWF were measured and modelled by HR Wallingford (HR Wallingford, 2002) as part of the TOWF ES (Royal Haskoning, 2005) with results indicating that spring tide currents reached 1.0ms^{-1} within the wind farm and up to 1.6ms^{-1} along the offshore export cable route (HR Wallingford, 2002). Peak tidal velocities are presented in Table 2.2.

Table 2.2 Peak tidal velocities at the TOWF project site (HR Wallingford, 2002)

Current direction		Velocity (ms^{-1})	
State	Direction (°N)	State	Direction (°N)
Flood	189	Flood	189
Ebb	004	Ebb	004

2.2.1.4 Wave Regime

221. The proposed Wind Farm Area is exposed to northerly and easterly waves generated in the North Sea as well as waves generated in the English Channel that can propagate from the south. Wave data from Drill Stone Buoy, located to the east of the proposed Wind Farm Area, indicates a higher frequency of waves of all heights from the north-east quarter and shows larger waves of up to 3.25m significant wave height (Hs) from both the north-east and south-west. However, there is a strong correlation between tidal surges and large wind waves within the southern North Sea and the coincidental occurrence of a surge, causing water levels to be higher than the predicted tidal condition and severe wave conditions can give rise to conditions that have the potential to influence structural design or sediment transport. However, these events are infrequent and are not significant to Thanet Extension.

2.2.1.5 Bedload Sediment and Transport

222. The dominant driver for sediment transport over most of the proposed Wind Farm Area is tidal current; the effects of unbroken waves in the relatively deep water of the site are limited mainly to a stirring effect whereby the entrainment process is enhanced, particularly during periods of higher wave activity (Royal Haskoning, 2005). Wave action can increase the magnitude of the suspended sediment concentration by this process, but the transport pathways are unaltered.

2.2.2 Potential Impacts

2.2.2.1 Potential impacts during construction

223. **Effects to hydrodynamic regime (waves and tidal currents):** Whilst there is potential for the physical presence of construction plant and offshore infrastructure to impact upon the hydrodynamic regime, this impact would increase incrementally as the wind farm is constructed with the greatest potential impacts resulting from the completed wind farm. This impact is therefore covered under 'Potential impacts during operation', below.

224. **Effects on sediments and sedimentary structures**: Construction would not alter the geology of the site, particularly the strata which are below the level at which construction activity would occur. There would, however, be localised effects in the immediate vicinity of the WTG foundations, where construction would be likely to directly impact the seabed and the shallow subsea sediments.

225. **Effects on suspended sediment concentrations and transport**: There would be short-term increases in suspended sediment levels as a result of ground preparation, cable laying and WTG foundation installation. The methods used for installation would affect the amount of sediment which is displaced, but it is considered that the impacts would be localised and not spread at a significant level outside the footprint of the wind farm and therefore not have an impact on morphological conditions. The chalk plume monitoring study undertaken for TOWF (TOWL, 2009) indicated the levels of suspended sediment observed as a result of the cable share plough trial was relatively minor in comparison to the natural background levels of suspended sediment observed at the time of the surveys. Data taken from the Cefas buoy TH01 demonstrated that the period when the plough trial was undertaken had very low levels of background turbidity in comparison to other temporal periods (such as winter) and therefore should any major effect have been observed, it would have been expected to have occurred during this period.

2.2.2.2 Potential impacts during operation

226. Given the proximity of the proposed Wind Farm Area to TOWF impacts during operation will interact and therefore will be considered together for this topic.

227. **Effects to hydrodynamic regime (waves and tidal currents):** Multiple large foundations may increase local drag forces and tidal flows and potentially diffract and scatter waves which could lead to morphological and physical compositional changes at the coast.

228. Evidence gained from monitoring work at operational offshore wind farms demonstrates that impacts on the hydrodynamic regime are restricted to near-field changes only (i.e. close to the structures); far field effects outside other offshore developments (such as at adjacent coastlines) have not been observed. This is supported by Walker and Judd (2010) who reviewed the results of monitoring from several UK offshore wind farm projects and found no evidence of far-field effects. The potential for operational effects on waves and tidal currents will be assessed using expert based assessment.

229. The process of cable laying is short term and temporary and during the operational phase the export cables would be buried beneath the seabed and would have no effect on waves and tidal currents at the coast. Hence, any ongoing processes of coastal erosion or accretion would continue to be controlled by natural processes unaffected by the presence of the Offshore Export Cable.

230. **Effects on sediments and sedimentary structures**: Impacts on sediment transport (through accretion or erosion) have been studied at industry level (ABPmer, 2005) as well as for site specific monitoring studies (Cefas, 2005). Such studies have concluded that minimal impacts can be expected on prevailing sediment transport conditions, both within wind farm sites as well as in the far-field, provided that the foundations are adequately spaced (which would vary depending on the details of the foundations and wind farm layout). Site specific surveys (TOW, 2013) for TOWF comparing pre-construction and post construction conditions have shown the following:

- The size and distribution of sand waves and the sediment types remained constant. The general appearance of the site has remained the same as the pre-construction survey in 2007.
- Sediment boundaries changed slightly at within the TOWF wind farm; however the sediment types remained constant. Overall, the general appearance of the site remained the same as the pre-construction survey.
- Sediment boundaries along the offshore export cable route changed slightly, but general trends along the route remained the same as the pre-construction survey
- Based on survey results the extent of scour was considerably less than the worst case scenario identified in the ES.

231. Impacts on sediments and sedimentary structures will be assessed using well-established empirical methods applied to offshore wind farms elsewhere.

232. **Effects on suspended sediment concentrations and transport**: During the operational phase, there is potential for sediments to be re-suspended by scouring effects. Consideration will be given (using conceptual methods) to likely changes in

suspended sediment concentrations due to scour during both construction and operational phases.

2.2.2.3 Potential impacts during decommissioning

233. The removal of the foundations has the potential to affect hydrodynamic regime, sediments and sedimentary structures, and suspended sediment concentrations and transport. Any impacts arising from decommissioning are likely to be of lower magnitude than those described for construction and embedded mitigation (for example, through management of construction practices or Construction Environment Management Plans) would be in place.

2.2.2.4 Potential cumulative impacts

234. **Interactions with other wind farms**: Monopiles and jacket foundations are not likely to have significant effects on waves, currents or sediment transport, either within the proposed Thanet Extension Wind Farm Area or over a wider area. Coastal process studies and assessments in The Wash (Cefas, 2004) have shown that the cumulative effects of offshore wind farms on waves, currents and sediment transport, both in the near field and far field are not considered significant (Cefas, 2004). Given the distance to other wind farms in the region, it is unlikely that there would be a pathway for cumulative impacts.

235. **Interactions with other activities**: Cumulative impacts upon physical processes may occur between Thanet Extension and other plans or projects in the region. The following activities will be taken into account in the assessment:

- Aggregate extraction and dredging;
- Existing and planned construction of subsea cables and pipelines; and
- Potential port and harbour development.

236. There are a number of telecommunications cables, both in-service and out-of-service within the vicinity of the proposed Wind Farm Area and the proposed Offshore Export Cable Corridor. There is also the planned construction of the consented Nemo Link Belgium to UK interconnector cable with offshore installation on the UK side expected to commence May to September 2017. The TOWF offshore export cable route is across some of these cables, with there being no evidence at present to suggest that any of the existing cables have any ongoing impact on seabed processes. Given this finding, it is assumed that the seabed would only be influenced locally and no widespread impacts would occur.

237. As with the case for other wind farms, it is likely that potential impacts would be highly localised, small scale and temporary with limited potential for interactions between Thanet Extension and other activities.

2.2.2.5 Transboundary impacts

238. Given that the likely hydrodynamic and sedimentary impacts of the proposed Wind Farm Area and proposed Offshore Export Cable Corridor would be restricted to near-field change only, transboundary impacts are unlikely to occur or are unlikely to be significant and therefore the Applicant propose not to consider transboundary impacts for Marine Geology, Oceanography and Physical Processes further during the EIA. This is supported by the post construction monitoring for TOWF (TOWL, 2013a) where no significant difference in the surrounding area was identified.

2.2.2.6 Summary of potential impacts

Table 2.3: Summary of impacts relating to marine geology, oceanography and physical processes (scoped in (✓) and scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Effects to hydrodynamic regime (waves and tidal currents)	×	✓	✓
Effects on sediments and sedimentary structures	✓	✓	✓
Effects on suspended sediment concentrations and transport	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	×	×	×

2.2.3 Mitigation

239. It is expected that the impacts on geology, oceanography and physical processes would be small scale, localised and temporary. If significant impacts are predicted, suitable potential mitigation options would be discussed with the relevant authorities.

2.2.4 Approach to assessment and data gathering

240. The Applicant has commissioned various surveys to develop a more detailed understanding of the seabed conditions within the proposed Wind Farm Area and proposed Offshore Export Cable Corridor. These surveys will be undertaken in 2016/2017, and include:

- Gather accurate bathymetric data for the area;
- Assess topography for areas with steep gradients;

- Provide 'snapshot' data to enable the extent of ongoing movement in seabed sediments to be assessed;
- Collect data concerning variations in thickness and sediment cover of the seabed sediments and shallow geology;
- Provide acoustic sediment type data to inform benthic surveys;
- Production of charts and maps suitable for use on GIS systems, including track plots, bathymetry, seabed features with contacts, relative to LAT;
- Demonstration of interpretability of the Sub-Bottom Profiling seismic data through example interpreted seismic profiles;
- Locate any structural complexities or geohazards within the shallow geological succession, such as faulting, accumulations of shallow gas, buried channels, etc; and
- Chart any obstructions, debris or wrecks such as pipelines, cables, ordnance, etc
- Deploy two Acoustic Wave and Current Devices (AWACs) at locations in close proximity to the proposed wind farm area, and a waverider buoy at one location, to obtain further information on metocean conditions (to inform Front End Engineering, not considered a requirement for EIA though data likely to be used to enhance assessment)

241. Assessment methodologies will be discussed and agreed with the appropriate statutory consultees in accordance with the following guidance documents:

- Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects (Cefas, 2011);
- Coastal Process Modelling for Offshore Windfarm Environmental Impact Assessment (COWRIE, 2009);
- Guidance on Environmental Impact Assessment in Relation to Dredging Applications (Office of the Deputy Prime Minister, 2001); and
- Review of Cabling Techniques and Environmental Effects applicable to the Offshore Windfarm Industry (BERR, 2008).

242. In addition, there are a large number of external sources of data which could be used in describing the baseline and assessing the potential impacts upon physical processes. Such sources of data include metocean surveys commissioned by Vattenfall, wave buoys (e.g. Cefas waveriders) and other data currently acquired via the British Oceanographic Data Centre (BODC).

2.3 Marine Water and Sediment Quality

2.3.1 Baseline

2.3.1.1 Data Sources

243. The primary sources of information for this section of the Scoping Report are provided by studies undertaken as part of the TOWF EIA and publicly available data on relevant receptors (Table 2.4). Water quality receptors in the vicinity of the proposed Wind Farm Area and proposed Offshore Export Cable Corridor are shown in Figure 2.2.

Table 2.4 Data sources for marine and coastal water quality

Data	Coverage	Date
Sediment contaminants	TOWF and export cable corridor and landfall	2005
Bathing water quality	Updated water classifications for Sandwich Bay and Ramsgate	2016
Shellfish waters	Updated classification of Pegwell Bay shellfisheries	2016
Sediment contaminants	Thanet Extension	2016

2.3.1.2 Water Quality

WFD

244. The proposed Wind Farm Area and proposed Offshore Export Cable Corridor lie within the Kent North water body (GB650704510000). For 2015 the water body was classified as having 'Good' chemical status and 'Moderate' ecological status (Environment Agency, 2016d).

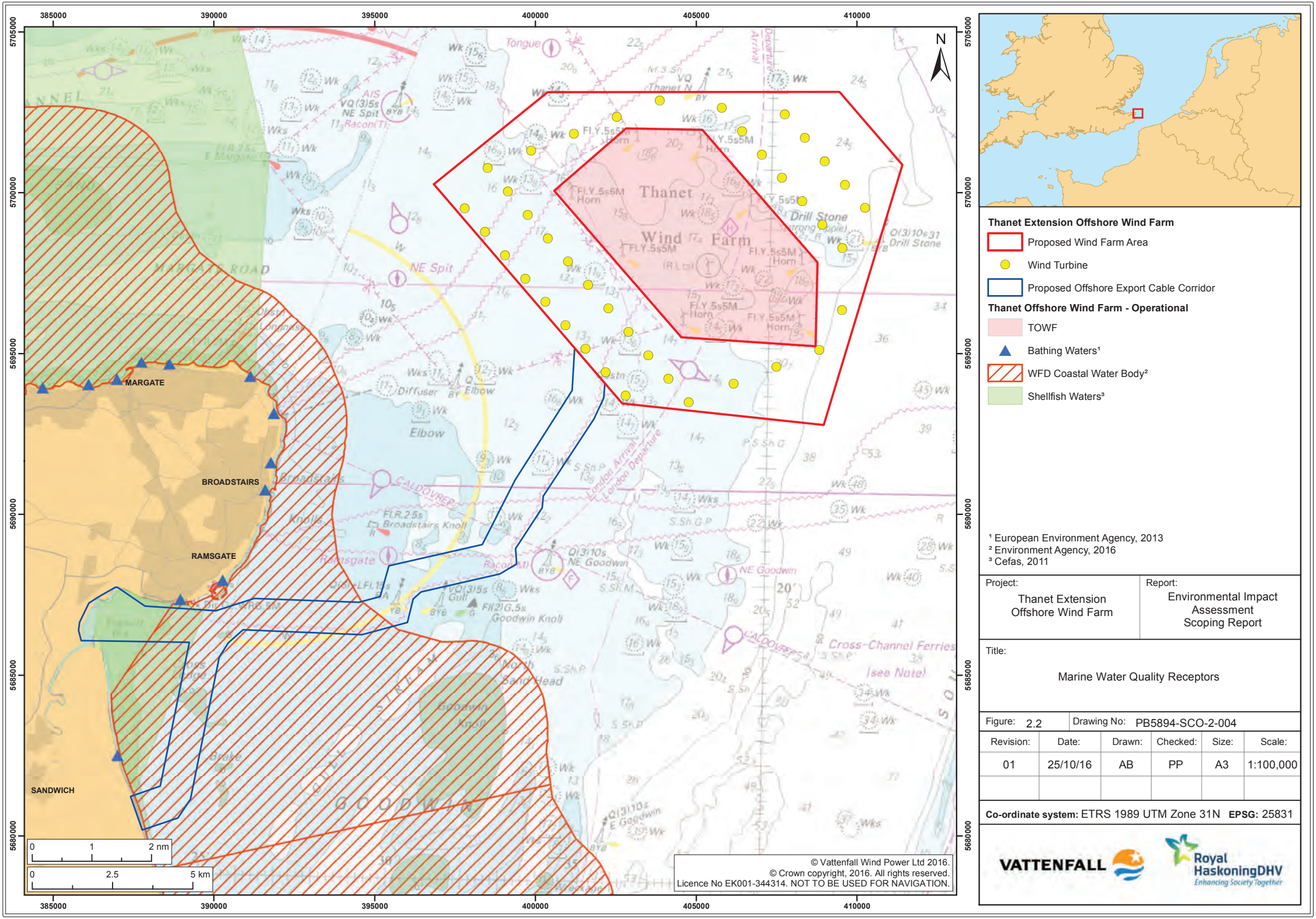
Designated bathing waters

245. There are two designated bathing waters (designated under the revised Bathing Water Directive (2006/7/EC)) within the vicinity of the offshore export cable route for TOWF, these being at Sandwich Bay and Ramsgate (Ramsgate Western Undercliffe). Water quality at designated bathing water sites in England is assessed by the Environment Agency. Annual ratings classify each site as excellent, good, sufficient or poor based on measurements taken over a period of up to four years. The available records for these both these bathing waters show that for the period 2012 – 2015 they have been classified as excellent (Environment Agency, 2016). The Directive protects from faecal pollution in waters used for swimming. This includes pollution from agriculture, misconnections, sewerage and urban drainage. Given

that Thanet Extension would not be a source of this type of pollution, it is considered that no assessment with regard to bathing waters is undertaken.

Designated shellfish waters

246. Shellfish waters protected areas are designated under the WFD with the aim is to protect and improve water quality and support the growth of healthy shellfish (bivalve and gastropod molluscs) and contribute to good quality edible shellfish. There is one designated shellfish water area located within the vicinity of the proposed Offshore Export Cable Corridor, the Stour Estuary site which covers the area from Ramsgate to Sandwich Bay. The location of the designated area is shown in Figure 2.2.



Thanet Extension Offshore Wind Farm

- Proposed Wind Farm Area
- Wind Turbine
- Proposed Offshore Export Cable Corridor

Thanet Offshore Wind Farm - Operational

- TOWF
- Bathing Waters[1]
- WFD Coastal Water Body[2]
- Shellfish Waters[3]

[1] European Environment Agency, 2013
[2] Environment Agency, 2016
[3] Cefas, 2011

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title:

Marine Water Quality Receptors

Figure: 2.2 | Drawing No: PB5894-SCO-2-004

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	25/10/16	AB	PP	A3	1:100,000

Co-ordinate system: ETRS 1989 UTM Zone 31N **EPSG:** 25831

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2.3.1.3 Sediment Quality

247. For the TOWF ES samples were taken from four stations (two intertidal and two subtidal) during the infaunal survey of the offshore cable routes to determine sediment quality. The concentrations of the following determinands were measured:

- A range of metals (including arsenic, copper, cadmium, lead, nickel and iron);
- A range of polyaromatic hydrocarbons (PAHs); and
- A range of polychlorinated biphenyls (PCBs).

248. Following discussion with Cefas, it was concluded that there was no evidence of potential contamination within the TOWF wind farm site boundary and that no specific chemical analysis would be required for this area (Royal Haskoning, 2005).

249. Sediment samples are being taken for ecological assessment of the benthic environment. Following the outcome of consultation with Cefas and the MMO, further analysis for sediment quality may be undertaken.

2.3.2 Potential Impacts

250. The potential for release and dispersion of sediments and any associated contaminants due to construction, operation and decommissioning of Thanet Extension has been informed by a physical processes assessment in Section 2.2 Marine Geology, Oceanography and Physical Processes. The EIA will look at the potential for effects on shellfish waters protected areas and be used to inform the assessments for other receptor topics such and Benthic Ecology, Fish and Shellfish Ecology and Marine Mammal Ecology.

2.3.2.1 Potential impacts during construction

251. **Deterioration in water quality due to increased suspended sediment concentrations:** As discussed in Section 2.2.2, impacts may occur from re-suspension of sediments as a result of construction activities, such as ground preparation, foundation installation, installation of export cables, the placement of scour material on the seabed and construction vessel activity.

252. Closer to the shore, there is potential for cable installation to occur around areas of chalk producing sediment plumes. However, as discussed in Section 2.2.2, as part of TOWF monitoring programme, (TOWL, 2009) field testing was undertaken of the cable installation plough to be used in the chalk bedrock geology that outcrops the seabed throughout much of the study area to monitor the development of dispersion of sediment plumes. The plume was over-flown once a day for the period

that the plume was visible to allow temporal and spatial analysis. The monitoring concluded that the levels of suspended sediment observed as a result of the cable share plough trial appear to be relatively minor in comparison to the natural background levels of suspended sediment observed at the time of the surveys. Therefore, the impact of installing the cables in chalk bedrock or other geological formations in the vicinity of the proposed Wind Farm Area is not anticipated to have a significant impact on water quality.

253. **Release of contaminated sediments:** Royal Haskoning (2005) showed that concentrations of PCBs, PAHs and Tributyltin (TBT) were below the limit of detection for all four sites sampled as an aspect of the TOWF EIA. In addition, to the short duration of the foundation installation and cabling work and the relatively small area over which the monopiles and cables would be installed, the risk of breaching the environmental quality standards is considered to be minimal. The high degree of mixing and dilution associated with the location of the proposed Wind Farm Area would minimise any potential impact.

254. Therefore, given the low background levels and low risk of release from construction activities, it is suggested that, subject to consultation with relevant consultees (i.e. Cefas and Natural England) and feedback from this Scoping Report and results of sediment contamination analysis (should it be required), this impact will be scoped out from further consideration within the EIA.

255. Note that the potential for release of contaminated sediments from the former hoverport in Pegwell Bay is discussed in Section 3.4.

256. **Spillage of contaminants**: Vattenfall is committed to the use of best practice techniques and procedures throughout all construction, O&M activities. This commitment ensures the use of appropriate preventative measures and serves as an embedded mitigation against all types of pollution incidence. For instance, all vessels involved in the construction, maintenance and decommissioning of the wind farm would comply with the International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78, specifically:

- Annex I Regulations for the prevention of pollution by oil – concerning machine waters, bilge waters and deck drainage; and
- Annex IV Regulations for the prevention of pollution by sewage from ships – concerning black and grey waters.

257. Given that these standard procedures would be followed to avoid or mitigate any impact, it is suggested that, subject to consultation with relevant consultees (i.e. Cefas and Natural England) and feedback from this Scoping Report, this impact will be scoped out from further consideration within the EIA.

2.3.2.2 Potential impacts during operation

258. **Deterioration in water quality due to increased suspended sediment concentrations**: The localised changes in the tidal and wave regimes around each foundation structure have the potential to result in localised scour of the sea bed. As this effect would be highly localised it is not expected that there would be any significant change to water quality and so the Applicant proposes that this impact will be scoped out from further consideration within the EIA.

259. **Release of contaminated sediments:** Given that the volume suspended sediment released during operation via scour would be much lower than during construction, it is suggested that this impact will be scoped out from further consideration within the EIA.

260. **Accidental release of contaminants:** As per construction, the Applicant is committed to the use of best practice techniques throughout the project life to avoid spillages during maintenance operations and therefore subject to consultation with relevant consultees (i.e. Cefas and Natural England) and feedback from this Scoping Report, this impact will be scoped out from further consideration within the EIA.

2.3.2.3 Potential impacts during decommissioning

261. During decommissioning, the foundation structures would be removed which is likely to result in disturbance to sediments. Any impacts are anticipated to be similar to those outlined during the construction phase and are unlikely to be significant.

2.3.2.4 Potential cumulative impacts

262. **Interactions with other wind farms or activities:** Considering the relatively low levels of potential contaminants within the sediments and given that any re-suspension of sediment is likely to be highly localised, no cumulative impacts are anticipated with other wind farms or other activities in the region. It is suggested that this impact will be scoped out from further consideration within the EIA.

2.3.2.5 Transboundary impacts

263. As with Marine Geology, Oceanography and Physical Processes (Section 2.2), due to the localised nature of any potential impacts, transboundary impacts are unlikely to occur and therefore it is suggested that this impact will be scoped out from further consideration within the EIA.

2.3.2.6 Summary of potential impacts

Table 2.5 Summary of impacts relating to marine water and sediment quality (scoped in (✓) and scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Deterioration in water quality due to re-suspension of sediments	✓	×	✓
Release of contaminated sediments	×	×	×
Accidental release of contaminants	×	×	×
Cumulative impacts	×	×	×
Transboundary impacts	×	×	×

2.3.3 Mitigation

264. Embedded mitigation in the form of adherence to the relevant MARPOL standards listed above would prevent potential impacts from spillages.

2.3.4 Approach to assessment and data gathering

265. A desk-based assessment of the water quality will be undertaken to find the most recent data and standards for the area. Data will be requested from Cefas and other potential sources of water quality information used, where necessary.

266. The approach proposed for assessing the potential effects on water quality arising from Thanet Extension will involve the comparison of predicted changes in water quality parameters with the standards within the various applicable EC Directives.

2.4 Offshore Air Quality

2.4.1 Baseline

267. The main likely source of atmospheric emissions in the offshore project area is from exhaust emissions from shipping. The main pollutants are sulphur dioxide (SO_2), nitrogen oxides (NO_X) and particulate matter (PM). The application of a sulphur emission control area in the North Sea, implemented at the end of 2007, has led to a significant reduction (20.3%) in the output of SO_2 (DEFRA, 2015). NOx emissions are falling more slowly (8.4%) (DEFRA, 2015). Targets set by the UK government under Directive 2001/81/EC on National Emission Ceilings are being achieved (NAEI, 2015).

2.4.2 Potential Impacts

268. Engine exhausts from construction, O&M and decommissioning vessels would contribute, at a small scale, to atmospheric emissions from existing shipping traffic. The number of vessels (up to approximately 12 for short periods during construction) and the associated atmospheric emissions would be small in comparison to the total shipping in the southern North Sea. Marine exhaust emissions are limited in line with the provisions of MARPOL Annex VI (MARPOL, 2016).

269. Given the likely negligible increases of air pollutants on site and the distance from any shore-based receptors, it is proposed that that all offshore air quality impacts should be scoped out from further consideration within the EIA. Summary of potential impacts

Table2.6 Summary of impacts relating to air quality (scoped in (✓) and scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Impacts on offshore air quality	x	x	x

2.5 Benthic and Intertidal Ecology

2.5.1 Baseline

2.5.1.1 Data Sources

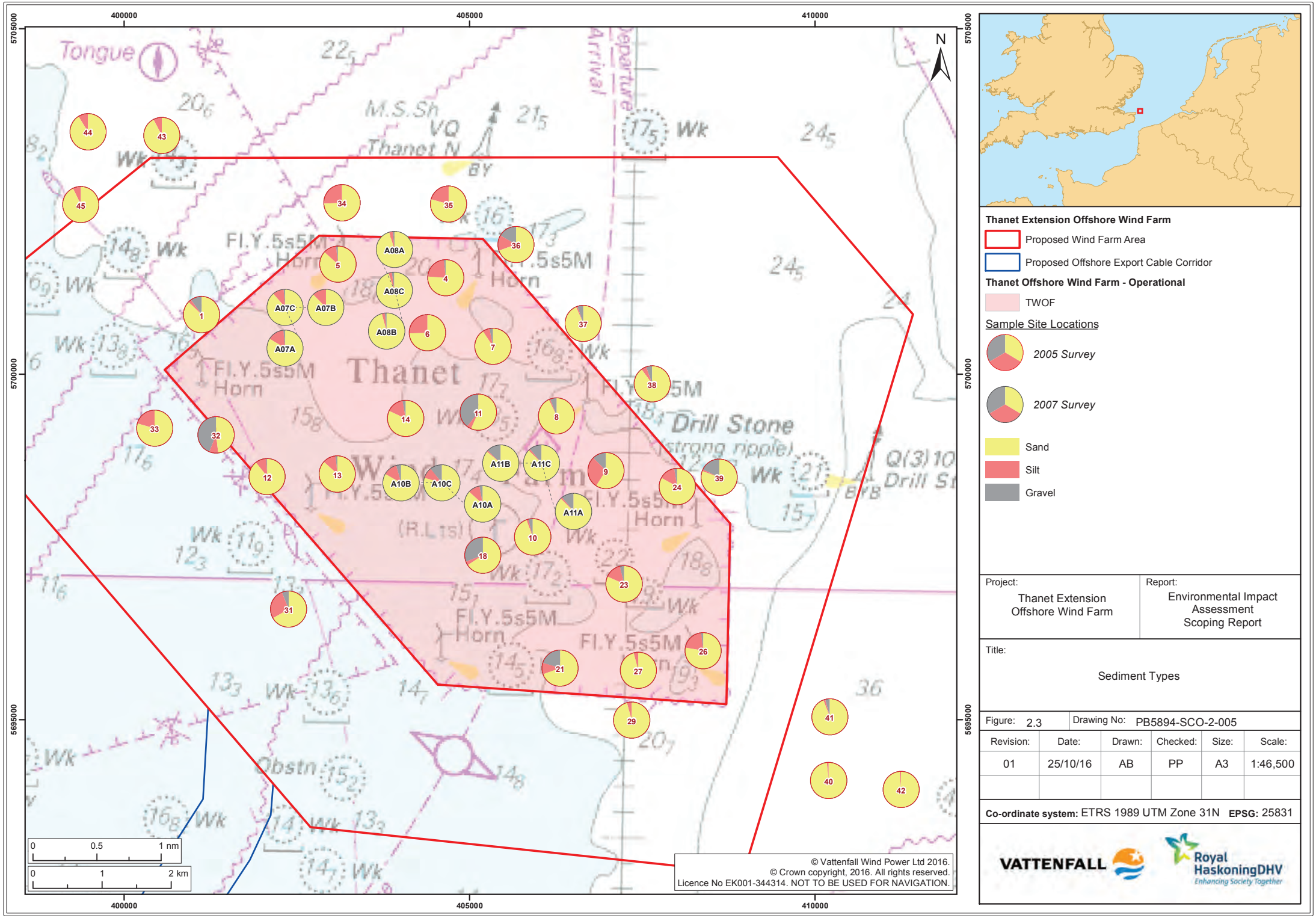
270. The primary sources of information for this section of the Scoping Report are provided by studies undertaken as part of the environmental assessment of the construction of TOWF.

271. Pre-construction baseline surveys of the benthic environment were undertaken for TOWF between May and August 2005 and included; a quantitative survey of the benthic infauna inhabiting the sediments within, and surrounding, a survey of the intertidal communities and habitats within Pegwell Bay, and a survey of the nature and distribution of Ross worm *Sabellaria spinulosa* communities in the survey area using a combination of high-resolution side scan sonar and seabed camera imagery.

272. These surveys were followed up with further pre-construction surveys in 2007 which looked at the benthic biological resources to determine the nature and extent of *S. spinulosa* communities within the TOWF site and the suitability of the sediments within Herne Bay (approximately 30km west of the TOWF site) for herring spawning. The surveys comprised of grab sampling and drop down camera work in triplicate within the TOWF site to supplement the information gained from the 2005 baseline survey. Planned survey locations for the 2016 survey are shown in Figure 2.3

Table 2.7 Available and planned site-specific benthic datasets

Data	Coverage	Date
TOWF pre-construction benthic and intertidal resource survey including *S. spinulosa* distribution survey	TOWF and export cable corridor	May – August 2005
TOWF pre-construction benthic and conservation resources survey	TOWF and export cable corridor	Oct – Nov 2007
TOWF post-construction benthic resources survey	TOWF and export cable corridor	Apr – Sept 2012
Thanet Extension Benthic survey	Proposed Wind Farm Area and proposed Offshore Export Cable Corridor	2016
National Biodiversity Network (NBN) gateway	Kent coast	collation of various data sources
Marine Life Information Network (MarLIN)	UK species information	collation of various data sources
UKSeamap 2010 Interactive Map	UK	collation of various data sources up to 2010
European Marine Observation and Data Network (EMODnet) Seabed Habitats	Europe	2004-2014



Thanet Extension Offshore Wind Farm

Proposed Wind Farm Area

Proposed Offshore Export Cable Corridor

Thanet Offshore Wind Farm - Operational

TWOF

Sample Site Locations

2005 Survey

2007 Survey

Sand

Silt

Gravel

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title: Sediment Types

Figure: 2.3 Drawing No: PB5894-SCO-2-005

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	25/10/16	AB	PP	A3	1:46,500

Co-ordinate system: ETRS 1989 UTM Zone 31N **EPSG:** 25831

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2.5.1.2 Sediment types

273. The post-construction monitoring program (TOWL, 2013a) has shown that the sediments within TOWF comprise a mixture of coarse sands, fine sands and cobbles, with bedrock outcrop within the central-southern portion of the site. The organic content of these sediments varied between <0.20% and 1.50%, representing low to moderate levels (Marine Ecological Surveys Ltd (MESL), 2013). An analysis of similarity (ANOSIM) test was carried out on the combined 2005 and 2007 PSD data compared with the 2012 particle size distribution (PSD) dataset. The results indicated that there was no overall significant difference in the data between these years (TOWL, 2013a).

274. In Pegwell Bay the intertidal sediments are distinctly defined as well sorted fine sands with coarse sediments along the TOWF offshore export cable route (Gardline Environmental, 2007).

275. Sediment types across the proposed Wind Farm Area and proposed Offshore Export Cable Corridor are shown in Figure 2.3.

2.5.1.3 Infauna

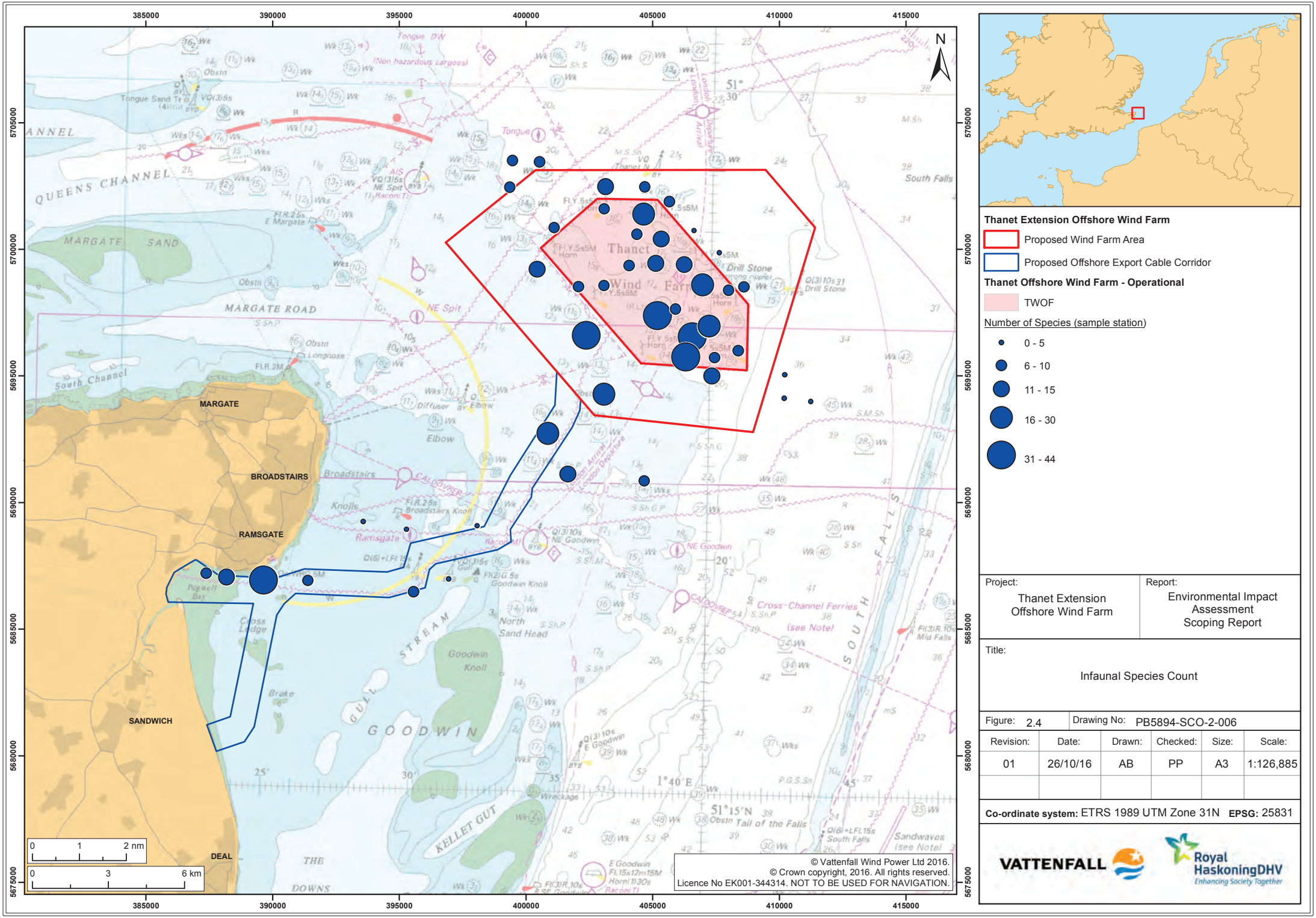
276. A wide range of benthic invertebrate species have been recorded at the site with a total of 264 species identified in the TOWF post construction monitoring surveys communities (TOWL, 2013a). Analysis of the benthic communities recorded in the post construction monitoring surveys at the TOWF site distinguishes 4 infaunal communities (TOWL, 2013a):

- Faunal Group A, occurring at 6 sampling stations and predominantly located towards the north of the site. This is the second most diverse group recorded consisting of 37 taxa. Characterising fauna of this group included: *Ophelia borealis*; *Spiophanes bombyx, Abra alba, Kurtiella bidentate* and *Owenia fusiformis*.
- Faunal Group B, occurring at 4 sampling stations across the site. This is the most diverse group recorded consisting of 44 taxa. Key characterising fauna of Group B include: *Pisidia longicornis* and *S. spinulosa.*
- Faunal Group C, occurring at 2 sampling stations towards the south east of the site. This is the least diverse group, consisting of 5 taxa. Key characterising fauna of Group C include: *Urothoe brevicornis* and *Mytilidae.*
- Faunal Group D, occurring at 4 stations within the central portion of the site. This group consisted of of 18 taxa. Key species include: *Ophelia borealis, Spiophanes bombyx* and *Mytilidae*.

277. Statistically significant differences were detected between benthic communities pre- and post-construction. However this is largely expected of benthic communities,

since similar changes were found at the five reference stations. It is most likely that the changes observed are a factor of natural variation (TOWL, 2013a).

278. Infaunal species numbers across the proposed Wind Farm Area and proposed Export Cable Corridor are shown in Figure 2.4



Thanet Extension Offshore Wind Farm

Proposed Wind Farm Area

Proposed Offshore Export Cable Corridor

Thanet Offshore Wind Farm - Operational

TWOF

Number of Species (sample station)

- 0 - 5
- 6 - 10
- 11 - 15
- 16 - 30
- 31 - 44

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title:

Infaunal Species Count

Figure: 2.4 | Drawing No: PB5894-SCO-2-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	26/10/16	AB	PP	A3	1:126,885

Co-ordinate system: ETRS 1989 UTM Zone 31N **EPSG:** 25831

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2.5.1.4 Epifauna

279. The most abundant epifauna recorded in the grab sampling was the long clawed porcelain crab *Pisidia longicornis* as well as *S. spinulosa*. Elasmobranch and adult and juvenile fish surveys were also undertaken as part of the pre and post construction monitoring for TOWF. The findings from this survey work are presented in Section 2.7 Fish and Shellfish Ecology.

2.5.1.5 Annex 1 Habitats

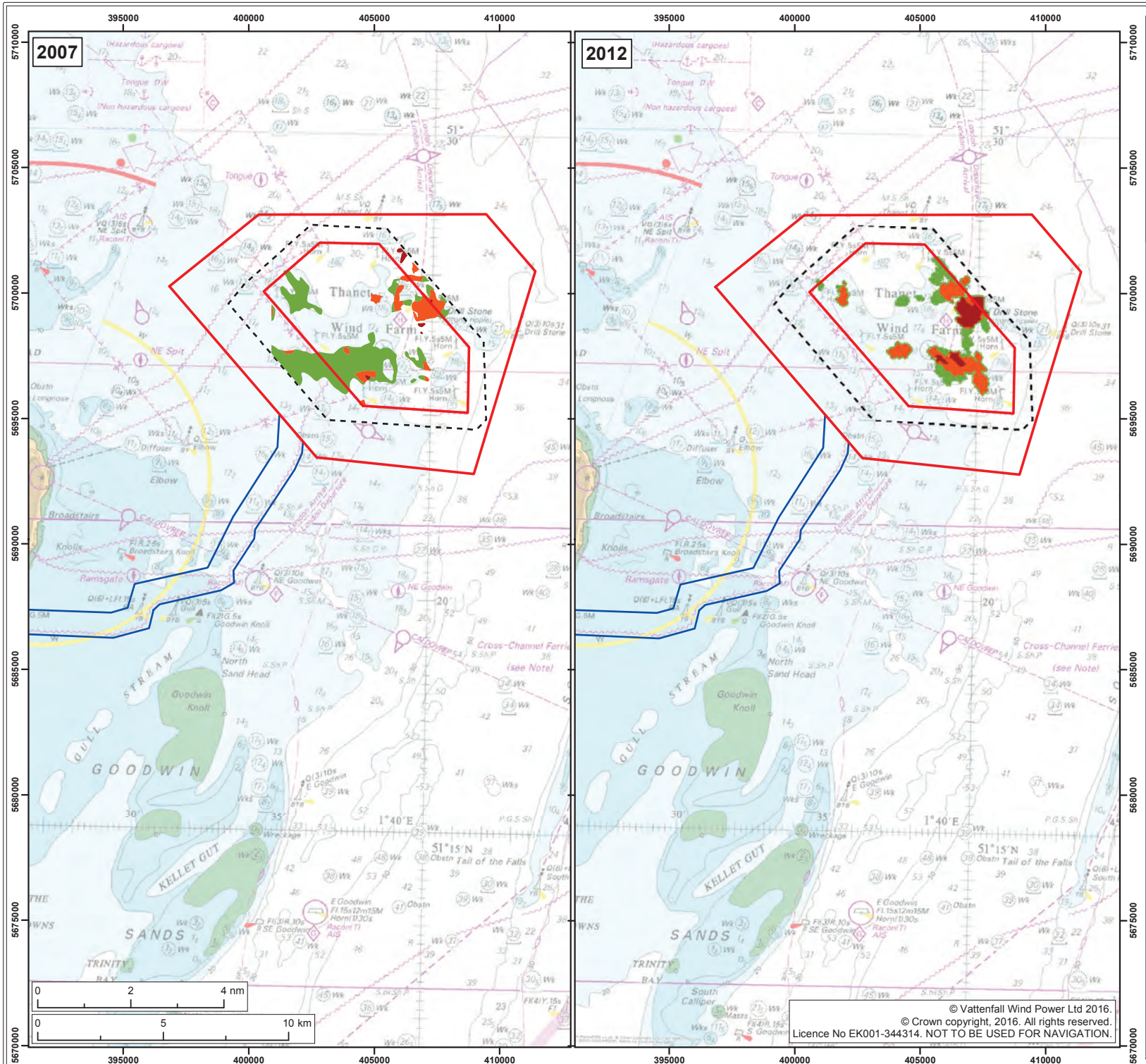
280. During the environmental characterisation surveys and pre-construction benthic surveys of 2005 and 2007 respectively, large aggregations of *S. spinulosa* were identified within the TOWF site. These surveys informed the micro-siting of WTGs and cables within the TOWF site during the construction phase of the wind farm to prevent any damage to the reef habitat.

281. Post-construction, a further geophysical survey using side scan sonar (SSS) was used to identify potential reef assessment stations. The 2012 side scan sonar and seabed imagery found *S. spinulosa* to be present over a large portion of the TOWF site (approximately 16% of the SSS survey area). Regions of dense growth that constituted reef were located to the eastern and central-southern regions of the TOWF site. Areas of sparse and patchy growth were found towards the north-west and central-west portions of the TOWF site as well as surrounding areas of dense reef growth (MESL, 2013).

282. In 2012, there was a wider distribution of *S. spinulosa* aggregation categorised as moderate (patchy) growth and dense growth as compared with earlier survey. In 2012, less signs of damage (e.g. rubble and scars) to the *S. spinulosa* aggregations were recorded when compared with the 2005 and 2007 data (MESL, 2013). It is assumed that the positive growth and stable *S. spinulosa* reef aggregations found across the TOWF site in the 2012 survey may be partially attributed to the reduction in destructive bottom fishing activities as a result of the presence of the offshore wind farm and associated cable infrastructure (MESL, 2013).

283. There has been no recorded evidence of damage to *S. spinulosa* aggregations from construction or operational activities associated with the development of the offshore wind farm. The data shows that although the *S. spinulosa* reef aggregations have migrated within the site, the positive growth and increase in dense and moderate aggregations of *S. spinulosa* in 2012 compared with 2005 and 2007 suggests there has been no detrimental impact caused by the construction of the wind farm.

284. *S. spinulosa* distribution in 2007 and 2012 in the TOWF site are shown in in Figure 2.5



Thanet Extension Offshore Wind Farm

- Proposed Wind Farm Area
- Proposed Offshore Export Cable Corridor
- Sabellaria spinulosa Survey Coverage

Sabellaria spinulosa[1]

- Sparse Sabellaria Region
- Moderate Sabellaria Region
- Dense Sabellaria Region

[1]MESL, 2012 & 2007

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title: *Sabellaria Spinulosa* Distribution: Comparison between 2007 & 2012

Figure: 2.5 | Drawing No: PB5894-SCO-2-007

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	26/10/16	AB	PP	A3	1:150,000

Co-ordinate system: ETRS 1989 UTM Zone 31N **EPSG:** 25831

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2.5.1.6 UK Post-2010 Biodiversity Framework

285. The UK Post-2010 Biodiversity Framework, published in July 2012, succeeded the UK Biodiversity Action Plan (BAP) and 'Conserving Biodiversity – the UK Approach'. The Biodiversity Framework is now focussed at country-level rather than a UK-level to demonstrate how the work of the four countries and the UK contributes to achieving those targets (JNCC, 2015). Priority species and habitats that were identified under the UK BAP remain important and are now referred to as habitats and species of principal importance.

286. The following habitats of principal importance are present in the area:

- Mud habitats;
- *S. spinulosa* reefs;
- Subtidal sands and gravels;
- Subtidal chalk;
- Peat and clay exposures; and,
- Coastal vegetated shingle.

287. The intertidal area of Pegwell Bay is characterised by muddy sandflats. The flats are dominated by the polychaete worms *Lanice conchilega* and *Arenicola marina*, and also support populations of bivalve molluscs such as edible cockle *Cerastoderma edule* and Baltic tellin *Macoma balthica*. The foreshore comprises a length of wave-cut chalk platform, fronting the chalk cliffs between Ramsgate and Cliffs End, and areas of *Spartina* saltmarsh either side of the disused hoverport. The Pegwell Bay landfall option is within the boundaries of the Sandwich Bay to Hacklinge Marshes SSSI, the Sandwich Bay SAC and the Thanet Coast and Sandwich Bay SPA and Ramsar site. It is also within the Sandwich and Pegwell Bay National Nature Reserve (NNR) (see Section 2.15 Offshore Designated Sites).

288. The intertidal area of Sandwich Bay is characterised by mudflats which are exposed at low tide along the foreshore and overlain with a shingle beach backshore. The shingle beach is recorded as supporting vegetated shingle habitat. The Sandwich Bay landfall option is within the boundaries of the Sandwich Bay to Hacklinge Marshes SSSI and the Sandwich Bay SPA and Ramsar site (see Section 2.15 Offshore Designated Sites).

2.5.2 Potential Impacts

289. A range of potential impacts on benthic ecology may occur during the construction, operation and decommissioning of Thanet Extension. Sensitivities of the benthic communities will be judged for each of these impacts on the basis of expert

judgement and reference to Marine Evidence-based Sensitivity Assessments (MarESA) available on the Marine Life Information Network (MarLIN) website[6].

2.5.2.1 Potential impacts during construction

290. **Physical disturbance:** There is potential for direct physical disturbance of the seabed during foundation and cable installation from jack-up vessel legs, piling seabed preparation (dredging) and cable installation. Areas affected by jack-up operations and cable installation would be relatively small and seabed recovery is expected quickly following cessation of installation activities given tolerance and recoverability of the communities present.

291. **Increased suspended sediments:** The installation of foundations and offshore cables may cause an increase of suspended sediment concentrations within the water column. Such concentrations have the potential to affect benthos through blockage of filter feeders and / or smothering sessile species.

292. **Smothering:** Sediment disturbance from construction activities, such as cable and foundation installation could have an adverse and indirect impact on the benthic communities through increased turbidity or as a result of smothering from deposition. However, given the substrate at the site and the existing dynamic conditions, it is likely that the communities are habituated to smothering from natural events and therefore have some tolerance. Evidence suggests that this is the case given the dominant species and communities detailed above.

293. **Changes to water quality:** Sediment disturbance could lead to the mobilisation of contaminants that could be harmful to the benthos. However, based upon the known levels of contaminants at the site (see Section 2.3 Marine Water and Sediment Quality) it is unlikely that there would be any risk from this impact. Vattenfall is committed to the use of best practice techniques and procedures throughout all construction, O&M activities with regard to the handling of materials and chemicals, which would avoid impact. Therefore, it is suggested that, subject to consultation with relevant consultees (i.e. Cefas and Natural England) and feedback from this Scoping Report, impacts from both resuspended contaminants and spillages will be scoped out from further consideration within the EIA.

294. **Underwater noise and vibration:** Research into the effects of underwater noise upon benthos is ongoing. However it is likely that there is habituation to noise created by the existing shipping which occurs in the area (See Section 2.10 Shipping and Navigation). There may be reactions from some benthic species to episodic noise such as that from pile driving (Lovell J.M., 2005) (Heinisch and Weise., 1987).

[6] http://www.marlin.ac.uk/

However any impact is likely to be localised and temporary (i.e. occurring only during piling). We therefore propose to scope this out of further assessment.

295. **Loss of habitat:** The installation of WTG foundations would result in a permanent loss of the existing seabed habitat. The WTG foundations would eventually be colonised however the habitats created are likely to be slightly different to those lost. As the loss of habitat is an on-going impact this is considered under operation rather than construction to avoid double counting.

296. **Potential impacts on sites of Marine Conservation Interest:** The proposed Wind Farm Area is outside of any designated marine sites and partially within the Harbour Porpoise Possible SAC (pSAC). The proposed Offshore Export cable Corridor passes through the Thanet Coast and Sandwich Bay SPA and Ramsar site, the Sandwich Bay SAC and the Sandwich Bay to Hacklinge Marshes SSSI. The potential impact on the designated features of these sites would be dependent on the choice of the final landfall option and will be further assessed within the EIA. The coastal and marine designations are discussed in full in Section 2.15 Offshore Designated Sites Summary.

2.5.2.2 Potential impacts during operation

297. **Physical disturbance:** There is potential for physical disturbance of the seabed from jack-up vessel legs during planned maintenance or, in the case of a cable failure, excavation of cables. In general, the impacts from planned maintenance should be temporary, localised and small scale and overall there would be less impact than during construction.

298. **Smothering:** Small volumes of sediment could be re-suspended during maintenance activities; the volumes would be lower than for construction. As discussed above, it is not expected that there would be significant smothering effects.

299. **Changes to water quality:** As per construction, it is suggested that impacts from both re-suspended contaminants and spillages will be scoped out from further consideration within the EIA.

300. **Underwater noise and vibration:** Noise and vibration generated by the operational turbines can be conducted through the tower and foundations into the water. Monitoring studies of underwater noise from operational turbines have shown the noise levels from North Hoyle, Scroby Sands, Kentish Flats and Barrow wind farms to be only marginally above ambient noise levels. There is no evidence to suggest this low level of noise and vibration has a significant impact on benthic ecology, therefore it is proposed that this impact is scoped out of the EIA.

301. **Loss of habitat:** The presence of foundations on the seabed would result in a relatively small footprint of lost habitat in the context of the habitat available in the proposed Thanet Extension Wind Farm Area and surrounding region. There is likely to be some loss of habitat over time associated with scour around foundations, which would also represent a small footprint. Given the results of the monitoring for *S. spinulosa* (see section 2.5.1.7) it is considered unlikely that construction of the Thanet Extension would adversely affect the distribution or abundance of this species.

302. **Colonisation of foundations:** The sub-sea structures (foundations and scour protection) are expected to be colonised by a range of species leading to a localised increase in biodiversity. The presence of the structures would also provide habitat for mobile species and for example serving as a refuge for fish. Although potentially viewed as a positive effect, this represents a change from the baseline ecology and may also increase the potential for colonisation by non-native species. Overall, the area available for colonisation would be low and to date there is no evidence of a clear 'reef effect' (Lindeboom, 2011) or significant changes of the seabed beyond the vicinity of the structures themselves.

303. **Potential impacts on sites of Marine Conservation Interest:** As discussed in paragraph 289 above, the Thanet Extension export cables may affect several designated sites due to the proximity of the proposed Offshore Export Cable Corridor to the sites. The impacts described above will be considered in relation to the conservation objectives, sensitivities of the Annex I and II habitats and species and the habitats and species of conservation importance.

304. **Electromagnetic fields (EMF):** EMFs as a result of the presence of offshore cables may be detected by some benthic species. Effects are likely to be highly localised, as EMFs are strongly attenuated and decrease as an inverse square of distance from the cable (Gill, 2010). Bochert & Zettler (2006) report that the brown shrimp *Crangon crangon,* common starfish *Asterias rubens* and polychaete worm *Nereis diversicolor* (also known as *Hediste diversicolor)* do not react when exposed to EMF. Gibb *et al.* (Gibb, 2014) state there is no evidence of EMF impacting *S. spinulosa.* It is proposed that the impact of EMF on benthic species and habitats is scoped out of the EIA due to the lack of evidence to suggest there is potential for an impact. The impacts of EMF on fish and shellfish are considered separately in Section 2.6 Fish and Shellfish Ecology.

2.5.2.3 Potential impacts during decommissioning

305. The potential impacts arising during the decommissioning phase are envisaged to be similar to those described for the construction phase. There will be an additional loss of habitat from the colonised foundations of the WTG.

2.5.2.4 Potential cumulative impacts

306. **Wind farms:** Potential cumulative impacts with the TOWF could occur and this will be fully assessed within the ES. Given the predicted localised nature of potential impacts and the distance to other planned offshore wind farms, there is unlikely to be significant overlap in impact zones during construction of other offshore windfarms and Thanet Extension.

307. Although there would be an aggregated direct and permanent loss of habitat during the operational phase of the wind farm it is anticipated that, given the recoverability of the species found in the proposed Wind Farm Area and proposed Offshore Export Cable Corridor as well as across the Thames Estuary region and wider southern North Sea, cumulative impacts would not be considered significant. If the situation were to arise where a number of export cables were to be under construction concurrently, there may be potential for cumulative impacts to arise however these are not expected to be significant.

308. **Other activities:** There is the potential for cumulative impacts from other activities occurring in the region, these include aggregate dredging, shipping and O&G exploration and development and subsea cabling. The Belgium to UK interconnector cable, Nemo Link, is consented and is sited in the vicinity of the proposed Offshore Export Cable Corridor. The cable landfall is at Pegwell Bay and there could be a cumulative impact with the Thanet Extension Option 1 landfall at Pegwell Bay if this option is taken forward. Whilst it is not considered likely that there would be significant cumulative impacts, all potential impacts (i.e. those listed for Thanet Extension in isolation) will be assessed as part of the EIA.

309. **Transboundary impacts**: Similarly to the general case with cumulative impacts, the localised and small scale nature of the impacts on the benthos and the distance to the other planned and proposed wind farm projects means that significant transboundary impacts are unlikely. The Applicant therefore proposes that transboundary benthic impacts should be scoped out from further consideration within the EIA.

2.5.2.5 Summary of potential impacts

Table 2.8 Summary of impacts relating to benthic and intertidal ecology (scoped in (✓) and scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Physical disturbance	✓	✓	✓
Increased suspended sediments	✓	✓	✓
Smothering	✓	✓	✓
Changes to water quality	×	×	×
Underwater noise and vibration	×	×	×
Loss of habitat	×	✓	✓
Colonisation of foundations	×	✓	×
Sites of Marine Conservation Interest	✓	✓	✓
EMF	×	×	×
Cumulative impacts	✓	✓	✓
Transboundary impacts	×	×	×

2.5.3 Mitigation

310. It is expected that the impacts upon the benthos would be small scale, localised and temporary. It is not considered that there are any highly sensitive receptors within the benthic communities. With the presence of *S. spinulosa* in the proposed Wind Farm Area infrastructure would be micro-sited to avoid potential impacts.

2.5.4 Approach to assessment and data gathering

311. Additional data will be collected to add to the already extensive data available for the site. These additional data will include:

- Up to thirty seven camera drop stations positioned in order to allow ground-truthing of main areas of potential biogenic reef and coarser seabed habitats. These locations will be determined by analysing the geophysical data;
- Up to seventeen indicative borehole/vibrocore locations (12 in the proposed Wind Farm Area and 5 on the proposed Offshore Export Cable Corridor), and an additional 12 grab locations placed on areas anticipated to be primarily sedimentary for the determination of biotopes; and,
- Epifaunal surveys which will be based on the camera drop down as well as findings from the beam trawl surveys for fish.

2.6 Fish and Shellfish Ecology

2.6.1 Baseline

2.6.1.1 Data sources

312. Given that fish are mobile, data sets with large scale coverage are particularly relevant and useful for characterising the community. A key data source is fisheries landings data; these provide information on large scale spatial coverage and fishing effort, although the data have some limitations (i.e. they will be skewed towards commercial species with many non-commercial species being discarded at sea). Pre and post construction monitoring surveys for fish were undertaken for TOWF. The reports from these surveys provide valuable data and understanding of the potential impacts of wind farm construction and operation on fish species within the proposed Thanet Extension Offshore Wind Farm Area. The available environmental datasets upon which this section is based are listed in Table 2.9.

Table 2.9 Available fish datasets

Data	Coverage	Date
Site Specific – TOWF pre-construction survey: spring adult fish survey	TOWF + buffer and offshore export cable corridor	April 2005
Site Specific – TOWF pre-construction survey: summer adult fish survey	TOWF + buffer and offshore export cable corridor	July 2005
Site Specific – TOWF pre construction survey: autumn elasmobranch fish survey	TOWF + buffer and offshore export cable corridor	October 2007
Site Specific – TOWF pre construction survey: summer elasmobranch fish survey	TOWF + buffer and offshore export cable corridor	August 2008
Site Specific – TOWF pre-construction: Thanet herring spawning survey	TOWF + buffer and offshore export cable corridor	August 2008
Site Specific - TOWF post-construction survey: fish and epi-benthic (spring)	TOWF + buffer and offshore export cable corridor	April 2012
Site Specific - TOWF post-construction survey: fish and epi-benthic (spring)	TOWF + buffer and offshore export cable corridor	July 2012
Site Specific – Thanet Extension fish ecology surveys	Proposed Thanet Extension Wind Farm Area and proposed Offshore Export Cable Corridor	2016
Landings data (MMO)	ICES Rectangles, 34F1, 34F2, 34F3, and 35F2	2008 - 2014
International Bottom Trawl Survey (IBTS) CPUE (ICES)	ICES Rectangles, 34F1, 34F2, 34F3, and 35F2	2011 – 2016
Spawning and nursery grounds (Coull *et al.*, 1998)	North Sea	-

Data	Coverage	Date
Spawning and nursery grounds (Ellis, 2012)	North Sea	-

2.6.1.2 Surveys

313. The adult fish surveys undertaken for TOWF ES (TOWL, 2005a) indicated that the number of species caught at the site were low in comparison to other Thames Estuary offshore wind farm sites, and no species of national or local conservation importance or species designated by the Bern convention (1979) were caught. The most prevalent species caught overall were lesser spotted dogfish *Scyliohinus canicula*, plaice *Pleuronectes platessa* and dabs *Limanda limanda*. In the spring surveys at the TOWF site, there were higher catch rates of lesser spotted dogfish and dabs, and in the summer surveys there were higher catch rates of plaice, bib *Trisopterus luscus*, Dover sole *Solea solea* and lemon sole *Microstomus kitt*. Only moderate numbers of Dover sole were caught and this is the principal species targeted by locally based vessels. Herring *Clupea harengus* and cod *Gadus morhua* are not targeted by the local fishing fleet, although neither of these species featured strongly in the survey catches.

314. The post construction monitoring surveys replicated the pre-construction work. Fourteen species were identified from the otter trawl sampling. The most prevalent species were lesser spotted dogfish, dab and plaice. This was unchanged from that found during the pre-construction surveys. Overall, species diversity remained moderately consistent between the pre and post construction surveys, potentially suggesting that the operational wind farm did not adversely affect localised fish populations.

315. The total catch rates recorded at the control stations were of similar levels in the pre- and post-construction surveys, whereas within the wind farm the total catch rates were higher post-construction. The highest total catch rate in the wind farm was recorded in the spring 2012 survey where large numbers of lesser spotted dogfish and thornback ray *Raja clavata* were found.

2.6.1.3 Elasmobranchs

316. Specific elasmobranch surveys undertaken for the TOWF pre-construction monitoring in October 2007 and August 2008. In total seven species of elasmobranch were found at the windfarm site; starry smooth-hound *Mustelus asterias*, thornback ray, lesser spotted dogfish, spotted ray *Raja montagui*, tope *Galeorhinus galeus* and thresher shark *Alopias vulpinus*. A greater diversity and higher abundance of species

was recorded in the August 2008 survey. Overall, starry smooth-hound and thornback ray were recorded in the highest abundance at the site.

2.6.1.4 Fish and shellfish spawning and nursery areas

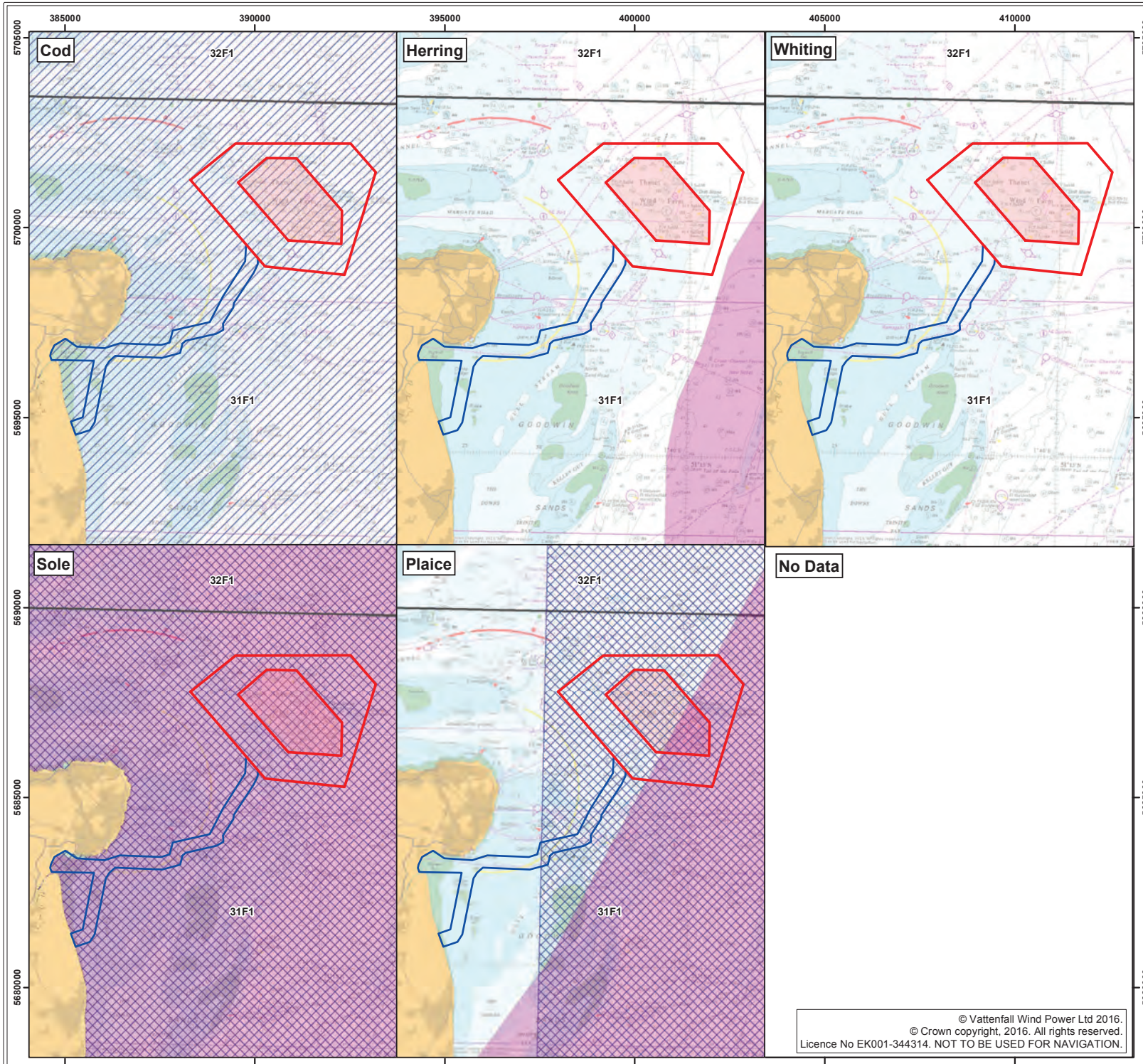
317. The proposed Offshore Wind Farm Area and proposed Offshore Export Cable Corridor are within or in close proximity to spawning grounds for a number of protected (UK BAP) species including sole, herring and plaice. The spawning and nursery grounds around the proposed Wind Farm Area are illustrated in Table 2.10 and Figure 2.6 and Figure 2.7. However, the proposed Wind Farm Area itself is not considered to be an important spawning ground or nursery area for commercially important fish species (e.g. herring), as those which spawn within the proposed Wind Farm Area and proposed Offshore Export Cable Corridor also spawn widely within the surrounding coastal waters of the southern North Sea.

Table 2.10 Spawning and nursery grounds in the vicinity of Thanet Extension Offshore Wind Farm Area

Spawning Ground	Nursery Ground
Sole*	Cod*
Bass	Bass
Plaice	Plaice
Whiting	Whiting
Herring*	Herring*

*BAP species

318. The shellfish resources of relevance are mainly lobster and crab around the proposed Wind Farm Area, and cockle resources in Pegwell Bay around the proposed Offshore Export Cable Corridor. Unlike at other areas in the Thames Estuary native oysters *Ostrea edulis* are not found near the proposed Wind Farm Area or proposed Offshore Export Cable Corridor.



Thanet Extension Offshore Wind Farm

- Proposed Wind Farm Area
- Proposed Offshore Export Cable Corridor

Thanet Offshore Wind Farm - Operational

- TOWF
- ICES Rectangles
- Spawning Ground (Coull *et al.* 1998)[1]

Spawning Ground (Intensity)[1]

- High Intensity (Ellis *et al.* 2010)
- Low Intensity (Ellis *et al.* 2010)

[1] Cefas, 2010.

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title: ICES rectangles and fish spawning areas in Thanet Extension Offshore Wind Farm Area

Figure: 2.6 | Drawing No: PB5894-SCO-2-008

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	26/10/16	AB	PP	A3	1:100,000

Co-ordinate system: ETRS 1989 UTM Zone 31N **EPSG:** 25831

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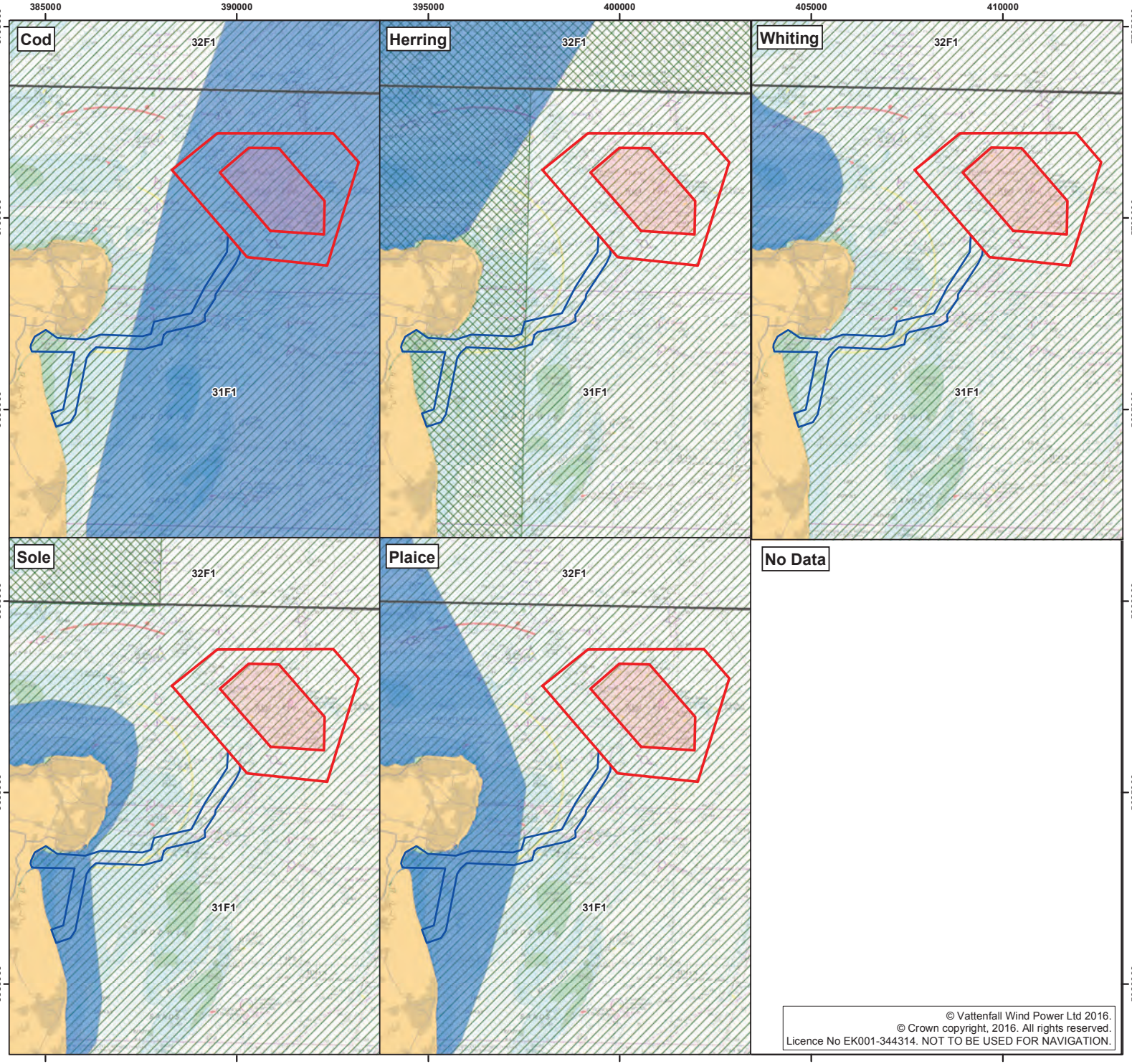

Thanet Extension Offshore Wind Farm

- Proposed Wind Farm Area
- Proposed Offshore Export Cable Corridor

Thanet Offshore Wind Farm - Operational

- TOWF
- ICES Rectangles
- Nursery Ground (Coull *et al.* 1998)[1]

Nursery Ground (Intensity)[1]

- High Intensity (Ellis *et al.* 2010)
- Low Intensity (Ellis *et al.* 2010)

[1] Cefas, 2010.

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title: ICES rectangles and fish nursery areas in Thanet Extension Offshore Wind Farm Area

Figure: 2.7 | Drawing No: PB5894-SCO-2-010

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	26/10/16	AB	PP	A3	1:100,000

Co-ordinate system: ETRS 1989 UTM Zone 31N **EPSG:** 25831

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2.6.2 Potential Impacts

2.6.2.1 Potential impacts during construction

319. **Physical Disturbance:** There would be physical disturbance of the seabed during construction from the installation of cables and foundations, thorough placement of jack up barge legs, spud cans and anchors/chains and potentially seabed preparation. This has potential to impact demersal (bottom or near bottom dwelling) fish and shellfish as well as potentially impact upon spawning or nursery grounds. Disturbance would be limited in extent and duration. The overall footprint of works will be determined during the EIA and is anticipated to be relatively small in the context of the wider habitat available in this area of the southern North Sea.

320. **Increased suspended sediments and smothering:** The construction activities listed above have the potential to cause mobilisation of sediments in the water column and an increase in suspended sediment concentrations (SSC) (see Section 2.2 Marine Geology, Oceanography and Physical Processes). Sensitive species may react to this through physical or reproductive decline or it may impact upon migration or spawning behaviour. Impacts are likely to be temporary and localised and will need to be seen in the context of background SSC levels and natural variations from storm events and seasonal changes. The assessment of the potential impact will be based upon the results of site specific physical processes assessment.

321. **Changes to water quality:** Sediment disturbance could lead to the mobilisation of contaminants that could be harmful to the benthos. However, based upon the known levels of contaminants at the site (see Section 2.3 Marine Water and Sediment Quality) it is unlikely that there would be any risk from this impact. Vattenfall is committed to the use of best practice techniques and procedures throughout all construction, O&M activities with regard to the handling of materials and chemicals, which would avoid impact. Therefore, it is suggested that, subject to consultation with relevant consultees (i.e. Cefas and Natural England) and feedback from this Scoping Report, impacts from both re-suspended contaminants and spillages will be scoped out from further consideration within the EIA.

322. **Underwater noise and vibration disturbance:** Construction activities are potential sources of underwater noise including vessels, seabed preparation, rock dumping and cable installation. However, of the potential sources, piling is the greatest source of noise and is subject to a great deal of study within the industry (Nedwell *et al.*, 2007) (Lindeboom *et al.,* 2011).

2.6.2.2 Potential impacts during operation

323. Monitoring studies conducted at operational wind farms indicate that any changes recorded once a wind farm is operational are difficult to distinguish from expected natural variation (Judd, 2009) (Lindeboom *et al.,* 2011). There is little evidence that the TOWF has had a significant impact on either adult fish species abundance or diversity since only Dover sole and lesser spotted dogfish showed significant differences between pre and post construction and only in the spring surveys. Temporal differences in catch rates between pre and post-construction suggest there may be the potential for a slight fish aggregating effect from the wind farm infrastructure although the drop in numbers for the summer surveys also suggests seasonal changes in spatial distribution (TOWL, 2013a). Although there were some significant differences in catch rates for elasmobranchs and fish species there was no consistent pattern of statistical difference (TOWL, 2013a). Whilst monitoring studies have been conducted over relatively short periods, the lack of evidence of gross changes to the fish and shellfish community at operational wind farms should be borne in mind when considering potential operational impacts.

324. **Physical Disturbance:** Routine maintenance activities may require jack-up or anchoring of vessels and there would be some seabed disturbance as a result. Any disturbance would be localised, temporary and overall impacts would be lower than for construction.

325. **Increased suspended sediments and smothering:** Routine maintenance (discussed above) may increase SSC levels, however this would be localised and temporary and overall impacts would be lower than for construction.

326. **Changes to water quality:** As per construction, it is suggested that impacts from both re-suspended contaminants and spillages will be scoped out from further consideration within the EIA.

327. **Noise and vibration disturbance:** Operational noise would come from two sources; vessel movements and turbine operation. Given the small number of vessels on site during O&M, and the volume of traffic in the waters around the proposed Thanet Extension Wind Farm Area, it is not likely that this would be a significant source of noise or impact.

328. Operational turbines would produce noise and vibrations which would be transmitted into the seabed and water column (Nedwell *et al.,* 2007). Measurements made at four operational wind farms (North Hoyle, Scroby Sands, Kentish Flats and Barrow) indicate that operational noise would only be a few decibels above background noise within the wind farm, which is significantly lower in

magnitude than those produced by other activities in the marine environment such as dredging or commercial fishing (CMACS 2003, Nedwell *et al.,* 2007). Although these turbines were much smaller than those envisaged for Thanet Extension, it is not expected that operational noise levels from the proposed Wind Farm Area would cause a significant impact.

329. **Loss of habitat:** The construction of the wind farm would lead to a permanent loss of habitat in the footprint of foundations, scour protection and potential areas of cable protection. The loss of area would represent a small percentage of the development area and would be dependent upon the foundation type chosen and need for cable protection; the magnitude of any impact would be relatively small. As discussed previously, the seabed is relatively homogeneous across the offshore project area and therefore there would be sufficient alternative habitat available to fish and shellfish.

330. **Fish aggregation:** The presence of wind farm infrastructure (in the form of turbine towers and foundations, scour protection and cable protection) would create new habitats which would be colonised by a range of species which may not normally be present in the area; this effect has the potential to attract and aggregate fish (Hoffman *et al.*, 2000). To date, there is no clear evidence of any gross changes in local fish communities as a result operational wind farms. Any change is expected to be of low magnitude and limited to the immediate vicinity of each wind turbine foundation. The post construction monitoring surveys for the TOWF showed that fish communities post construction were similar or slightly enhanced from the pre-construction surveys (TOWL, 2013a). This will be considered within the ES in further detail.

331. **EMF:** Some species of fish utilise EMF for activities such as hunting prey and navigation. These species include elasmobranchs and some bony fish species such as cod. Several studies have been undertaken to understand the potential impacts of EMF on fish, however to date, research has been inconclusive as to whether EMF causes attraction or repulsion or has a significant effect (Gil, 2010) (Gill *et al.,* 2009). CMACS (2012) reviewed available literature and assessed potential EMF impacts and concluded that any impacts would be limited to within a few metres of the cables and would not be significant. It is proposed therefore that the impact of EMF on fish and shellfish is scoped out of the EIA due to the lack of evidence to suggest there is potential for an impact.

2.6.2.3 Potential impacts during decommissioning

332. During decommissioning the potential impacts are anticipated to be similar to those described above for the construction phase although on a smaller scale (for example, noise impacts would be lower as there would be no piling).

2.6.2.4 Potential cumulative impacts

333. **Offshore wind farms:** At the time of submission no construction activities associated with other offshore wind farm developments are anticipated within the range at which there could be cumulative impacts for the majority of potential impacts, given that most impacts would be localised, small scale and of short duration (e.g. increases in suspended sediments, habitat disturbance). The exception would be from cumulative underwater noise associated with piling where there may be overlapping impacts.

334. **Other activities:** There is the potential for cumulative impacts from other activities occurring in the region, these include aggregate dredging, shipping and O&G exploration and development and subsea cabling. The Belgium to UK interconnector cable, Nemo Link, is consented and is in the vicinity of the proposed Thanet Extension. The Nemo Link cable landfall is at Pegwell Bay and there could be a cumulative impact with the proposed Thanet Extension Option 1 landfall at Pegwell Bay if this option is taken forward. Whilst it is not considered likely that there would be significant cumulative impacts, all potential impacts (i.e. those listed for Thanet Extension in isolation) will be assessed as part of the EIA.

2.6.2.5 Transboundary impacts

335. Given the level of development in the southern North Sea in other EU Member States waters there is potential for transboundary impacts especially with regard to noise and given that populations of fish may be highly mobile. Potential transboundary impacts will be assessed as with the other cumulative impacts and the Applicant, where possible, will liaise with developers in other Member States to obtain up to date project information to feed into the assessment.

2.6.2.6 Summary of potential impacts

Table 2.11 Summary of impacts relating to fish ecology (scoped in (✓) or scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Physical Disturbance	✓	✓	✓
Suspended sediments	✓	✓	✓
Changes to water quality	×	×	×

Potential impacts	Construction	Operation	Decommissioning
Loss of (or changes to) habitat	×	✓	×
Noise and vibration disturbance	✓	✓	✓
Fish aggregation	×	✓	×
EMF	×	×	×
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

2.6.3 Mitigation

336. The impacts on fish are anticipated to be localised and temporary and it is considered unlikely that mitigation would be appropriate. This will be considered through consultation with key stakeholders during the EPP, based on the findings of the EIA.

2.6.4 Approach to assessment and data gathering

337. In accordance with the Cefas (2004) guidance the assessment phase of the EIA will consider the following aspects for fish and shellfish resource in the area:

- Spawning grounds;
- Nursery grounds;
- Feeding grounds;
- Shellfish production areas (including oyster beds);
- Overwintering areas for crustaceans (e.g. lobster and crab); and,
- Migration routes

338. Assessment of impacts will be informed through reference to monitoring results from operational offshore wind farms which have described the spatial and temporal distribution of key fish and shellfish species in the area, the findings from industry-wide studies (e.g. COWRIE funded research) such as those on EMF and piling noise impacts, as well as information obtained through consultation with local sea fisheries committees and commercial fishermen. With regard to noise, it is likely that modelling would be undertaken utilising site-specific physical parameters (geology and bathymetry) and project specific detail.

2.7 Marine Mammal Ecology

2.7.1 Baseline

2.7.1.1 Data sources

339. Marine mammal sightings were recorded at the TOWF site as incidental sightings during the ornithological surveys undertaken for the pre-construction (2004-2005), during construction (2009-2010) and post-construction monitoring (2010-2013) of the TOWF site (TOWL, 2013a).

340. Marine mammal sightings will be recorded as part of the ornithological survey work taking place for Thanet Extension (see Section 2.8 Offshore Ornithology).

341. Further to these area specific surveys, a range of information is available and will be incorporated in the EIA, including, but not limited to:

- Revised Phase III data analysis of Joint Cetacean Protocol (JCP) data resources (Paxton *et al*., 2016);
- The identification of discrete and persistent areas of relatively high harbour porpoise density in the wider UK marine area (Heinänen and Skov, 2015)
- Small Cetaceans in the European Atlantic and North Sea (SCANS) II Cetacean abundance and distribution in European Atlantic shelf waters to inform conservation and management (Hammond *et al*., 2013);
- Atlas of Cetacean distribution in northwest European waters (Reid *et al*., 2003);
- Management Units for cetaceans in UK waters (IAMMWG, 2015).
- UK grey and seal usage maps (Jones *et al.*, 2013); and
- Special Committee on Seals (SCOS) annual reporting of scientific advice on matters related to the management of seal populations (SCOS, 2015).

2.7.1.2 Cetaceans

342. Several cetacean species (whale, dolphin and porpoise) occur throughout the southern North Sea; these include the harbour porpoise *Phocoena phocoena*, white-beaked dolphin *Lagenorhynchus albirostris*, bottlenose dolphin *Tursiops truncatus* and minke whale *Balaenoptera acutorostrata* (DECC, 2009; Hammond *et al*., 2013; Reid *et al*., 2003; SCOS, 2015; WWT, 2009). However, within UK waters species diversity and abundance of cetaceans within the southern North Sea is relatively low compared to the more northerly areas of the North Sea (Sea Watch Foundation, 2008). Harbour porpoise and white-beaked dolphin are recorded regularly throughout the year in the southern North Sea and minke whale is recorded as a frequent visitor (Reid *et al*., 2003; Sea Watch Foundation, 2008). Bottlenose dolphin is recorded occasionally, for example in the Thames Estuary (Castello *et al.*, 2015). A

number of cetacean species, including Atlantic white-sided dolphin *Lagenorhynchus acutus*, short-beaked common dolphin *Delphinus delphis*, killer whale *Orcinus orca*, sperm whale *Physeter microcephalus* and long-finned pilot whale *Globicephala melas* are recorded as occasional visitors to the southern North Sea (Reid *et al*., 2003; DECC, 2009). Other cetacean species can occur in the southern North Sea, although sightings are infrequent and rare (Reid *et al*., 2003).

343. Harbour porpoise was the only cetacean species recorded during the ornithology surveys at the TOWF site (TOWF, 2013). The marine mammal sightings survey area covered the TOWF site, plus 0-1km buffer and 0-2km buffer. These surveys included the pre-construction period (2004-2005), construction period (2009-2010) and post-construction period (Year 1 (2010-11); Year 2 (2011-12); and Year 3 (2012-13)) (TOWF, 2013).

2.7.1.3 Pinnipeds

344. Two seal species (pinnipeds) are resident in UK waters: grey seal *Halichoerus grypus* and harbour seal *Phoca vitulina* (SCOS, 2015). Both seal species occur in the southern North Sea and were recorded during the ornithological surveys at the TOWF site (TOWL, 2013a).

2.7.1.4 Designated sites and conservation importance

Cetaceans

345. All cetaceans in UK waters are classed as European Protected Species (EPS) under Annex IV of the Habitats Directive (European Union (EU) Directive 92/43/EEC). Bottlenose dolphin and harbour porpoise are all listed under Annex II of the Habitats Directive and are afforded protection through the designation of Natura 2000 sites. Harbour porpoise is also listed on the OSPAR list of threatened and declining species (OSPAR, 2008) and many species of cetaceans are listed as Species of Principle Importance (SPI) under the NERC Act 2006.

346. The southern North Sea pSAC is currently proposed for designation for harbour porpoise (see Section 2.15 Offshore Designated Sites Summary). JNCC undertook consultation on the site in 2016, which is has been identified as being within the top 10% of persistently high density areas for harbour porpoise in UK waters (JNCC, 2016b). During the Habitats Regulations Assessment (HRA) Screening a review of wider Natura 2000 sites which are designated (or are proposed for designation) for mobile species such as marine mammals will be undertaken to consider potential connectivity with the proposed Wind Farm Area.

Pinnipeds

347. Grey seal and harbour seal are all listed under Annex II and V of the Habitats Directive and harbour seal is listed as a SPI under the NERC Act 2006. There are no designated sites for either species in close proximity in UK waters, although sites in other Member States may be of relevance.

2.7.2 Potential Impacts

2.7.2.1 Potential impacts during construction

348. **Underwater noise:** This has the potential to cause impacts upon marine mammals ranging from behavioural disturbance and masking of communication to auditory injury, physical injury and death (Southall *et al*., 2007). The potential impact from underwater noise is not just related to the level of the underwater sound and its frequency relative to the hearing bandwidth of the animal, but is also influenced by the duration of exposure.

349. The underwater noise generated by piling activities has the potential to disturb marine mammals at a considerable distance from the piling location, e.g. (Thomsen *et al.,* 2006) (Nedwell *et al.,* 2007) (Brandt *et al.,* 2011). It should be noted that although harbour porpoise numbers were shown to decline during construction at of the TOWF, numbers increased substantially above the pre-construction numbers post-construction (TOWL, 2013a) therefore any effect may be short lived.

350. Although the behavioural response can vary due to a range of factors such as exposure level, the hearing sensitivity of the individual, context, previous exposure history or habitation, motivation and ambient noise levels (Southall *et al*., 2007). High exposure levels from underwater sound sources, such as piling, can also cause auditory injury or hearing impairment; in the form of a temporary loss in hearing sensitivity (Temporary Threshold Shift or TTS), or a permanent loss of hearing sensitivity (Permanent Threshold Shift or PTS). Very close to the source, the high peak pressure sound levels have the potential to cause death, or severe injury leading to death (Southall *et al*., 2007).

351. The potential impact from piling would depend on a number of factors which include:

- The source levels of noise, subject to factors such as:
    - Foundation type;
    - Foundation size; and
    - Installation method.

- The spatial footprint of the impact as a feature of noise propagation conditions which would depend on:
    - Sediment/sea floor composition;
    - Water depth; and
    - The sensitivity of marine mammal species present in the area.

352. Other sources of underwater noise associated with offshore wind farm construction include vessel noise, seabed preparation, rock dumping and cable installation. However, of these potential sources, piling is of greatest concern and subject to a great deal of study within the industry (Scheidat *et al.,* 2011).

353. The impacts associated with underwater noise will be considered during the EIA, taking into account the most recent and robust research available.

354. **Impacts upon prey species:** Construction noise has the potential to injure or to displace fish species that are sensitive to noise impacts. The presence of sensitive fish species at the proposed Wind Farm Area and proposed Offshore Export Cable Corridor is discussed in Section 2.5.1.

355. Any potential impact on fish is not expected to have a significant impact on marine mammals given the small number of marine mammals recorded at TOWF, the proposed Wind Farm Area and surrounding waters; the varied diet of marine mammals and their ability to move and locate prey in other areas. However due to the potential for cumulative impacts, this will be considered further during the EIA.

356. **Vessel Interaction:** Collisions between construction vessels and marine mammals are possible, however the low number of marine mammals recorded at TOWF and the proposed Wind Farm Area mean the risk is relatively low.

357. At present the type and number of vessels to be used in the construction of the proposed Thanet Extension is unknown. The risk of collision with marine mammals will be given further consideration in the EIA.

358. **Disturbance at seal haul-out sites:** Increased activity around landfall, including increased vessel activity could have potential to disturb seals from any nearby haul-out sites. There is the potential for seals to use haul-out sites close to the proposed landfall location (e.g. Pegwell Bay (ZSL, 2014)). Therefore the potential disturbance to seal haul-out sites will be given further consideration in the EIA, including the latest the Zoological Society of London (ZSL) seal surveys of the Greater Thames Estuary.

359. **Changes to water quality:** Accidental release of contaminants or mobilisation of sediment contaminants could have potential to impact on marine mammals, either

directly or indirectly. However, based upon the known levels of contaminants at the site (see Section 2.3 Marine Water and Sediment Quality) it is unlikely that there would be any risk from the mobilisation of sediment contaminants. In addition, Vattenfall is committed to the use of best practice techniques and procedures throughout all construction, O&M activities with regard to the handling of materials and chemicals, which would avoid and mitigate any potential risk from accidental spills. Therefore, it is suggested that, subject to consultation with relevant consultees (i.e. Cefas and Natural England) and feedback from this Scoping Report, impacts from both re-suspended contaminants and spillages will be scoped out from further consideration within the EIA for marine mammals.

2.7.2.2 Potential impacts during operation

360. **Underwater noise:** Noise generated by the operational turbines can be conducted through the tower and foundations into the water. Additional noise sources may include engine noise of maintenance and supply vessels. This operational underwater noise could have the potential to cause disturbance to marine mammals. However, monitoring studies of underwater noise from operational turbines have shown the noise levels from North Hoyle, Scroby Sands, Kentish Flats and Barrow wind farms to be only marginally above ambient noise levels (Nedwell *et al.*, 2007) (Edwards *et al.,* 2007). Operational noise is also not considered to be able to mask acoustic communication by seals and porpoises (Tougard *et al.*, 2009).

361. With regard to vessel noise, the area has high levels of existing shipping activity and therefore the increase in noise levels from maintenance activities is unlikely to be significant.

362. Given these findings, the potential for any impacts from operational noise is not considered significant and therefore will not be assessed further in the EIA.

363. **Impacts upon prey species:** To date, there is no clear evidence of any significant changes in fish abundance as a result of the presence of operational offshore wind farms (Lindeboom, 2011) (Bergström *et al.,* 2014, TOWL, 2014). Any change to prey species is expected to be limited to the immediate vicinity of each wind turbine foundation with no significant impacts on marine mammals. Therefore any operational impacts on prey will not be considered further in the EIA.

364. **Vessel Interactions:** At present the type and number of O&M vessels is unknown but consideration will be given in the assessment to collision risk with marine mammals during the impact assessment.

365. **Disturbance at seal haul-out sites:** As per construction, there may be a pathway for impact dependent upon the landfall location.

366. **Physical Barrier Effects:** The proposed Wind Farm Area is not located on any known migration routes for marine mammals; spacing between wind turbines is not expected to impinge animal movement, and both seals and harbour porpoise have been shown to forage within operational wind farm sites (Russell *et al.,* 2014; Marine Scotland, 2012; Teilmann *et al.*, 2006; Lindeboom *et al.*, 2011). It is therefore proposed that this impact should be scoped out from further consideration within the EIA.

367. **EMF:** It is widely believed that harbour porpoise are capable of detecting small differences in relative magnetic field strength, however there is, at present, no evidence to suggest that existing cables have influenced cetacean movements. Harbour porpoise move in and out of the Baltic Sea with several crossings over operating subsea high voltage direct current cables in the Skagerrak and western Baltic Sea without any apparent effect on their migration pattern (Faber Maunsell & Metoc, 2007). There is also currently no evidence that pinnipeds respond to EMF (Gill *et al.,* 2005) and they have been recorded foraging in operational wind farm sites (Russell *et al.*, 2014). It is therefore proposed that this impact should be scoped out from further consideration within the EIA for marine mammals.

368. **Changes to water quality:** As per construction, it is suggested that impacts from both re-suspended contaminants and spillages will be scoped out from further consideration within the EIA for marine mammals.

2.7.2.3 Potential impacts during decommissioning

369. The impacts of decommissioning of the wind farm would be similar in nature to those of the construction phase, but likely to be of lower magnitude. There would be no piling and therefore noise impacts would be significantly reduced, although there would still be noise from activities required to remove infrastructure. The potential impacts on marine mammals during decommissioning will be given further consideration in the EIA.

2.7.2.4 Potential cumulative impacts

370. **Offshore wind:** The impacts of the proposed Thanet Extension are likely to be small in isolation, with respect to marine mammals. This is largely due to the fact that usage of the area by marine mammals is low. However, given the scale of development across the southern North Sea, particularly with regard to future offshore wind there is the potential for even small impacts associated with the proposed Wind farm Area and Offshore Export Cable Corridor to be part of a significant cumulative impact. The CIA would consider projects across the southern

North Sea and within the relevant marine mammal management units (e.g. IAMMWG, 2015; SCOS, 2015).

371. The key cumulative impact is likely to come from underwater noise from pile driving. As previously discussed, there is the potential for this impact to have a large spatial footprint (with regard to disturbance effects and displacement of prey species). This could have cumulative impacts spatially (i.e. if two or more piling operations are undertaken simultaneously) or temporally (i.e. if piling operations are happening consecutively).

372. It is necessary to consider that even if a piling programme is scheduled for many months, the actual duration of pile driving would be limited to a few hours per pile given the experience of other projects in the southern North Sea. A range of realistic scenarios for cumulative noise impacts will be developed for the CIA, based on publically available information, liaison with other developers where possible, as well as consultation with the Regulators and stakeholders.

373. **Other activities:** There is the potential for other activities occurring in the region surrounding the proposed Wind Farm Area to create cumulative impacts, these include aggregate dredging, shipping, subsea cabling and O&G exploration and development. As discussed above, the impacts of the proposed Wind Farm Area alone are likely to be minor. Some potential cumulative impacts are unlikely to be significant, for instance behavioural disturbance from noise associated with dredging area operations would not have a spatial footprint on the scale of pile driving and there would therefore be limited cumulative impact (Robinson *et al.,* 2011). However, these other activities, where relevant, will be assessed as part of the EIA.

2.7.2.5 Transboundary impacts

374. Given the level of development in the southern North Sea by other EU Member States (i.e. Belgium, The Netherlands, Germany and Denmark) and that marine mammals are highly mobile there is potential for transboundary impacts especially with regard to disturbance from underwater noise.

375. Transboundary impacts will be assessed in the EIA and the Applicant will, where possible, liaise with developers in other Member States to obtain up to date project information to feed into the assessment.

2.7.2.6 Summary of potential impacts

Table 2.12 Summary of impacts relating to marine mammal ecology (scoped in (✓) and scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Underwater noise	✓	×	✓
Impacts upon prey species	✓	×	✓
Vessel interactions	✓	✓	✓
Physical Barrier effects	×	×	×
EMF	×	×	×
Disturbance at haul out sites	✓	✓	✓
Changes to water quality	×	×	×
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

2.7.3 Mitigation

376. A marine mammal mitigation plan (MMMP) would be prepared in consultation with key stakeholders, based on the latest guidance.

377. Where possible, mitigation will be embedded in the design of the project, for example in construction methods through the use of soft-start piling in order to reduce the potential for auditory injury.

2.7.4 Approach to assessment and data gathering

378. Given the relatively low numbers of marine mammals in and around the proposed Wind Farm Area, specific marine mammal surveys are not thought to be required as any data collected is likely to be limited and therefore probably not adequate to generate robust site densities. However, during the offshore ornithological surveys for Thanet Extension (see Section 2.9.4) sightings of marine mammals will be recorded. The offshore ornithological surveys will encompass the proposed Wind Farm Area plus a 4km buffer.

379. To assess the potential impacts form underwater noise on marine mammals and their prey it is proposed (as advised by Natural England) that site specific underwater noise modelling is conducted, utilising site-specific physical parameters (geology and bathymetry) and project specific detail.

2.8 Offshore Ornithology

380. This section describes the baseline, potential impacts and approach to assessment for offshore ornithology. Onshore ornithology, including potential impacts on coastal birds around the landfall works are considered in Section 3.7 Onshore Ornithology.

2.8.1 Baseline Characteristics

2.8.1.1 Data sources

381. Existing ornithological survey data for the area of the proposed Thanet Extension Wind Farm Area and its immediate surrounds derive primarily from the baseline and post-consent surveys undertaken for TOWF. The area has also been covered by Wildfowl and Wetlands Trust (WWT)/Department of Trade and Industry (DTI) surveys undertaken to determine important concentrations of inshore, non-breeding, waterbirds in the Outer Thames Estuary, which informed the designation of the Outer Thames Estuary SPA (Webb *et al.* 2009, O'Brien *et al.* 2012).

382. The baseline and post-consent data for TOWF were derived from boat-based line transect surveys, which broadly followed the methods recommended by Camphuysen *et al.* (2004). These surveys extended over a (non-continuous) period from November 2004 to March 2013 (Table 2.13). During this period, survey coverage varied from encompassing the full year (during the baseline/pre-construction phase) to focussing on the non-breeding season only in the construction and post-construction phases. This reflected the fact that the main ornithological sensitivities at the TOWF site (as identified during baseline surveys) were associated with the non-breeding season. Survey intensity was higher during the construction and post-construction phases, with two surveys completed during October to March in these phases, as opposed to one survey per month during pre-construction (Table 2.13).

Table 2.13 Details of the survey coverage undertaken for TOWF.

Wind Farm Phase	Period	Number of Surveys	Survey Frequency	Transect Spacing	Coverage of Thanet Extension Proposed Wind Farm Area (and of proposed Wind Farm Area Plus 4km Buffer)
Baseline/Pre-construction	November 2004 – October 2005	12	monthly	1km	38.14 (8.79) %
Construction	October 2009 – March 2010	10	2* per month	1km	37.89(11.16) %
Post-construction	October – March, 2010/11, 2011/12 and 2012/13	10 – 12 per survey year	2* per month	1km	37.89 (11.16) %

*occasional months in some years received only a single survey

383. The survey area for the TOWF site, and hence the extent to which the area of the proposed Wind Farm Area was encompassed by these surveys, also varied between the wind farm development phases (Table 2.13). During pre-construction, a 1km buffer around the TOWF site was surveyed, whereas this buffer was increased to 2km in the later phases (giving survey areas of 67km^2 and 100km^2, respectively). In addition, the 33km^2 control area to the south of the TOWF site and buffer, was increased to 38km^2 during the later phases. Therefore, 37.89 - 38.14% of the proposed Wind Farm Area and 8.79 – 11.16% of the proposed Wind Farm Area plus 4km buffer were encompassed by these earlier surveys, with the largest extent of non-surveyed area being the north-eastern corner of the proposed Wind Farm Area, along with large extents of the 4km buffer, particularly in the east and south-eastern parts (Table 2.13, Figure 2.8).

384. Transect spacing in all of the boat-based surveys of the TOWF site was 1km, with transects running from east to west to give 17 transects in total when coverage of the control area was included.

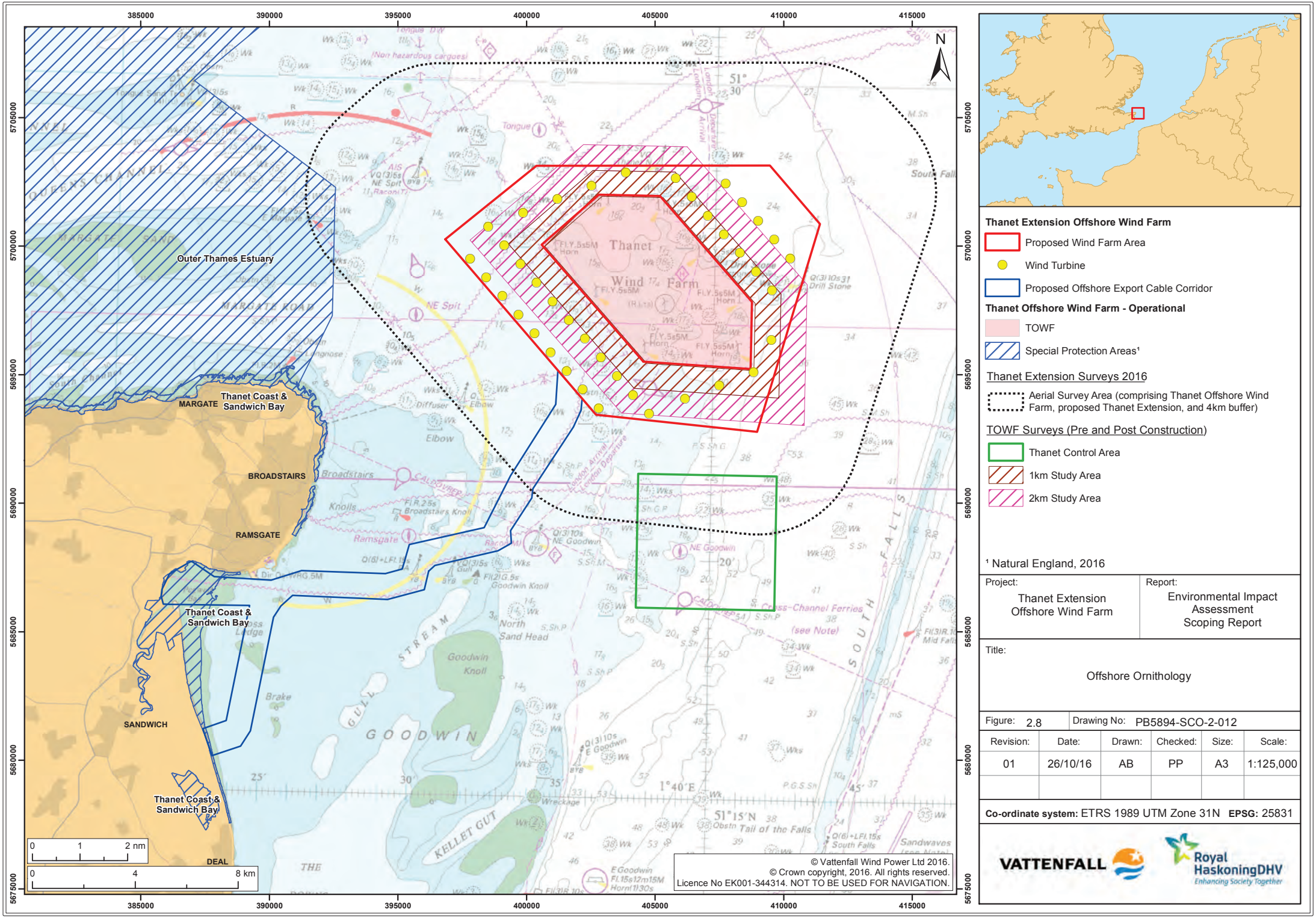
385. The WWT/DTI aerial surveys of the Outer Thames Estuary were undertaken from 2001 to 2007 and encompassed the full extent of the proposed Wind Farm Area. These aerial surveys used direct visual methods to record bird occurrence and number, as opposed to digital stills or digital video (Webb *et al.* 2009, O'Brien *et al.* 2012). The main species of interest in these surveys was red-throated diver *Gavia stellata*, with the Outer Thames Estuary SPA subsequently designated on the basis of the wintering numbers of this species.

2.8.1.2 Overview of the likely main ornithological interests

386. Based upon the existing survey information from the TOWF site, together with that from the WWT/DTI aerial surveys, the main features of ornithological interest at the proposed Thanet Extension Wind Farm Area are likely to occur during the non-breeding season. In particular, red-throated diver is likely to be the species of greatest interest, given that it is a qualifying feature of the Outer Thames Estuary SPA and that the proposed survey buffer for the proposed Wind Farm Area would extend into this SPA (see below).

387. The existing survey information demonstrates that densities of wintering red-throated diver have, historically, been low within the TOWF site relative to those within the Outer Thames Estuary SPA (TOWL, 2005; O'Brien *et al.* 2012). Construction and operation of TOWF were associated with reductions of 18% and 27%, respectively, in the numbers of red-throated divers using the site, through the displacement of approximately 18 – 20 individuals. Given the availability of similar alternative habitat in the wider area, this level of impact was not considered to be ecologically significant (TOWL 2013).

388. It is likely that densities of red-throated diver will be higher within the western parts of the proposed Wind Farm Area (where it is closest to the SPA) than within the TOWF site, as indicated by the modelled density map for this species produced from the WWT/DTI survey data (O'Brien *et al.* 2012). At its closest point, the proposed Wind Farm Area is approximately 5km from the SPA boundary (compared to c.8km for the TOWF site), whilst the proposed survey buffer extends within the SPA boundary.



Thanet Extension Offshore Wind Farm

- Proposed Wind Farm Area
- Wind Turbine
- Proposed Offshore Export Cable Corridor

Thanet Offshore Wind Farm - Operational

- TOWF
- Special Protection Areas[1]

Thanet Extension Surveys 2016

- Aerial Survey Area (comprising Thanet Offshore Wind Farm, proposed Thanet Extension, and 4km buffer)

TOWF Surveys (Pre and Post Construction)

- Thanet Control Area
- 1km Study Area
- 2km Study Area

[1] Natural England, 2016

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title: Offshore Ornithology

Figure: 2.8 | Drawing No: PB5894-SCO-2-012

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	26/10/16	AB	PP	A3	1:125,000

Co-ordinate system: ETRS 1989 UTM Zone 31N **EPSG:** 25831

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389. A range of other seabird (and wildfowl) species were recorded during the TOWF surveys, with the key species listed in Table 2.14. Other seabird and sea duck species recorded during the TOWF surveys included, common scoter *Melanitta nigra*, eider *Somateria mollissima*, black-throated diver *Gavia arctica*, little gull *Hydrocoloeus minutus*, black-headed gull *Chroicocephalus ridibundus*, Arctic skua *Stercorarius parasiticus*, great skua *Stercorarius skua*, cormorant *Phalacrocorax carbo* and shag *Phalacrocorax aristotelis*. The overall seabird assemblage on the site was dominated by gull and auk species, and these groups accounted for 68% and 21%, respectively, of the numbers of individuals from the key seabird species recorded during the pre-construction surveys, which encompassed the full annual period (TOWL 2005).

390. Monitoring of the TOWF site during the construction and post-construction periods revealed initial declines in the density of guillemots on the site, which appeared to extend up to 1km from the site, albeit to a lesser extent than within the actual site. However, there was evidence of subsequent recovery during the second and third years of post-construction monitoring, so that the findings were equivocal as to an overall impact on the species (TOWL 2013). Similar patterns of change were noted for razorbill, which were less abundant than guillemot. These possible displacement impacts were concluded to be negligible and of no ecological significance. There were few indications of disturbance and/or displacement effects on other key seabird species (TOWL 2013).

391. Estimates of potential collision mortality from the TOWF site, as determined by the pre-construction survey data, were highest for gull species (TOWL 2005). In all cases these were considered to represent a small proportion of the background mortality for the populations of interest, although for lesser black-backed gull and herring gull they were considered sufficient to represent moderate adverse impacts. Post-construction monitoring indicated no likely increases in the predicted of collision risk as a result of changes in flight behaviour (TOWL 2013).

392. It is likely that substantially larger WTGs would be used for Thanet Extension than for TOWF, and that they would be spaced further apart, which may affect the predicted collision risk.

Table 2.14 Definitions of the biological seasons appropriate to each of the key seabird species recorded during surveys of TOWF (as determined by Furness 2015).

Species	Scientific (Latin) Name	Breeding	Migration - free breeding	Migration - autumn	Winter	Migration - spring	Non-breeding
Wildfowl & Divers							
Red-throated diver	*Gavia stellata*	Mar-Aug	May-Aug	Sep-Nov	Dec-Jan	Feb-Apr	-
Gulls							
Common gull	*Larus canus*	Not included in Furness 2015					
Lesser black-backed gull	*Larus fuscus*	Apr-Aug	May-Jul	Aug-Oct	Nov-Feb	Mar-Apr	-
Herring gull	*Larus argentatus*	Mar-Aug	May-Jul	Aug-Nov	Dec	Jan-Apr	Sep-Feb
Great black-backed gull	*Larus marinus*	Mar-Aug	May-Jul	Aug-Nov	Dec	Jan-Apr	Sep-Mar
Kittiwake	*Rissa tridactyla*	Mar-Aug	May-Jul	Aug-Dec	-	Jan-Apr	-
Auks							
Guillemot	*Uria aalge*	Mar-Jul	Mar-Jun	Jul-Oct	Nov	Dec-Feb	Aug-Feb
Razorbill	*Alca torda*	Apr-Jul	Apr-Jul	Aug-Oct	Nov-Dec	Jan-Mar	-
Others							
Northern fulmar	*Fulmarus glacialis*	Jan-Aug	Apr-Aug	Sep-Oct	Nov	Dec-Mar	-
Gannet	*Morus bassanus*	Mar-Sep	Apr-Aug	Sep-Nov	-	Dec-Mar	-
Sandwich tern	*Sterna sandvicensis*	Apr-Aug	Jun	Jul-Sep	Oct-Feb	Mar-May	Sep-Mar
Common tern	*Sterna hirundo*	May-Aug	Jun – mid Jul	Late Jul-early Sep	Oct-Mar	Apr-May	Sep-Apr

393. The offshore ornithological assessment and analyses of survey data for Thanet Extension will consider seasonal differences in site usage by each key species, as well as the importance of the site for the life stages of each species. Determining the relevant seasons for each key seabird species will, where possible, be based upon the recent, comprehensive, review of the existing information by Furness (2015).

These seasonal periods are set out for the key seabird species recorded at the TOWF site in Table 2.14.

394. Reference populations for each species and their population sizes will be based on the best available information at the time of undertaking the assessment and will be agreed with key stakeholders during consultation. Given that the main ornithological interests are likely to arise during the non-breeding season, the determination of appropriate reference populations is likely to be guided by the work of Furness (2015) on defining species-specific non-breeding season seabird populations at biologically defined minimum population scales.

395. Assessments for Thanet Extension will also consider the conservation status of each species (Table 2.15).

Table 2.15 Summary of conservation value of the main seabird species recorded during surveys for TOWF.

Species	EU Birds Directive		National conservation criteria	
	Annex 1	Migratory species	BoCC[1]	Biodiversity 2020 priority species[2]
Wildfowl & Divers				
Red-throated diver	✓	✓	green	
Gulls				
Common gull		✓	amber	
Lesser black-backed gull		✓	amber	
Herring gull		✓	red	✓
Great black-backed gull		✓	amber	
Kittiwake		✓	red	
Auks				
Guillemot		✓	amber	
Razorbill		✓	amber	
Others				
Northern fulmar		✓	amber	
Gannet		✓	amber	
Sandwich tern	✓	✓	amber	
Common tern	✓	✓	amber	

[1] Birds of Conservation Concern 4 – Eaton *et al.* 2015

[2] Biodiversity 2020 Strategy for England (Defra 2011, http://webarchive.nationalarchives.gov.uk/20140711133551/http://www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/habsandspeciesimportance.aspx)

2.8.1.3 Designated sites

396. During the EIA, a review of wider SPAs and Ramsar sites will be undertaken to consider potential connectivity with the proposed Wind Farm Area. HRA screening will be undertaken in consultation with key stakeholders through the EP process to identify SPAs likely to be affected by the proposed Wind Farm Area.

397. A number of SPAs are likely to have potential connectivity to the proposed Wind Farm Area most notably the Outer Thames Estuary SPA. As detailed above, this SPA

lies approximately 5km from the proposed Wind Farm Area at its closest point. The Outer Thames Estuary SPA extends from Caister-on-Sea (just north of Great Yarmouth) at its northern boundary to Margate in the south, and in parts extends up to approximately 60km offshore. The SPA is designated for its internationally important population of wintering red-throated diver.

398. Extensions to the Outer Thames Estuary SPA are currently proposed for the purpose of protecting foraging areas of common terns *Sterna hirundo* and little terns *Sterna albifrons* from nesting colonies at the Foulness SPA and Minsmere to Walberswick SPA (Natural England 2015). However, this extension encompasses more inshore waters to the east of the existing SPA, whilst predicted foraging ranges suggest that birds from these colony SPAs are unlikely to make extensive use of the proposed Wind Farm Area (Wilson *et al.* 2014).

399. Other SPAs with potential connectivity to the proposed Wind Farm Area may include the Alde-Ore Estuary SPA, for which breeding lesser black-backed gull *Larus fuscus* is a feature, and the Flamborough Head and Filey Coast proposed SPA (including the Flamborough Head and Bempton Cliffs SPA), for which breeding kittiwake *Rissa tridactyla* and gannet *Morus bassanus* are features that may use the proposed Wind Farm Area, at least during the non-breeding season.

400. Impacts upon the Thanet Coast and Sandwich Bay SPA are covered in section 3.7 Onshore Ornithology.

2.8.2 Potential Impacts

2.8.2.1 Potential impacts during construction

401. **Disturbance and displacement**: Construction activities (e.g. pile driving, increased boat traffic) at the proposed Wind Farm Area would result in noise and vibration. The noise associated with the construction activities has the potential to disturb and displace bird species from the site for the duration of installation activities.

402. The presence of plant and personnel on site and potentially floodlights during night-time working may cause localised disturbance throughout construction. In all cases, such disturbance impacts are likely to be temporary, occurring only when construction activities are being undertaken. Therefore, birds may readily re-distribute in periods of less intense, or no, activity during the construction period.

403. The susceptibility of each species to construction disturbance will depend upon factors such as the feeding strategy of the species (i.e. aerial, swimming or surface), timing of construction activities and behaviour (whether birds are breeding or

migrating). The assessment will be informed by reviews of species sensitivity (e.g. Garthe & Hüppop 2004).

404. **Indirect impacts through effects on habitats and prey species within the wind farm site**: Noise from construction activities has the potential to disturb fish which are prey species for birds foraging within the proposed Wind Farm Area. The key source of noise would be from pile driving (if piled foundations are used) which can cause avoidance behaviour in susceptible fish (see Section 2.7.2). The potential for impact will be determined by the susceptibility to noise impacts of the fish species present on the site and whether those species are important as prey for seabirds at the proposed Wind Farm Area.

405. **Indirect impacts through effects on habitats and prey species within the proposed Offshore Export Cable Corridor:** Cable laying activities have potential to cause disturbance for prey species and their habitats. Disturbance effects on prey are likely to be short term, temporary and localised around the cable route. The resultant indirect impact on any foraging birds (if present) is likely to be indiscernible and it is therefore proposed that this impact should be scoped out from further consideration within the EIA.

2.8.2.2 Potential impacts during operation

406. **Disturbance and displacement:** The movement of O&M vessels, and the presence of turbines and offshore platforms, may affect bird abundance and distribution during the operational life of the Thanet Extension.

407. Given that potential impacts along the cable route would be highly localised and episodic (i.e. limited to any maintenance or repair operations) it is proposed that this impact should be scoped out from further consideration, with the focus for such impacts on the proposed Wind Farm Area only.

408. The predicted potential effects of displacement on sensitive species will be assessed either using matrices that relate varying levels of displacement to varying levels of additional mortality, or other appropriate assessment techniques with consideration then given to the population-level impacts of the potential additional mortality.

409. **Indirect impacts through effects on habitats and prey species:** Indirect displacement of birds may occur during the operational phase if there are impacts on prey species and the habitats of prey species. These indirect effects include those resulting from the production of underwater noise (e.g. the turning of the WTGs) and the generation of suspended sediments (e.g. due to scour or maintenance activities) that may alter the behaviour or availability of bird prey species. Underwater noise and EMF may cause fish and mobile invertebrates to avoid the

operational area and also affect their physiology and behaviour. Suspended sediments may cause fish and mobile invertebrates to avoid the operational area and may smother and hide immobile benthic prey. These mechanisms could result in less prey being available within the operational area to foraging seabirds. Changes in fish and invertebrate communities due to changes in presence of hard substrate (resulting in colonisation by epifauna) may also occur.

410. **Collision risk:** There is a risk that birds would collide with the WTG rotors as they fly through the wind farm. The susceptibility of a species to collision depends upon physiological and behavioural characteristics of birds in addition to the project design specifications. Collision risk modelling (CRM) will be undertaken using industry-standard approaches (Band 2012, Cook *et al.* 2014, SNCBs 2014) to predict potential mortality levels from this impact. The population-level impacts of this potential additional mortality will be considered.

411. **Barrier effect:** During operation, birds may change their flight path to avoid crossing through a wind farm, resulting in the wind farm acting as a barrier to free movement and increasing energetic costs of foraging flights and migration (DECC 2009). It has been shown that some species (e.g. divers and scoters) avoid wind farms by making detours around WTG arrays, which potentially increases their energy expenditure (Petersen *et al.* 2006, Petersen & Fox 2007), with an associated potential risk of decreased survival rates. Such effects may have a greater impact on birds that regularly commute around a wind farm (e.g. birds transiting between foraging grounds and roosting/nesting sites) than migrants that would only have to negotiate around a wind farm once per migratory period, or twice per annum, if flying the same return route (Speakman *et al.* 2009).

412. As determined during the assessment for TOWF, the distance of the proposed Wind Farm Area from large seabird breeding colonies (Mitchell *et al.* 2004) means that, in the main part, the area is likely be of low importance during the breeding period and therefore the likelihood of significant increases in flight distances is low. The potential for impact during the migration period will be considered further in the EIA, but due to a small increase relative to total migration path and limited exposure, it is not considered likely to be a significant issue.

2.8.2.3 Potential impacts during decommissioning

413. During decommissioning, the potential impacts are anticipated to be similar to those described above for the construction phase although on a smaller scale. For example, noise impacts would be lower and there would therefore be less indirect impact upon birds through potential disturbance of prey species.

2.8.2.4 Potential cumulative impacts

414. **Offshore wind:** Given the scale of development in the southern North Sea with operational, consented and planned offshore wind farms, there is potential for cumulative impacts upon birds. Given that many bird species are highly mobile, there is potential for the same individuals and populations to be affected by several wind farms (e.g. if there are barrier effects which impact upon migration routes) or for the scale of development to impact a common resource (e.g. the cumulative impact on prey species). Of particular relevance to the cumulative assessment will be other wind farms in and around the Outer Thames area including, TOWF, Kentish Flats, the Kentish Flats Extension, London Array, Gunfleet Sands, Greater Gabbard and Galloper. Also, other wind farms along the east coast of Britain are likely to be relevant to some seabird species in relation to the cumulative collision risk, given the potential for populations to encounter these wind farms during passage movements. Overall, the potential for cumulative impacts would be species specific as it would depend upon the individual sensitivities of each species and, most importantly, where the birds originate from and, hence, their potential to interact with other wind farms (i.e. on passage or foraging routes).

415. **Other activities**: There is potential for other marine industries to have cumulative impacts with Thanet Extension. The cumulative assessment will take into account the fact that birds may already be habituated to on-going activities and therefore these may be considered to be part of the baseline conditions to avoid overestimation or exaggeration of potential impacts.

2.8.2.5 Transboundary impacts

416. Due to the wide-ranging nature of some seabird species, there is potential for Thanet Extension to have impacts on birds from other member states. Vattenfall will undertake work to identify potential receptors and stakeholders.

2.8.2.6 Summary of potential impacts

Table 2.16 Summary of the potential impacts on offshore ornithology which are proposed to be scoped in (✓) and scoped out (x).

Potential impacts	Construction	Operation	Decommissioning
Disturbance and displacement	✓	✓	✓
Indirect impacts through effects on habitats and prey species within the proposed Wind Farm Area	✓	✓	✓
Indirect impacts through effects on habitats and prey species within the proposed Offshore Export Cable	✓	×	×

Potential impacts	Construction	Operation	Decommissioning
Corridor			
Collision risk	×	✓	×
Barrier effect	×	✓	×
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

2.8.3 Mitigation

417. The need for mitigation (and the feasibility of this) will be dependent on the results of site specific survey and the impact assessment. Consultation with key ornithological stakeholders will be ongoing throughout the EIA process and will include discussion of the need for mitigation and the feasibility of potential options.

2.8.4 Approach to assessment and data gathering

418. Further surveys are currently being undertaken across the proposed Wind Farm Area to help define the baseline ornithological conditions for the site. Boat-based surveys were commenced in January of 2016, however on the basis of advice from Natural England (letter of 3rd March 2016 from Natural England to Vattenfall), communicating a clear preference for digital aerial survey methods, boat based surveys were cancelled in March 2016 to be replaced by digital aerial surveys from March 2016 onwards. Surveys will encompass the existing TOWF area, the proposed Wind Farm Area, plus a 4km buffer.

419. Following completion of a12 month survey, an Annual Report will be provided detailing and analysing the results of the 12 aerial surveys and 3 boat based surveys, and including a review of existing data in relation to Thanet. This report will then be submitted to Natural England and other relevant stakeholders for consideration pending confirmation of the need for further aerial surveys beyond February 2017. Given the breadth of existing baseline data for TOWF and the wider local area, it is proposed that the DCO application for Thanet Extension would be submitted on the basis of a single year of additional baseline data, pending further discussion in 2017 on the need for additional surveys.

420. Digital aerial surveys collect data on the species of bird (or groups if is not possible to distinguish species[7]), location, numbers, sex and age (where possible), flight heights and flight direction. The EIA will identify the nature of site usage by the birds recorded (e.g. seasonal variation, extent of foraging, overwintering or on passage) in order to determine the importance of the site for seabirds throughout the year relative to the wider area.

421. Detailed analysis will include abundance and density estimates (with associated confidence intervals and levels of precision). Where possible, flight height data (collected for all records of birds in flight) will be used in the CRM, as will generic flight height data (Johnston *et al.* 2014a, 2014b), subject to discussion with stakeholders.

422. Valuable additional contextual information will derive from the existing surveys of the areas around the proposed Wind Farm Area, including those undertaken for other operational wind farms in the Outer Thames area, Natural England's condition monitoring of the Outer Thames SPA and particularly from those undertaken in relation to the TOWF site. Surveys and monitoring associated with other offshore wind farms in this region, and elsewhere, will also provide relevant information, as will data that are (or will become) available from the RSPB seabird tagging studies (e.g. at the Flamborough Head and Bempton Cliffs SPA and the Alde-Ore Estuary SPA).

423. Further, potentially highly relevant, information on bird activity and behaviour in relation to offshore wind farms is likely to arise from the findings of the Offshore Renewables Joint Industry Programme (ORJIP) study into bird collision risk and avoidance (https://www.carbontrust.com/about-us/press/2013/11/3m-joint-industry-programme-to-accelerate-the-deployment-of-the-uk-offshore-wind-programme/). Fieldwork for this study was undertaken at TOWF and is likely to report sometime in 2017.

424. Reference populations for each species, and the associated population sizes, for the assessment of Thanet Extension will be based on the best available information at the time of undertaking the assessment and will be agreed with key stakeholders.

425. The sensitivity of each species will be determined based on the size of its population, its conservation status and its known sensitivity to offshore wind farms. Species identified as sensitive receptors will be subject to full impact assessment against the

[7] For example, it is likely that a proportion of the records for the different species of large gulls, auks and (importantly in the context of Thanet Extension) divers would have to be classed as 'large gulls', 'auks' and 'divers', respectively.

impacts listed above. The impact assessment will be undertaken in line with guidance by IEEM (2010) and expert opinion.

2.9 Commercial Fisheries

2.9.1 Baseline

2.9.1.1 Data sources

426. As well as available public information, Table 2.17 provides an outline of data sources that will be used to inform the EIA. No site specific surveys for commercial species are proposed.

Table 2.17 Available commercial fisheries datasets

Data	Coverage	Date
UK fleet landings and foreign fleet landings into the UK by port 2014 (MMO, 2016).	Coverage includes Thanet Extension Proposed Wind Farm Area	Accessed 2016
UK Sea Fisheries Annual Statistics Report 2015	Coverage includes Thanet Extension Proposed Wind Farm Area	Sept 2016
International Bottom Trawl Survey (IBTS) CPUE (ICES, 2016)	Coverage includes Thanet Extension Proposed Wind Farm Area	2016
Spawning and nursery grounds (Coull *et al.*, 1998)	Coverage includes Thanet Extension Proposed Wind Farm Area	1998
Spawning and nursery grounds (Ellis, 2012)	Coverage includes Thanet Extension Proposed Wind Farm Area	2012
VMS data for ICES Rectangle 31F1 (on request from MMO)	Coverage includes Thanet Extension Proposed Wind Farm Area	2010-2014
Aerial surveillance data for ICES Rectangle 31F1 (on request from MMO)	Coverage includes Thanet Extension Proposed Wind Farm Area	2010-2014
Goodwin Sands Environmental Impact Assessment, Volume 3- Appendix 13.1 MEP Full Characterisation of Commercial Fishing and Charter Angling Activity at and Around the Goodwin Sands.	Coverage includes Thanet Extension Proposed Wind Farm Area	May, 2016
TOWF Environmental Statement- Section 12 Commercial Fisheries	Coverage includes Thanet Extension Proposed Wind Farm Area	2005
Consultation with local fishing industry/KEIFCA	Coverage includes Thanet Extension Proposed Wind Farm Area	2017

2.9.1.2 Commercial fisheries status

Species

427. The Thames Estuary has long supported exploitable populations of a wide range of fish species, including eels *Anguilla anguilla*, sole *Solea solea*, plaice *Pleuronectes platessa*, thornback ray (roker) *Raja clavata*, cod *Gadus morhua*, herring *Clupea harengus*, sprat *Sprattus sprattus*, bass *Dicentrarchus labrax* and spurdog *Squalus acanthias*.

428. Important shellfish species landed to commercial fishing ports in Kent include, lobster *Homarus gammarus*, king scallop *Pecten maximus*, brown crab *Cancerus pagurus*, whelk *Buccinum undatum* and oyster *Ostrea edulis*.

429. Sole is the most valuable species targeted by local, UK and non-UK vessels around the proposed Wind Farm Area and Offshore Export Cable Corridor, generating £2.6 million between 2010 and 2014. Lobster, whelk and crab are also important around the Thanet area and contribute significantly to the value of landings. Locally, £10m of fish and shellfish have been landed at Ramsgate, Whitstable and Folkestone between 2010 and 2014. Whelk potting currently represents a significant percentage of the Ramsgate landings with seven vessels currently potting

430. Fishing type is varied with local (under 10m) fleet from Ramsgate targeting sole using gillnets, although trawling, dredging, potting and angling methods are frequently used in the Thanet area. The main fishing method used for Dover Sole by Thanet vessels is bottom drifted trammel nets. Static trammel and gill nets are also used for cod, skate and bass. Trawling is used but there are only currently two trawlers based in Ramsgate and around five in Whitstable.

431. The proposed Wind Farm Area and proposed Offshore Export cable Corridor lie within ICES statistical block 31F1 sub-square 2, which is within the jurisdiction of Kent and Essex Sea Fisheries Inland Fisheries Conservation Authority (KEFICA) (Anatec 2015).

432. There are several primary fishing ports within local area where fishing vessels potentially access the proposed Wind Farm Area:

- Whitstable;
- Ramsgate;
- Margate;
- Broadstairs;
- Deal;
- Dover; and

- Folkstone.

433. Information for the area around the TOWF indicate that the majority of fishing vessels using the site are based in Ramsgate or Whitstable. In addition to UK vessels, the area is fished by Dutch fishing vessels, with occasionally Belgium and French vessels using the site too.

434. There are 20 fishing vessels based in Ramsgate and are also seasonal additions and dependant on species and time of year, this can add three or four vessels. Ramsgate, Whitstable and Folkstone are the main ports for landing catches in the Thanet area. Defra data collected as part of the Balanced Seas project, indicated that the proposed Wind Farm Area is of medium importance, although it is likely to be considered of higher importance to local fishermen.

2.9.2 Potential Impacts

2.9.2.1 Potential impacts during construction

435. **Impacts on landings of commercially exploitable species**: There is the potential for temporary displacement of fish species of commercial importance from the area of the construction works as a result of, for example, underwater noise associated with piling activities (finfish) or from physical disturbance of the seabed (which would be most likely to impact upon benthic and demersal fish and shellfish). This part of the assessment will be cross referenced to Fish and Shellfish Ecology assessment.

436. **Loss of or restricted access to traditional fishing grounds**: During the construction phase, it is generally best practice to establish safety zones around construction works to prevent incidents. During installation of the offshore export cables, fishermen would be advised to maintain a safe distance from the offshore cable laying vessel.

437. **Displacement of fishing activity**: Displacement during the construction period may lead to increased use of other areas outside the proposed Wind Farm Area.

438. **Increased collision risk**: Navigational safety issues will be covered by the NRA as part of the impact assessment for shipping and navigation and will be discussed and agreed with relevant stakeholders, including appropriate commercial fisheries representatives.

439. **Increased steaming times**: The construction of the proposed Wind Farm Area, proposed Offshore Export Cable Corridor and the associated construction vessels (including safety zones) in the area would potentially exclude the passage of fishing boats in some areas. This has the potential to slightly increase steaming times to

reach fishing grounds. It should be noted that the presence of the TOWF site will have increased steaming times since its construction.

440. **Impacts to ancillary and fishing support services**: Impacts on fishing activity may result in impacts to services associated with the fishing industry (fish wholesalers, processors, chandlers, harbours and suppliers).

2.9.2.2 Potential impacts during operation

441. **Impacts on landings of commercially exploitable species:** Monitoring studies conducted in existing offshore wind farms in the North Sea, such as Kentish Flats in the UK (Vattenfall, 2009) and Horns Rev in Denmark (DTU Aqua, 2011) indicate that there have been minor or no changes to the abundance, distribution or observed behaviour of the fish resource at the sites that could be related to the construction or operation of the wind farms, with any changes recorded being considered to be indistinguishable from natural variability in the case of Kentish Flats (Vattenfall, 2009). It is predicted that there would be minimal impacts on commercial landings results as a result of the wind farm. This part of the assessment will be cross referenced to Fish and Shellfish Ecology assessment.

442. **Loss of or restricted access to traditional fishing grounds:** Due to the physical footprint of the proposed Wind Farm Area infrastructure, some seabed which was previously able to be fished would be inaccessible. In addition, some types of fishing may be displaced / excluded due to the presence of the turbines (i.e. drifting or trawling). A full assessment of impacts will be undertaken as part of the EIA. During maintenance works a temporary advisory safety zone may be required around certain activities. Further discussion will be undertaken with relevant stakeholders during the pre-application process to establish appropriate operating procedures and to address any outstanding concerns from the fishing industry.

443. **Displacement of fishing activity:** This impact will be considered within the EIA.

444. **Loss of or damage to fishing gear:** All cables should be buried or protected by mattresses or other protective substrate associated with cable crossings (if required).

445. It would be a requirement of the Marine Licence that any large items of equipment lost overboard during construction works which are potential snagging hazards are located and recovered. An assessment on the potential impacts of snagging will be undertaken as part of the EIA and if appropriate, mitigation to reduce the risk of snagging would be identified.

446. **Increased collision risk:** Navigational safety issues will be covered by the NRA as part of the impact assessment for shipping and navigation and would be discussed and agreed with the relevant stakeholders. The impact on fishing vessels will be included within the EIAs shipping and navigational assessment.

447. **Increased steaming times:** During the operational phase, it is not anticipated that there would be significant restrictions on vessel access. For certain maintenance activities there may need to be restrictions in some areas (e.g. around temporary safety zones for O&M vessels). The impact on steaming times to reach fishing grounds will be assessed in the EIA but is expected to be minimal and short term.

448. **Impacts to ancillary and fishing support services:** Impacts on fishing activity may result in impacts to services associated with the fishing industry (fish wholesalers, processors, chandlers, harbours and suppliers). Potential impacts to ancillary services would be dependent on the significance of other impacts that may result in changes to fishing activity baseline conditions.

2.9.2.3 Potential impacts during decommissioning

449. The potential impacts associated with decommissioning are likely to be similar to those during the construction phase. Foundations are likely to be removed at or below the seabed and cables may be removed. A decommissioning plan would be developed and approved by the Regulatory Authorities to ensure that any hazards to fishing activities are identified and either removed or marked clearly on charts, which would mitigate the risk.

2.9.2.4 Potential cumulative impacts

450. **Displacement as result of other wind farms:** Installation of multiple wind farms is a similar geographic area has the potential to displace and concentrate fishing activity in nearby areas. Due to the number of offshore wind farms already installed or planned for the central and southern North Sea there is the potential for cumulative impacts from the overall loss of seabed and increased transit times.

451. **Interactions with other activities:** Cumulative impacts upon commercial fisheries may occur between Thanet Extension and other activities or developments in the region. The following activities will be taken into account in the assessment:

- Aggregate extraction and dredging;
- Navigation and shipping;
- Existing and planned construction of sub-sea cables and pipelines;
- O&G industrial activities
- Potential port and harbour development; and

- The designation of Marine Protected Areas and potential effects of management measures (and other nature conservation sites).

2.9.2.5 Transboundary impacts

452. There is potential for transboundary impacts upon fisheries, particularly with regard to the issue of impacts on Dutch, Belgium and French vessels and the displacement of fishing effort, potentially in to international waters.

2.9.2.6 Summary of potential impacts

Table 2.18 Summary of impacts relating to commercial fisheries (scoped in (✓) or scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Impacts on landings of commercially exploited species	✓	✓	✓
Loss of or restricted access to traditional fishing grounds	✓	✓	✓
Displacement of fishing activity	✓	✓	✓
Loss of or damage to fishing gear	✓	✓	✓
Increased collision risk (to be covered by NRA)	Included in shipping and navigation assessment.	Included in shipping and navigation assessment	Included in shipping and navigation assessment
Increased steaming times	✓	✓	✓
Impacts to ancillary services		✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

2.9.3 Mitigation

453. Identification of appropriate mitigation will be undertaken as part of the EIA. Mitigation measures and monitoring options would be agreed with local, national and international fishing bodies as appropriate through consultation and would follow relevant guidance such as:

- COWRIE options and opportunities for marine fisheries mitigation associated with wind farms (Blyth-Skyrme, 2010);
- MMO Review of environmental data associated with post-consent monitoring of licence conditions of offshore wind farms (MMO, 2014); and

- Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW), Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison (FLOWW, 2014).

2.9.4 Approach to assessment and data gathering

454. The approach to undertaking the assessment will be agreed with regulators and stakeholders, however broadly, it will be in accordance with the Seafish, 2012. Best practice guidance for fishing industry financial and economic impact assessment.

455. The assessment will include;

- Estimation of commercial, charter and recreational fishing activity in the site;
- Identification of important fishing grounds;
- Overview of fishing activity, seasonality, fishing methods, base ports;
- Identification of key species of importance;
- Estimation of importance of windfarm site to the UK and international fishing fleets; and
- Identification of key transiting routes.

456. An assessment of the impacts will be informed through reference to existing studies from other wind farms, the use of existing monitoring and catch data from the MMO, including vessels surveillance and AIS data, as well as through discussions with the KEIFCA and the local fishing fleet. The assessment will aim to estimate the importance of the proposed Wind Farm Area to the UK and international fishing fleets and quantify impacts to the fleet. Based on experience from other EIAs, it is likely to be difficult to assign a monetary value; however, the assessment would seek to estimate of value through identifying likely landings volumes and key species of importance. The assessment will also identify and assess potential impacts to the wider fishing industry, which would be inferred through changes to fishing activity baseline conditions. If it is determined there would be no significant impacts to fishing fleet using the proposed Wind Farm Area, it will be assumed that there would be no impact on fisheries supporting services as a result of the project.

2.10 Shipping and Navigation

2.10.1 Baseline

2.10.1.1 Data Sources

457. The available shipping and navigation datasets upon which this section is based are listed in Table 2.19. Planned datasets, for use as part of the final EIA are also listed in Table 2.19.

458. The study area under consideration for Thanet Extension was determined as the proposed Wind Farm Area with a buffer of 10nm[8].

Table 2.19 Available and planned shipping and navigation datasets

Data	Coverage	Date
Available		
Marine traffic survey Automatic Identification System (AIS) data collected from coastal AIS stations.	Summer Winter	June/July2014 December 2014
Marine Accident Investigation Branch (MAIB) maritime incident data.	Within study area (2004 – 2013)	March 2015
Admiralty Sailing Directions (NP 28)	Within study area	March 2015
UK Admiralty Charts issued by the United Kingdom Hydrographic Office (UKHO).	Within study area	March 2015
Royal National Lifeboat Institute (RNLI) maritime incident data.	Within study area	March 2015
Marine aggregates dredging data (licensed and active areas) from The Crown Estate.	Within study area	March 2015
British Marine Aggregate Producers Association (BMAPA) dredger transit routes.	Within study area	March 2015
Ministry of Defence exercise areas and explosive dumping grounds from Admiralty Charts.	Within study area	March 2015

[8] 1nm (nautical mile) = 1,852metres

Data	Coverage	Date
Existing locations of O&G platforms and other infrastructure such as pipelines and wells from Admiralty Charts.	Within study area	March 2015
Anchorage Areas from Admiralty Charts.	Within study area	March 2015
International Maritime Organisation (IMO) routeing measures from Admiralty Charts.	Within study area	March 2015
Royal Yachting Association (RYA) UK Coastal Atlas of Recreational Boating (2009) and geographical information systems shapefiles.	Within study area	March 2015
Fishing data through AIS only.	Within study area	March 2015
Planned		
Marine Traffic Survey Data (AIS, radar and visual observations) collected from vessel based surveys and AIS receivers located on met masts and shore-based receivers.	Within study area	2016/2017
Fishing surveillance and satellite data (where available)		Latest available

2.10.2 Baseline Overview

459. Anatec were commissioned to undertake a feasibility study for Thanet Extension using Marine traffic survey data has been collected from coastal AIS stations throughout June / July 2014 (summer) and December 2014 (winter) (Anatec, 2015). The information in this baseline is largely taken from that report. Note that this work was based upon an indicative site boundary which has since been refined.

460. The proposed Wind Farm Area is in an area of low to medium density shipping with density increasing in the north-west and the south-east corners of the area. In the south-east the shipping density is medium density and in the north-west the shipping density increases from medium to high (Anatec, 2015).

461. For TOWF, traffic was shown to disperse around the wind farm for navigational safety due to the depth of water, which would account for the low shipping densities in this area.

462. The majority of vessels transiting within 10nm of the TOWF site were cargo vessels (54.2% of marine traffic throughout summer and 61.0% throughout winter) and tankers (18.9% of marine traffic throughout summer and 25.4% throughout winter). Recreational vessels also represent a significant proportion of marine traffic throughout the summer survey period (11.1%) however this drops to 0.3% throughout the winter survey period which is reflective of the highly seasonal nature of recreational traffic. Wind farm support vessels were recorded throughout both the summer and winter surveys transiting between Ramsgate to London Array Offshore Wind Farm representing 5.8% of marine traffic throughout the summer survey period and 2.9% throughout the winter survey period (Anatec, 2015).

463. At the time of writing the TOWF ES, the Marine Accident Investigation Board (MAIB) navigational incident database had recorded 19 hazardous incidents or close quarter situations reported in the TOWF site in the previous 14.67 years, an average of 1.30 incidents per annum. The proposed Wind Farm Area is relatively underused and has a low incident rate when compared to other areas (TOWL, 2005). Updated MAIB data showed that 9 incidents occurred both within and in close proximity to the TOWF site and the proposed Wind Farm Area (Anatec, 2015).

2.10.3 Navigational Features

2.10.3.1 Commercial Shipping

464. Cargo vessels were the most frequently recorded vessel type throughout the survey period representing approximately 54% of marine traffic throughout the summer survey and 61% of traffic throughout the winter survey. An average of 98 unique cargo vessels per day was recorded within the study area.

465. Tankers (including crude, oil products and other liquids) were also frequently recorded throughout the survey period and represented approximately 18.9% of marine traffic throughout summer and 25% throughout winter. An average of approximately 37 unique tanker vessels per day was recorded within the study area.

466. Commercial ferries recorded throughout the survey period include Roll on Roll off vessels (Ro-Ro's) on regularly scheduled services (see Table 2.20).

Table 2.20 Summary of commercial ferry operations

Operator	Route
Cobelfret	Purfleet – Zeebrugge
	Purfleet – Rotterdam
	Dagenham - Vlissingen
P&O	Tlbury - Zeebrugge
Stena Line	Tilbury - Zeebrugge

467. Figure 2.9 illustrates the navigational features in the vicinity of the proposed Wind Farm Area.

2.10.3.2 Fishing Vessels

468. Commercial fishing is based on AIS data only. AIS data does not show significant fishing vessel activity within the TOWF site and the proposed Wind Farm Area. There are however a number of vessels transiting within and in proximity to the sites (Anatec, 2015). Some potting activity was identified to the west of the TOWF site; which would be within the proposed Wind Farm Area. Note that AIS is likely to be an under-representation of activity in a given area, as vessels under 10m are not required to carry AIS.

2.10.3.3 Recreational Vessels

469. The division of recreational cruising routes into heavy, medium and light use is based on the following classification:

- Heavy Use – Very popular routes on which a minimum of six or more recreational vessels would probably be seen at all times during summer daylight hours. These also include entrances to harbours, anchorages and places of refuge.
- Medium Use – Popular routes on which some recreational craft would be seen at most times during summer daylight hours.
- Light Use – Routes known to be in common use but which do not qualify for medium or heavy classification.

470. The Anatec 2015 report illustrates tracks of the recreational vessels recorded on AIS throughout the survey period, the RYA cruising routes and the RYA sailing / racing areas. There is a notable level of recreational activity within the study area.

2.10.3.4 Other receptors

471. There are no oil & gas or storage areas (or associated traffic) for analysis within the 10nm study area around the proposed Wind Farm Area.

472. Dredger vessels were recorded in the area during the survey period.

473. The highest density areas in terms of anchoring vessel activity were located to the north (Tongue anchorage) and west (Margate Roads anchorage) of the proposed extension overlapping with the designated anchorage areas (Anatec, 2015). Both designated sites are used by vessels awaiting pilots or berths within the Thames and Medway. There are also isolated areas of anchoring vessel activity which corresponds to single vessels recorded at anchor. Vessels which were identified at anchor within both TOWF and London Array Offshore Wind Farm were excluded from this assessment as it is most likely that vessels were holding position on offshore structures rather than at anchor.

474. Marine Environmental High Risk Areas (MEHRAs) are areas that have been identified by the UK Government, as having environmental sensitivity and at high risk of pollution from ships. The Kent coastal area to the west of the proposed Wind Farm Area is classified as a MEHRA. Particularly Sensitive Sea Areas (PSSAs) are areas that need special protection through action by the IMO because of its significance for recognised ecological, socio-economic or scientific reasons which may be vulnerable to damage by international maritime activities. All of the waters of the study area are classified as a PSSA.

475. While there are MoD PEXAs in close proximity to the proposed Wind Farm Area, no restrictions are placed on the right to transit the practice areas at any time although mariners are advised to exercise caution. Exercise and firing only takes place when the areas are considered to be clear of all shipping.

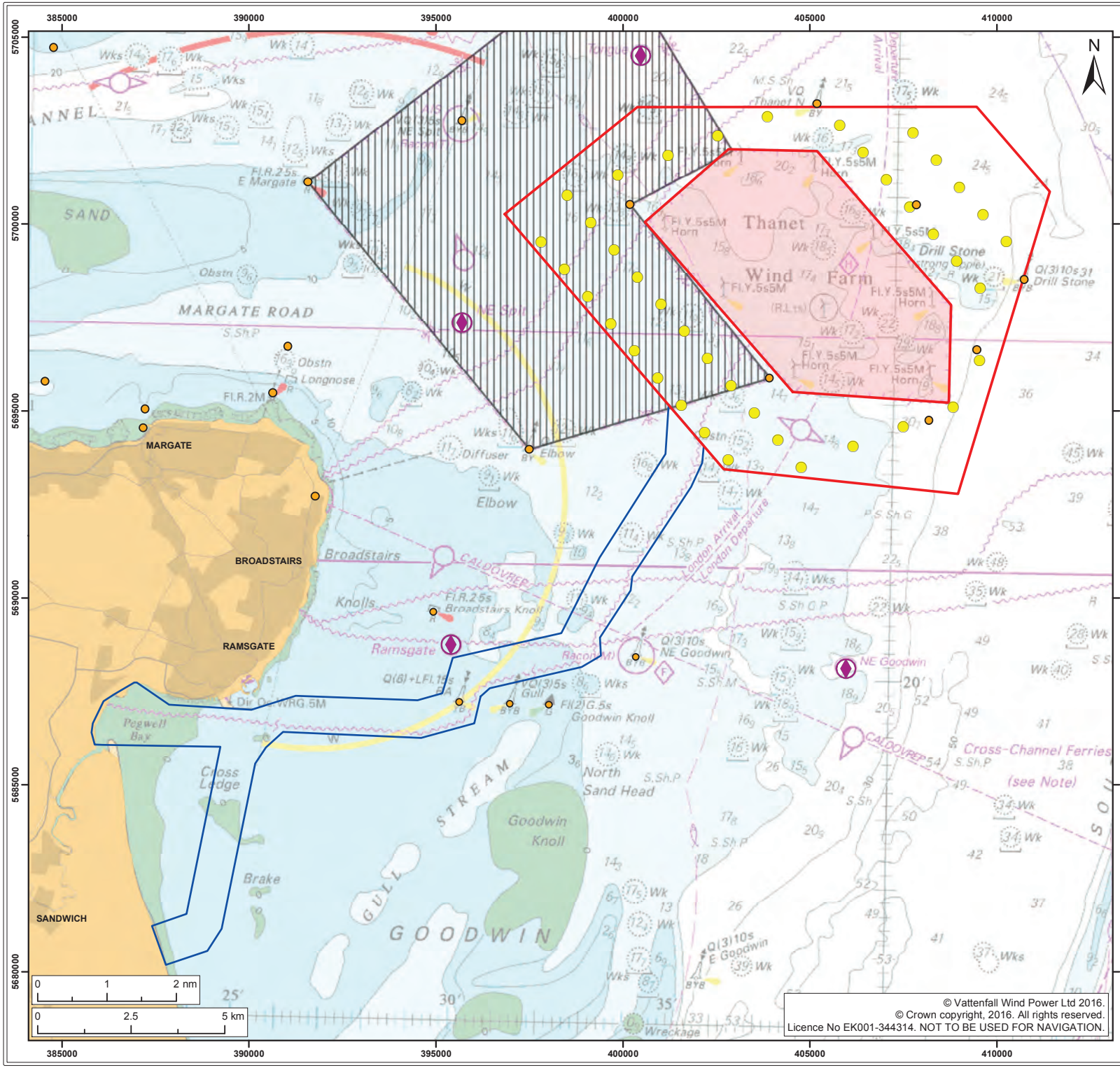
476. The Maritime and Coastguard Agency (MCA) and Port of London Authority (PLA) operate two radars in the Dover Strait and the Thames Estuary approaches at Dover and Margate respectively. Three Port Authorities operate in this area, namely Dover Port Authority, Medway Ports Authority and the PLA. Each of these operates radar systems for local control of shipping movements. It can be expected that radars used by these organisations would be located to provide significant range coverage of the sea surface.

477. There are numerous features associated with the high level of traffic and ports in the area noted on the charts; as well as south bound traffic to the Dover Straits TSS. The location of the Very High Frequency (VHF) calling points and the pilot boarding stations are also in close proximity. Pilot vessels are utilised to transport pilots from port to larger vessels which require pilotage inward to Thames and Medway ports. Throughout the survey period pilot boarding vessels were recorded transiting from Ramsgate (pilot base) to designated anchorage areas to the west of the TOWF site. Pilot vessels comprised approximately 1.0% of marine traffic throughout both the

summer and winter survey periods. Although the majority of vessels do board further south from the NE Spit cardinal buoy there is still a number of larger (deep draught) vessels boarding within or to the north of the proposed Wind Farm Area.

478. The two closest pilot boarding stations to the Thanet Extension Offshore Wind Farm are NE Spit Deep Water (Tongue) located approximately 1.0nm north and NE Spit located approximately 1.9nm west. Throughout the traffic survey pilot boats were recorded transferring pilots to a variety of vessel types including, cargo vessels, tankers and dredgers (although it is noted that some vessels do carry pilotage exemption certificates).

479. London Array Offshore Wind Farm is the closest operational wind farm to the proposed extension, located approximately 7.1nm north of the TOWF site boundary. The marine traffic survey data (collected between June 2014 – Dec 2014) showed wind farm support vessels were recorded transiting from Ramsgate to London Array Offshore Wind Farm (Anatec 2015). A proportion of these wind farm support vessel tracks intersect the proposed Wind Farm Area.



Thanet Extension Offshore Wind Farm

- Proposed Wind Farm Area
- Wind Turbine
- Proposed Offshore Export Cable Corridor

Thanet Offshore Wind Farm - Operational

- TWOF
- No Anchorage Area
- Buoys
- Pilot Boarding Locations

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title: Navigational Features

Figure: 2.9 | Drawing No: PB5894-SCO-2-013

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	26/10/16	AB	PP	A3	1:100,000

Co-ordinate system: ETRS 1989 UTM Zone 31N **EPSG:** 25831

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2.10.4 Potential Impacts

480. The sections below summarise the potential impacts of the proposed project on navigational receptors identified as part of the baseline assessment. This section includes a summary of the likely impacts. However, it should be noted that a full baseline assessment as part of the NRA may identify additional impacts from receptors that could not have been identified using the data considered within this Scoping Report.

2.10.4.1 Potential impacts during construction

481. **Vessel Routing:** From the desk top review of AIS data it was identified that there are transit routes currently passing adjacent to the proposed Wind Farm Area which are likely to be displaced during construction including displacement due to presence of safety zones around partially constructed structures.

482. The AIS data shows that the routes are used primarily by cargo vessels and tankers; however recreational, fishing vessels and pilot vessels are also included and may be impacted.

483. **Displacement of Third Party Marine Activities:** Fishing vessels (engaged in fishing) and recreational users are also likely to be displaced given the risks associated with passing in proximity to construction activities and as a result of the presence of temporary safety zones.

484. **Increased Collision Risk:** Construction activities within the proposed Wind Farm Area, including construction vessels and safety zones, may displace commercial vessels, commercial fishing vessels (in transit) and recreational vessels, leading to an increase in vessel-to-vessel collision risk.

485. Vessels operating on-site are expected to include, but are not limited to, heavy lift construction vessels, crew transfer vessels, barges, jack-up vessels, cable installation vessels and tugs. When they are restricted in their ability to manoeuvre or undertaking sensitive operations they would have advisory safety zones around them, again temporarily displacing other vessels.

486. Experience shows that it is unlikely that vessels would deliberately pass between on-going construction activities within the sites, with passage plans instead altered to take the presence of hazards into account. The extent of this and the impact the proposed project may have upon navigational receptors (i.e. increased voyage distances and times) would depend upon the phase and extent of development. The displacement of traffic to outside the proposed Wind Farm Area and subsequent

reduction in sea room may lead to a change in the number of vessel-to-vessel encounters and subsequently a change in the collision risk.

487. **Allision Risk:** The physical presence of partially constructed structures within the proposed Wind Farm Area would cause additional allision risk for all vessels including commercial vessels (including pilot vessels), recreational craft and commercial fishing vessels.

488. Fishing vessels navigating between ports and fishing grounds would be exposed to allision risks in the same way as commercial vessels, but vessels actively fishing within the proposed Wind Farm Area could be subject to a further risk of allision from partially constructed turbines given the exposure to them.

489. The physical presence of partially constructed structures within the proposed Wind Farm Area would also increase allision risk to all vessels not under command (NUC) including commercial vessels, recreational users and commercial fishing vessels in an emergency situation (including machinery related problems or navigational system errors).

490. The physical presence of partially constructed structures may also cause a gear snagging risk for commercial fishing vessels with potential for gear to be damaged or vessel stability impacted.

491. **Interaction with Partially Constructed Subsea Cables:** The physical presence of partially installed cables (which may be exposed or partially buried) could result in an increased risk of anchor snagging for commercial vessels and commercial fishing vessels (in transit). This impact would be associated with the export and inter array cables.

492. In addition, the physical presence of partially installed cables (which may be exposed or partially buried) could result in an increased risk of commercial vessel gear snagging, with potential for gear to be damaged or vessel stability impacted.

493. **Impacts on Emergency Response Resources:** Construction activities associated with the proposed project may diminish emergency response capability (including Search and Rescue (SAR) and pollution response) within the prosed project area during construction.

2.10.4.2 Potential impacts during operation

494. **Vessel Routeing:** From the desk top review of AIS data it was identified that there are transit routes currently passing in close proximity to the proposed Thanet Extension Wind Farm Area that are likely to be displaced during the operational phase. The extent of this is dependent on the design of the proposed Wind Farm

Area. This would be influenced by the number and alignment of wind turbines north west of the TOWF site.

495. The routes are used primarily by cargo vessels and tankers; however recreational, fishing and pilot vessels may also be impacted.

496. **Displacement of Third Party Activities:** Large commercial vessels are likely to be displaced during the operation phase dependent on the design and number of structures within the proposed Wind Farm Area. In addition, the area within which pilot vessels operate would be reduced through the development of Thanet Extension. The scale would be determined through refinement of the proposed Wind Farm Area layout.

497. **Increased Collision Risk:** The physical presence of the proposed project may displace other windfarm operators' vessels, commercial shipping, fishing vessels, recreational vessels and pilot vessels, leading to an increased vessel-to-vessel collision risk.

498. The following modelling scenarios will be considered during the NRA:

- Base case without wind farm;
- Base case with wind farm;
- Future case without wind farm (assuming 10% increase in traffic); and
- Future case with wind farm (assuming 10% increase in traffic) vessel-to-vessel only.

499. The future case increase may be altered during the NRA process if consultation feedback demonstrates that this may change significantly.

500. **Allision Risk:** The physical presence of the proposed project may cause additional vessel-to-structure allision risk for all vessels including commercial vessels, recreational users and commercial fishing vessels.

501. The presence of the proposed project may also increase allision risk to vessels NUC, including commercial vessels, recreational users and commercial fishing vessels in an emergency situation (including machinery related problems and drifting).

502. Recreational vessels passing in the vicinity of the turbines would be exposed to a risk of blade / mast interaction which is dependent upon the clearance of the rotor blades in different tidal and sea conditions as well as the air draught of yachts using the area. This risk should be minimised through adequate clearance height (as per RYA requirements) and implementation of an emergency shutdown system of the rotor blades.

503. **Interference with Marine Navigational Equipment:** The physical presence of structures within the proposed Wind Farm Area may create interference on the effectiveness or the operation of marine navigational equipment.

504. This includes the potential for radar interference effects on vessels passing in proximity to wind turbines, including those larger vessels using the IMO Deep Water Routes (DWRs) which are at a minimum of one nautical mile from the proposed Wind Farm Area. This could lead to increased vessel collision risks, especially in reduced visibility. This distance shall be reviewed during the EIA process to assess the proximity of turbines from the red line boundary of the sites.

505. **Interaction with Subsea Cables:** As part of the embedded mitigation planned cables would be either buried or protected by mattresses or other protective substrate associated with cable crossings (if required) to ensure that they do not pose a risk to vessel anchoring or use of gear within the area. This would also include mitigations to ensure that they are maintained throughout the life of the project and do not become exposed.

506. **Impacts on Emergency Response Resources:** Operational activities associated with the proposed project have the potential to impact on emergency response capability (including SAR and pollution response) within the southern North Sea area during operation. Compliance with protocols and requirements relating to emergency response will be met.

2.10.4.3 Potential impacts during decommissioning

507. The same impacts as per the construction and operational stages will be assessed for decommissioning.

2.10.4.4 Potential cumulative impacts

508. **Interactions with other wind farms:** The port of Ramsgate is the operations and maintenance base for the London Array Wind Farm. They transit north from Ramsgate, passing both west (over the Margate sands) and east of the NE Spit cardinal buoy. Should development extend from the TOWF site to the NE Spit, the wind farm support vessels could continue to pass to the west but their movements could be restricted. It is also likely that wind farm support vessels transiting through the development would have to reduce speed and which could then impact on transit times and thus the efficiency of the route.

509. **Interactions with other activities:** Cumulative impacts will be considered for shipping and navigation receptors, including other offshore developments, as well as associated with other marine operations. However it should be noted that fishing,

recreational and marine aggregate dredging transits would be considered as part of the baseline assessment.

2.10.4.5 Transboundary Impact Assessment

510. Similarly to the cumulative impacts, the NRA and ES would consider transboundary offshore wind developments with regards to vessel routeing and international ports. Again it should be noted that fishing, recreation and marine aggregate dredging impacts, although having the potential to be internationally owned or located, would be considered as part of the baseline assessment.

2.10.4.6 Summary of potential impacts

511. The following table shows the potential impact and consideration by phase.

Table 2.21 Summary of impacts relating to shipping and navigation (scoped in (✓) and scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Vessel Routeing	✓	✓	✓
Displacement of Third Party Activities	✓	✓	✓
Increased Collision Risk	✓	✓	✓
Allision Risk	✓	✓	✓
Interference with Marine Navigational Equipment	✓	✓	✓
Interaction with Subsea Cables	✓	✓	✓
Impacts on Emergency Response Resources	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

2.10.5 Mitigation

512. There are a range of measures that could be applied to mitigate the impacts of a wind farm development (including through site design). The following are potential measures that could be applied to a particular project, as appropriate to the level and type of risk determined during the EIA:

- Compliance with MCA Marine Guidance Note 543 (M+F) (MGN 543 M+F) including site and wind turbine design;
- Marked on Admiralty Charts;
- Promulgation of information and warnings through notices to mariners and other appropriate media;
- Continuous watch by multi-channel VHF, including Digital Selective Calling;

- Safety zones of appropriate configuration, extent and application to specified vessels;
- Appropriate means to notify and provide evidence of the infringement of safety zones;
- Marine Traffic Control for project vessel during construction;
- Creation of an Emergency Response Co-operation Plan with the relevant Maritime Rescue Co-ordination Centre from construction phase onwards;
- Inter-array and export cable protection;
- Marking and lighting the site in accordance with General Lighthouse Authority requirements (which includes a system of routine inspection and maintenance of lights and marks);
- Wind turbine rotor blade tip clearance at a minimum 22m above Mean High Water Springs; and
- Vessel nomination as guard vessel during construction / decommissioning activities.

2.10.6 Approach to assessment and data gathering

2.10.6.1 Data Sources

513. Consultation with navigational or cumulative stakeholders throughout the proposed project would be used to provide supplementary information. Consultees would include:

- MCA;
- Department for Transport;
- Ministry of Defence and Civil Aviation Authority;
- Trinity House;
- Chamber of Shipping;
- Royal National Lifeboat Institute;
- RYA;
- Cruising Association;
- Ports on the south east coast of the UK;
- Regular operators identified as part of the survey;
- Local stakeholders such as yacht clubs;
- National Federation of Fishermen's Organisation; and
- Transboundary or cumulative receptors identified as part of the assessment.

2.10.6.2 EIA Methodology

514. The assessment methodology would principally be based on the following:

- MCA MGN 543 (M+F) Offshore Renewable Energy Installations (OREI) Guidance on UK Navigational Practice, Safety and Emergency Response Issues (MCA, 2016);
- Department of Energy & Climate Change Methodology for Assessing the Marine Navigational Safety Risks of OREI (DECC 2013b).

515. Other guidance used within the assessment includes:

- IMO Guidelines for Formal Safety Assessment (FSA) (IMO, 2002);
- MCA Marine Guidance Note MGN 372 (M+F) (MGN 372 M+F) OREI Guidance to Mariners Operating in the Vicinity of UK OREIs (MCA 2008);
- DECC Guidance Notes on Safety Zones (DECC, 2007 as updated);
- RYA – The RYA's Position on Offshore Energy Developments: Paper 1 – Wind Energy (RYA, 2015); and
- International Association of Lighthouse Authorities (IALA) – O-139 the Marking of Man-Made Offshore Structures (IALA, 2013).

516. The NRA would follow a different assessment process from the EIA; although the approaches are very similar. The result of both would be an assessment of the risk posed by the proposed project to navigation and the mitigation required to minimise those risks. The MCA require that the DECC Methodology (DECC, 2013a) including the IMO FSA is used as a template for preparing an NRA.

517. The NRA would have a baseline data gathering phase broadly similar to the EIA, which would include marine traffic surveys, desk-based assessment and consultation to allow the identification of higher risk areas. This phase is followed by the FSA in line with the IMO FSA Process (IMO, 2002) and the DECC guidance (DECC, 2013a).

518. Following completion of the NRA, impacts that have a clear pathway of effect on receptors would be considered as part of the FSA process and will therefore be detailed within the assessment.

519. The assessment of potential risks and impacts on shipping and navigation would also be made with specific reference to Overarching NPS for Energy (EN-1) (July 2011); and NPS for Renewable Energy Infrastructure (EN-3) (July 2011).

2.11 Offshore Archaeology

2.11.1 Baseline

2.11.1.1 Data sources

520. Desktop archaeological information was taken from the TOWF ES (TOWL, 2005). That chapter was informed by information from Wessex Archaeology, which covered an area 2km either side of the TOWF site and offshore export cable corridor. Cartographic sources were collated from the Centre for Kentish Studies in Maidstone and the East Kent Archives Centre, Whitchurch, Dover. Wreck data was collected from the UKHO via SeaZone, and from the Maritime and Coastguard Agency Receiver of Wreck.

521. Provision was also made for the archaeological interpretation of primary data arising from the marine geophysical survey

2.11.1.2 Features

522. The floor of the North Sea contains prehistoric submarine archaeological remains which date back to around 100,000 ago (DTI, 2002). Human occupation of Britain dates back to 500,000 years ago since when there have been three glacial periods. The latest glacial episode, the Devensian, which ran from 70,000 years ago until approximately 12,000 BP, impacted the current geological and topographical evidence. Current sea levels were reached during medieval times and human settlement within the area has changed to reflect continuing developments in technology and culture (TOWL, 2005).

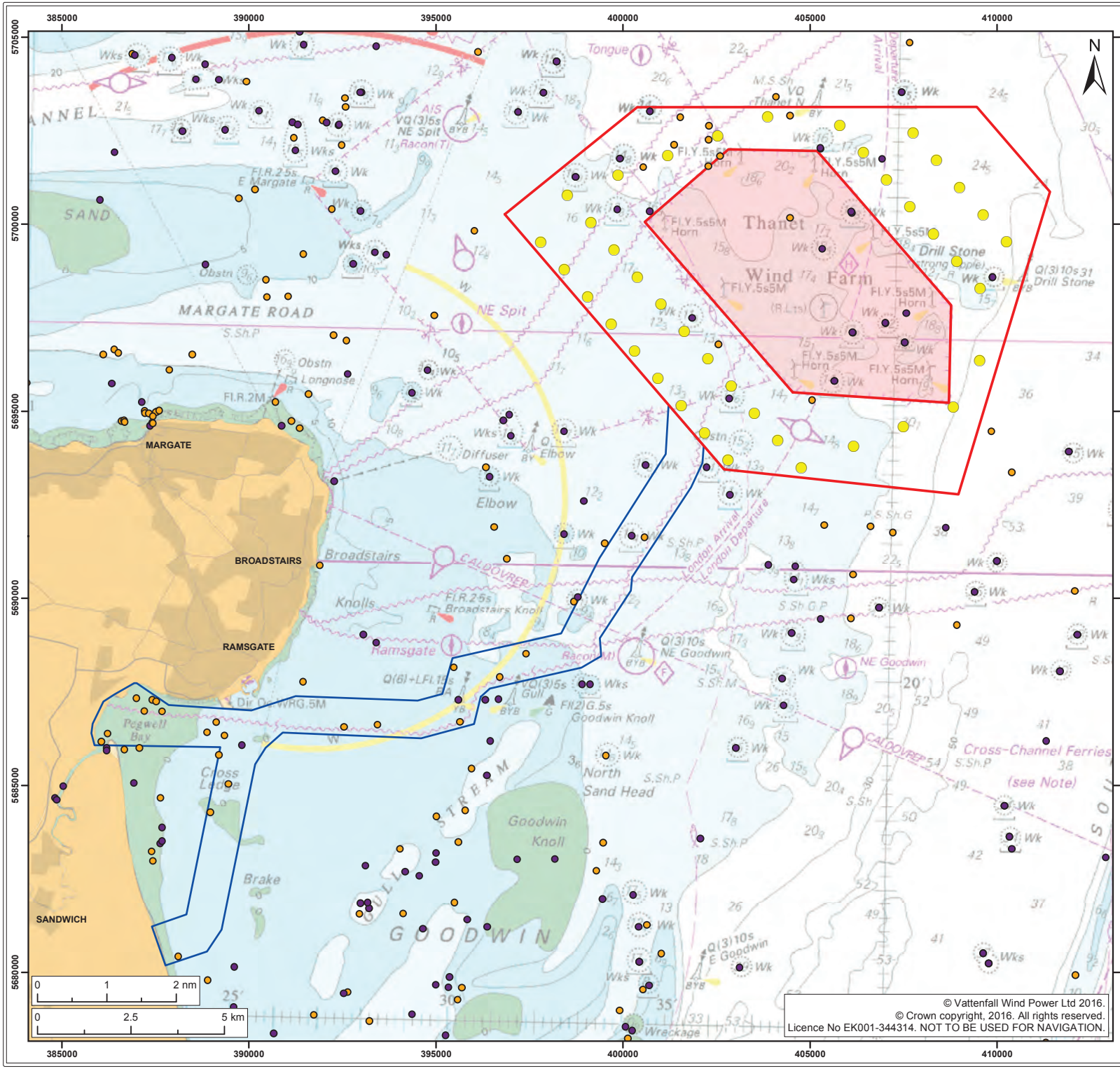
523. The geology of the area is characterised by gravels, sands and smaller muddier deposits. Some remains from the lower or middle Palaeolithic (50,000 to 30,000 BP) activity may be present, but due to glacial action in the Devensian period artefacts from more temporal periods are more likely to be discovered.

524. Potential for wrecks and associated marine artefacts around the proposed Wind Farm Area is high with over 25 live wrecks found. Evidence suggests that the area has the potential for wrecks since the Late Neolithic (7,500 to 6,500 BP). The proximity of Kent to the continent has provided a convenient landfall for migrants and traders and as such, the area has seen a steady increase in shipwrecks reflecting human development (TOWL, 2005, see Figure 2.10).

525. The Wantsum Channel (the area of sea that used to exist between the Isle of Thanet and the main land) was important for trade and defence in the late 3rd Century, and in Roman times (44 to 410AD) was an open and navigable waterway. Seafaring

activity continued into the Viking era and there is potential for remains from this period to be present.

526. Ramsgate developed as a port in medieval times and supported an increasing volume of vessels and hence more shipwrecks. This combined with extensive silting suggests that maritime remains may be preserved. Highly mobile sediments are also features of Pegwell Bay and large amounts of dredging at a site offshore from Pegwell Bay from Richborough Quay and the Port of Ramsgate may have caused increased sedimentation and increased the depths overlying identified and unidentified archaeological remains (TOWL, 2005).



Thanet Extension Offshore Wind Farm

- Proposed Wind Farm Area
- Wind Turbine
- Proposed Offshore Export Cable Corridor

Thanet Offshore Wind Farm - Operational

- TOWF
- Wrecks [1]
- Obstructions [1]

[1] OceanWise , 2016

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title: Known Wrecks

Figure: 2.10 | Drawing No: PB5894-SCO-2-014

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	26/10/16	AB	PP	A3	1:100,000

Co-ordinate system: ETRS 1989 UTM Zone 31N **EPSG:** 25831

VATTENFALL

Royal HaskoningDHV
Enhancing Society Together

2.11.2 Potential Impacts

527. Impacts upon archaeological assets are by their nature different from those upon ecological or other human environmental receptors. Assets would either be damaged or destroyed during construction if there is a pathway for impact. This impact would be permanent and there would be no way to replace the resource, as such the impact would be of major significance.

528. Therefore for this topic, impacts would largely be prevented through appropriate layout of the wind farm infrastructure. Wherever possible, infrastructure would be sited such that it avoids possible conflict with archaeological assets. In any case, from the perspective of a safe functioning plant it is necessary to avoid archaeological assets (particularly those made of metal) that could damage equipment.

2.11.2.1 Potential impacts during construction

529. **Direct physical disturbance:** The installation of the foundations for the wind turbines, potential scour protection and cables have the potential to cause direct disturbance and damage to known (including wrecks) and undiscovered artefacts of marine archaeological significance. Dependent upon the design of installed features, there may be a requirement for seabed preparation prior to installation which also has the potential to cause direct disturbance. Similar impacts may occur on surficial and shallow archaeology as a result of anchoring and jack-up activities associated with the construction works. Archaeological review of site specific geophysical and geotechnical datasets will ensure that known archaeological assets are avoided as part of the design process, with the potential for Archaeological Exclusions Zones (AEZs) within the development area.

530. With regard to unknown assets (for example those discovered during pre-construction or construction activity), procedures would be developed in conjunction with stakeholders to produce suitable mitigation measures for these. Implementation of these standard mitigation measures should reduce impacts so that they are not significant.

531. **Indirect physical disturbance:** As marine archaeological assets have often survived as a result of a stable environment, changes to hydrodynamic and sedimentary process could trigger renewed degradation as a result of changes in physical, biological or chemical processes. Thus changes in sediment transport or localised scour could have indirect impacts upon marine archaeological assets. The archaeological assessment will therefore need to take into account the results of

physical processes modelling and assessment to determine the likelihood and significance of indirect impacts occurring.

532. **Indirect disturbance of setting:** In assessing impacts to the historic environment it is also necessary to consider the setting of heritage assets defined as 'the surroundings in which an asset is experienced' (Historic England, 2015). Setting includes visual considerations and other environmental factors such as noise, dust and vibration, spatial associations, and consideration of the historic relationship between places.

533. The proposed Wind Farm Area is located an approximate distance of 8km from the coast. It is therefore proposed that impacts to the setting of onshore heritage assets from the offshore wind farm be scoped in. There would be potential temporary impacts relating to the presence of vessels associated with the construction of offshore cables close to the coast and activities at the landfall. These potential impacts would be assessed in respect of the setting of onshore heritage assets along the coast.

534. It is also proposed that the potential impacts of construction of the wind farm upon the setting of offshore heritage assets should be scoped in. Construction activities and additional vessel traffic would occur in the context of one of the busiest shipping channels between south-east England and mainland Europe and there is already an influence on the seascape from the existing features of the nearby gas rigs and their service vessels. Any impact upon the setting of offshore heritage assets is therefore unlikely to be considered significant.

2.11.2.2 Potential impacts during operation

535. **Direct physical disturbance:** Direct impacts during operation could occur as a result of routine maintenance activities if these disturb the seabed, however as areas would already have been disturbed during construction there would be limited scope for impact and any impacts are likely to be of lower magnitude than during construction. Exceptional maintenance activities have the potential to have a more significant impact on archaeological assets (for example if a cable needs to be replaced). However, given that known assets would have been avoided in the original layout, there would be limited potential for impacts from this source.

536. **Indirect physical disturbance:** Changes to hydrodynamic and sedimentary process during the operational phase could trigger renewed degradation as a result of changes in physical, biological or chemical processes. Thus changes in sediment transport or localised scour could have indirect impacts upon marine archaeological assets. The archaeological assessment will therefore need to take into account the

results of physical processes modelling and assessment to determine the likelihood and significance of indirect impacts occurring.

537. **Indirect disturbance of setting:** The potential impacts of the offshore wind farm on the setting of onshore and offshore heritage assets will be assessed. The setting offshore is already influenced by TOWF and passing shipping vessels in this area which may reduce the sensitivity and potential magnitude of change. This will be discussed fully within the ES.

2.11.2.3 Potential impacts during decommissioning

538. Impacts arising during the decommissioning are expected to be similar to those experienced during the construction phase. There would be a temporary impact from the activities on site to remove structures, but this would be of relatively short duration. The establishment of the archaeological environment baseline and subsequent assessment of impacts will result in the production of a detailed map of features of archaeological significance. This would facilitate the decommissioning works while minimising any impacts upon features of archaeological significance.

2.11.2.4 Potential cumulative impacts

539. Individual known archaeological receptors within the proposed Wind Farm Area and proposed Offshore Export Cable Corridor would not be subject to direct impacts from other known plans or projects as they are discrete and there would be no physical overlap of different infrastructure. Given that indirect impacts (i.e. impacts from scour or sediment transport changes) are likely to be highly localised and small scale it is not considered likely that there are pathways for cumulative indirect impacts.

540. There is potential though for cumulative impacts through the additive effect of small impacts across many projects, although to a great extent implementation of mitigation on each project should reduce this to impacts upon unknown assets. Each project would have an agreed Written Scheme of Investigation (WSI) which would cover the approach to unknown assets.

541. Although individual assets are discrete, taken together they could have collective heritage value, therefore multiple impacts upon similar assets could have a cumulative additive impact. In addition there is potential for multiple developments to affect the larger-scale archaeological features such as palaeolandscapes and to affect the setting of heritage assets and historic landscapes/seascapes.

2.11.2.5 Transboundary impact assessment

542. Transboundary impacts may be relevant to archaeology and cultural heritage where wrecks of non-British, European nationality are subject to impact from development and may therefore fall within the jurisdiction of another country. This will be considered further in the EIA as appropriate.

2.11.2.6 Summary of potential impacts

Table 2.22 Summary of impacts relating to offshore archaeology, onshore setting and cultural heritage (scoped in (✓) and scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Direct physical disturbance	✓	×	✓
Indirect physical disturbance	✓	×	✓
Indirect disturbance of setting (offshore)	✓	✓	✓
Indirect disturbance of setting (onshore landfall)	✓	×	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

2.11.3 Mitigation

543. Impacts to both known and potential archaeological receptors are addressed through the application of embedded mitigation. Known archaeology would be avoided through the application of AEZs and subsequent micro-siting of infrastructure on the seabed.

544. Unavoidable impacts to potential receptors would be addressed through a series of agreed mitigation measures to deal with the discoveries once impacts have occurred and been identified. These measures would be set out in the project WSI which would clarify the methodologies to address unavoidable impacts associated with the worst case scenario (project design envelope) in accordance with:

- Model Clauses for Archaeological Written Schemes of Investigation: Offshore Renewables Projects (The Crown Estate, 2010).

545. The WSI would be revised, as and when required, throughout the life of Thanet Extension, as new data become available and as aspects of the development evolve post consent.

2.11.4 Approach to assessment and data gathering

546. In addition to site specific site investigations, the archaeological desk based assessment would be informed by a range of primary and secondary sources including:

- Records of wrecks and obstructions data from the UKHO (including 'dead' and salvaged wrecks that are no longer charted as navigational hazards);
- Records held by the National Record of the Historic Environment, including documented losses of vessels;
- Records held by the Kent Historic Environment Record; and
- Existing archaeological studies and published sources.

547. The Historic Seascape Character (HSC) of coastal and marine areas around England has been mapped through a series of projects funded by Historic England. The programme uses GIS to map data that can be queried to identify the key cultural processes that have shaped the historic seascape within a given area. Impacts to the historic seascape may occur where a proposed development or activity results in change to the historic character.

548. A review of the HSC for the area will be undertaken in order to identify the key cultural processes that have shaped the historic seascape and to inform the assessment of how that seascape may change with the construction of Thanet Extension.

549. The potential impacts from the Thanet Extension will be assessed using standard methodologies and in accordance with available standards and guidance including:

- JNAPC Code of Practice for Seabed Development (Joint Nautical Archaeology Policy Committee and The Crown Estate, 2006);
- Historic Environment Guidance for the Offshore Renewable Energy Sector (Wessex Archaeology, 2007);
- Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy (Oxford Archaeology, 2008); and
- Chartered Institute for Archaeologists' Standard and Guidance for Historic Environment Desk-Based Assessments (2014a) and Code of Conduct (2014b).
- The Setting of Heritage Assets. Historic Environment Good Practice Advice in Planning Note 3. Historic England (2015).

2.12 Offshore Seascape, Landscape and Visual Impact Assessment

550. A Seascape, Landscape and Visual Impact Assessment (SLVIA) will be undertaken as part of the EIA in order to identify the likely significant effects of the Thanet Extension on seascape, landscape and visual amenity. This section addresses the proposed Thanet Extension Wind Farm Area, consisting the area proposed for the offshore wind farm itself, comprising wind turbine generators, inter-array cables and offshore substation infrastructure (if required). A full review of the baseline seascape, landscape and visual environment; the potentially significant effects of Thanet Extension to this baseline; the methods proposed to predict these impacts; and the primary mitigation proposed is provided in Appendix 1.

2.12.1 Baseline

2.12.1.1 Study Area for SLVIA

551. The study area for the SLVIA of Thanet Extension will cover a radius of 45km from the proposed Thanet Extension Wind Farm Area, as illustrated in the Blade Tip Zone of Theoretical Visibility (ZTV) in Figure A1 in Appendix 2. The 45 km study area is considered to be the outer limit of the area within which likely significant effects could potentially occur.

552. Within this 45 km study area, the SLVIA will focus primarily on the assessment of seascape, landscape and visual effects within Kent, its coastline and adjacent seascape, as shown in Figure A2 in Appendix 2. Assessment of receptors within Essex and its coastline are proposed to be scoped out of the SLVIA due to their distance (over 43 km) and the limited visibility/discernibility of Thanet Extension at this distance offshore.

553. Potential cumulative effect interactions with other offshore wind farms have also influenced the study area for the SLVIA. Offshore wind farms with which Thanet Extension may have significant cumulative effects and which are likely to affect decision making are shown in Figure A3 in Appendix 2. The existing TOWF, Kentish Flats and London Array will be most pertinent to the SLVIA for Thanet Extension.

2.12.1.2 Seascape and landscape Character

554. The baseline will consider both Seascape and Landscape Character.

555. In England, Seascape Character principally applies to coastal and marine areas seaward of the low water mark. Seascape is defined by Natural England as: *"An area of sea, coastline and land, as perceived by people, whose character results from the actions and interactions of land with sea, by natural and/or human factors"*. A summary of what constitutes seascape is presented in 'An Approach to Seascape

Character Assessment' (Natural England 2012c). Published Seascape Character Assessments within the SLVIA study area for Thanet Extension are described further in Appendix 1 and shown in Appendix 2.

556. Landscape Character principally applies to terrestrial areas lying to the landward side of the high water mark. There is a hierarchy of published Landscape Character Assessments that describe the baseline landscape character of the Kent section of the study area, at the National, County and District level. The SLVIA will prepare a baseline description of relevant LCAs within the study area and focus on assessing the likely significant effects of Thanet Extension on the relevant landscape character areas (as described further in Appendix 1 and shown in Appendix 2).

2.12.1.3 Landscape Designations

557. The Thanet Extension is located outwith any areas subject to international, national or regional landscape designation intended to protect landscape quality.

558. A number of landscape designations occur in the wider study area and include the nationally important Kent Downs Area of Outstanding Natural Beauty (AONB), which is located approximately 26.7 km from the proposed wind farm area (as described Appendix 1 and mapped in Figure A7). There are several Registered Parks and Gardens (RPG) in the study area (Figure A7). The SLVIA will prepare a baseline description of relevant RPGs and assess the potential effects of Thanet Extension on their character and quality, as described further in Appendix 1.

559. There are a number of locally designated landscapes within the study area (Figure A7). Of these, the Sandwich Bay/Pegwell Bay Special Landscape Area (SLA) and The Undeveloped Coast (Herne Bay to Reculver) area are most susceptible to changes.

2.12.1.4 Visual Receptors and Views

560. Visual effects will occur when the introduction of Thanet Extension changes or influences the visual amenity and views experienced by people in the area. The visual baseline is defined by the Zone of Theoretical Visibility (ZTV).

561. The ZTV indicates that the closest areas of visibility of Thanet Extension will be from the coastal areas of the Isle of Thanet near North Foreland, where the proposed Wind Farm Area will be visible approximately 8 km offshore at its closest point. There will be high visibility of the proposed Wind Farm Area from the coast around the Isle of Thanet, from the coastal conurbation of Ramsgate, Broadstairs and Margate and the small sandy bays and enclosing chalk cliffs around this coast, at distances between 8km – 15 km.

562. The theoretical visibility of Thanet Extension also extends inland from these conurbations to the plateau area of Thanet, where there will be long views between 10 km – 20 km to the proposed Wind Farm Area across intervening urban areas with the wind turbines likely to be visible as a backdrop.

563. Wider visibility of the proposed Wind Farm Area will be afforded from coastal areas to the south of Pegwell Bay, at distances of approximately 17km – 30 km between Sandwich Bay and South Foreland. The theoretical visibility of the proposed Wind Farm Area will also extend across inland areas of Kent, becoming more fragmented by either; landform, vegetation or settlement, restricted to areas of localised higher ground at distances between 25 km – 35 km. Beyond 35 km, theoretical visibility is much more restricted as successive layers of landform combine to limit visibility to scattered areas.

564. The principal visual receptors which are likely to be most susceptible to visual effects arising from Thanet Extension are described in Appendix 1 and shown in Figure A8. The principal visual receptors include people within settlements, driving on roads, passengers on main rail routes, visitors to tourist facilities or historic environment assets, and people engaged in recreational activity such as on walking and cycle routes. The SLVIA will undertake an initial baseline assessment of all visual receptors within the study area in order to identify those that may experience significant effects as a result of Thanet Extension.

565. Representative viewpoints proposed for the visual assessment of Thanet Extension are identified in Appendix 1 and mapped in Figure A8. Initial wireframe visualisations from several viewpoints are presented in Figures A9-A14 in Appendix 2.

2.12.2 Potential Impacts

2.12.2.1 Potential impacts during construction

566. The seascape, landscape and visual effects that could arise as a result of Thanet Extension during construction are identified as follows:

- **Temporary effects on coastal/seascape character**, within identified seascape character areas primarily as a result of wind turbine installation during construction, either as result of physical effects within the seascape character area, or the visual/perceptual characteristics of seascape character areas.
- **Temporary effects on the perception of landscape character**, within terrestrial landscape character areas and landscape designations, primarily as a result of visibility of wind turbine installation during construction.
- **Temporary visual effects on views**, primarily as a result of visibility of wind turbine installation and offshore export cable laying during construction, experienced by

visual receptors (groups of people) with visibility of the proposed development, on specific views and on their visual amenity/experience of the landscape.

2.12.2.2 Potential impacts during operation

567. The seascape, landscape and visual effects that could arise as a result of Thanet Extension during operation are identified as follows:

- **Long-term effects on coastal/seascape character**, within identified seascape character areas, primarily as a result of offshore wind turbine operation, either affecting the pattern of elements that define the character or affecting the visual/perceptual characteristics of seascape character areas.
- **Long-term effects on perception of landscape character**, within terrestrial landscape types and landscape designations, primarily as a result of visibility of the offshore wind turbines during operation.
- **Long-term visual effects on views**, primarily as a result of offshore wind turbine operation, experienced by visual receptors (groups of people) with visibility of the proposed development, on specific views and on their visual amenity/experience of the landscape. Visual effects on views at night-time as a result of navigational lighting and aviation lighting of offshore wind turbines.

2.12.2.3 Potential impacts during decommissioning

568. The effects of the Thanet Extension during decommissioning will be similar to those identified during construction.

2.12.2.4 Potential cumulative impacts

569. The SLVIA for Thanet Extension will fully address the issue of cumulative impact, to assess the combined visual effects of Thanet Extension with other existing or reasonably foreseeable developments, including offshore and onshore wind energy developments. The cumulative SLVIA will include operational, consented and application stage wind farms, within the 45km radius study area (Figure A3).

570. The cumulative SLVIA will seek to focus detailed assessment on the cumulative effects of Thanet Extension with other offshore wind farms within a main 'influencing distance', primarily TOWF, Kentish Flats and London Array, which are located within 30 km of Thanet Extension.

571. The key impacts to be considered as part of the cumulative SLVIA are likely to be:

- Cumulative effect with TOWF to which Thanet Extension will directly relate and be viewed in combination.

- Extent to which Thanet Extension may either extend the ZTV or the scale of effects, when considered in combination with TOWF and other offshore wind farms.
- Cumulative landscape and visual effects of Thanet Extension on the closest coastal areas of Thanet, where Thanet Extension may result in turbines being closer to the coast than TOWF; and where differences in scale will be most noticeable.
- Effects resulting from changes in vertical scale from areas where turbines are presently visible, as a result of the increased height of Thanet Extension turbines.
- Effects resulting from changes in the horizontal scale resulting from the increased lateral spread of development on the horizon in views and potential visual merging of existing offshore wind farms on the skyline.
- Extent to which the addition of Thanet Extension may increase the influence of wind farms as characteristic elements, creating seascape/landscape character change.

2.12.2.5 Summary of potential impacts

Table 2.23 Summary of impacts relating to landscape and visual impacts (scoped in (✓) and scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Seascape, landscape and visual effects, and cumulative effects, of Thanet Extension on seascape, landscape and visual receptors within 45km radius study area in Kent	✓	✓	✓
Seascape, landscape and visual, and cumulative effects, of Thanet Extension on seascape, landscape and visual receptors beyond 45 km radius study area	×	×	×
Seascape, landscape and visual effects, and cumulative effects, of Thanet Extension on seascape, landscape and visual receptors within 45 km in Essex	×	×	×

2.12.3 Mitigation

572. Options for mitigation of the identified potential effects which are predicted to arise from the development will be considered, iteratively alongside the assessment. Practical measures will be proposed and agreed to avoid, reduce or off-set these effects. The SLVIA will identify measures for avoiding or reducing the level of significance of potential effects. These measures will potentially include primary mitigation measures embedded into the design; and measures additional to these which would further reduce long term seascape and visual effects.

573. Potential embedded mitigation measures for effects on seascape and visual effects include the site selection for development, e.g. locating at distance from the coast

and the realisation of design objectives for the development, achieved through alterations to layout and design.

574. The mitigation measures proposed for the development will be dependent upon the final design of the site and the potential effects as determined by the EIA studies. Mitigation options will be discussed with the relevant stakeholders for the SLVIA.

575. Mitigation measures will be prepared in line with the design statement for Thanet Extension, illustrating the primary concept setting out known constraints; and a design concept plan considering the impacts of alternative layouts.

2.12.4 Approach to assessment and data gathering

576. Vattenfall will be undertaking consultation with relevant consultees, including Thanet District Council, Dover District Council, Kent County Council and Natural England, in order to define the scope of the SLVIA required for Thanet Extension.

577. The SLVIA will be undertaken in accordance with the methods outlined in the following best practice guidance documents.

- The Landscape Institute with the Institute of Environmental Management and Assessment (2013). Guidelines for the Assessment of Landscape and Visual Impacts. Third Edition;
- Landscape and Seascape Character Assessments published by Natural England and the Department for Environment, Food and Rural Affairs (2014);
- An Approach to Landscape Character Assessment (2014). Natural England;
- Scottish Natural Heritage (2012). Assessing the Cumulative Impact of Onshore Wind Energy Developments;
- Scottish Natural Heritage (2014). Visual Representation of Wind Farms: Version 2.1;
- The Landscape Institute (2011). Landscape Institute Advice Note 01/11, Photography and photomontage in landscape and visual impact assessment.

578. Data will be gathered from official, reliable and the most up-to-date sources. This would include Ordnance Survey map based data, as well as data on landscape characterisation, landscape designations and other Governmental and local authority data of relevance, together with site specific field survey.

579. For further details on the approach to the SLVIA and the relevant seascape, landscape and visual baseline, please refer to Appendix 1.

2.13 Aviation and Radar

580. This section covers civil and military aviation and radar by considering the proximity to and operations of civil airports, the types of radar operating around the East Anglia coast, Civil Aviation Agencies, helicopter operations and Ministry of Defence (MoD) operations.

581. Wind turbines have the potential to interfere with military and civil aviation operations, primarily through effects on radar systems but also in respect of their location and physical presence, relative to aerodromes and also within military low flying areas. The potential impacts arising from the proposed Project on these activities are considered with a summary presented of the relevant UK guidance, methodologies and best practice that will be applied in undertaking the EIA.

2.13.1 Baseline

582. The airspace above and around the proposed Wind Farm Area is used by civil and military aircraft, which are tracked by radar systems operated by National Air Traffic Services (NATS) and the Ministry of Defence (MoD). As reported in the TOWF ES (TOWL, 2005a), both the MoD and NATS confirmed that TOWF would have no impact on their operation. It is anticipated that Thanet Extension would also avoid any impact on these operations.

2.13.1.1 Airports

583. Kent International Airport (Manston), now closed, is less than 30km away from the proposed Thanet Extension Wind Farm Area. The closest operational airport is London Southend Airport which is 63km from the extension site.

2.13.1.2 Radar

584. Other radar facilities are unlikely to be affected, the nearest are at Dengie Flats. Consultation with the MoD will confirm whether these need to be considered further.

2.13.1.3 En-Route Services

585. NATS plc (NERL) is responsible for the provision of ATC services to aircraft in their en-route phase of flight between their source and destination airports and as such is responsible for the protection of the electronic equipment, such as radar, that allows NERL to carry out this function. The responsibility for the provision of ATC to aircraft in other phases of flight, such as take-off and landing, falls on the airport operator.

2.13.1.4 MoD

586. TOWL consulted with the MoD for TOWF in accordance with the required consultation procedure determined by the MoD. The MoD confirmed that TOWF would not have an effect on MoD operations. Vattenfall will consult with the MoD to determine whether there are potential implications for Thanet Extension

2.13.1.5 Military Training Areas

587. The Military Practice Area X5122 which is used by the Royal Navy overlaps with the proposed Thanet Extension Wind Farm Area. X5122 was listed in the UK Governments Offshore Energy SEA as Marine Counter Measures Area. In addition Firing Practice Area X5123 is located immediately to the south which is also a mine disposal area. These sites are shown in Figure 2.11. Vattenfall will consult with the MoD to determine whether there are potential implications for Thanet Extension.

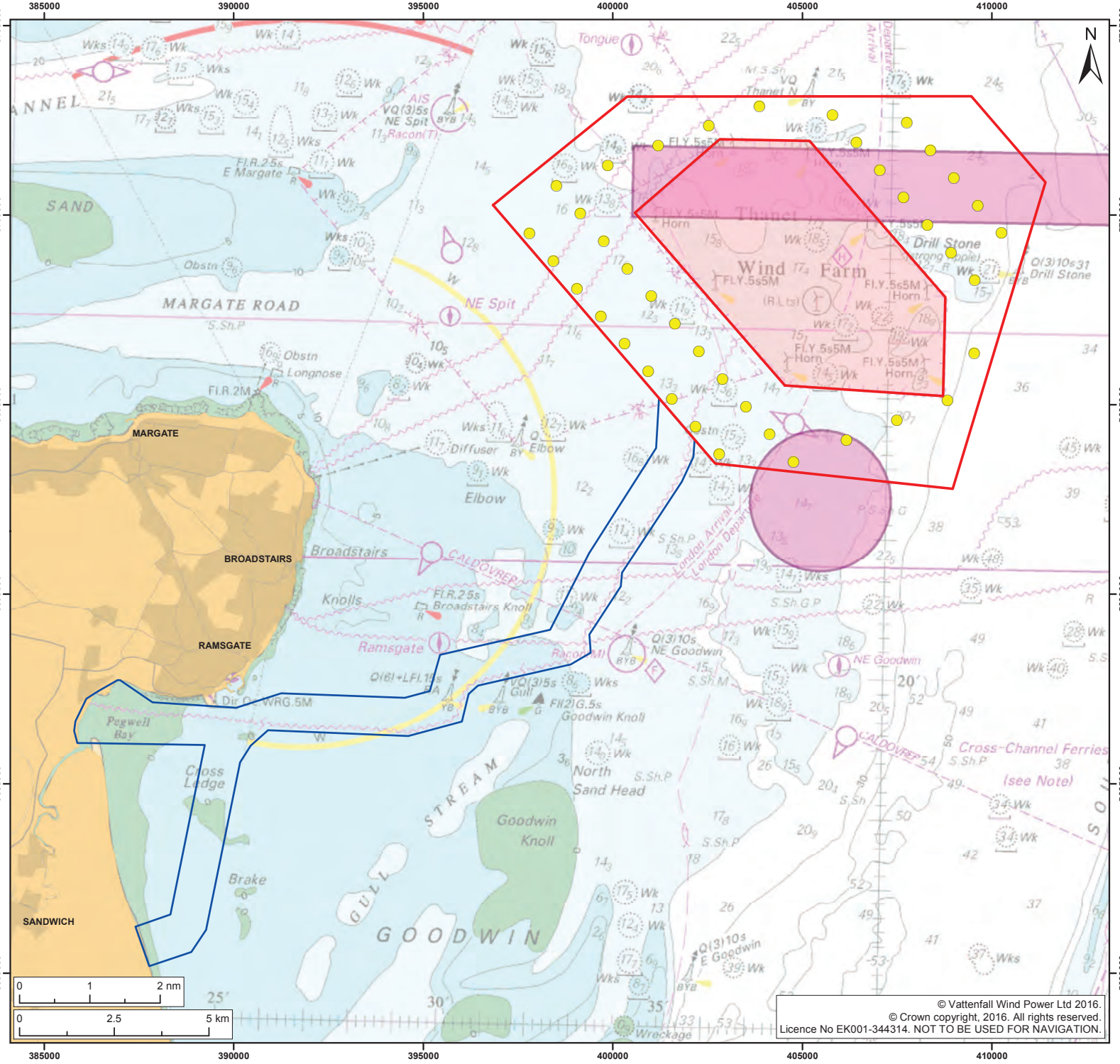
2.13.1.6 Search and Rescue (SAR) Operations

588. When on an operational mission, SAR aircraft are not constrained by the normal rules of the air, and operate in accordance with their Aircraft Operator Certificate (AOC), which allows them total flexibility to manoeuvre using pilot's best judgement.

589. An Emergency Response Co-operation Plan (ERCoP) would be compiled in conjunction with the MCA (see Section 2.10.5).

2.13.1.7 Meteorological Office Radar

590. The closest Met Office radar system is at Thurnham, approximately 60km from the proposed Thanet Extension Wind Farm Area. This is beyond the range at which there would be any impact.



Thanet Extension Offshore Wind Farm

- Proposed Wind Farm Area
- Wind Turbine
- Proposed Offshore Export Cable Corridor

Thanet Offshore Wind Farm - Operational

- TOWF
- Practice and Exercise Areas (PEXA)[1]

[1] UKHO, 2016.

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title:

Military practice and Exercise Areas

Figure: 2.11 | Drawing No: PB5894-SCO-2-015

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2.13.2 Potential Impacts

2.13.2.1 Potential impacts during construction

591. **Impacts on radar systems:** There would be no specific impact on radar as a result of construction activities, potential impacts arise from the presence of WTGs which are considered in more detail under operational impacts.

592. **Increased collision risk:** During the construction phase, the presence and movement of certain construction vessels (e.g. tall cranes) may present a potential collision risk to aircraft and helicopter flight operations.

593. **Impact on SAR:** The helicopter operators may have concerns with the potential physical presence of the WTGs as they are constructed including the layout of the windfarm. SAR rely on regularity of layout and given bigger turbines would be used for the proposed Wind Farm Area, there might be an impact on the ability to operate.

594. **Impact on Military Training Areas:** TOWL consulted with the MoD for TOWF in accordance with the required consultation procedure determined by the MoD. The MoD confirmed that the TOWF site would not have an effect on MoD operations. Vattenfall will consult with the MoD to confirm the position for Thanet Extension.

2.13.2.2 Potential impact during operation

595. **Impacts on radar systems:** The physical presence of wind turbines may have an impact on the aviation radar installations.

596. **Impact on SAR:** The helicopter operators may have concerns with the potential physical presence of the WTGs as they are constructed including the layout of the windfarm. SAR rely on regularity of layout and given bigger turbines would be used for the proposed Wind Farm Area, there might be an impact on the ability to operate due to the interaction of the proposed Wind Farm Area with the TOWF site.

597. **Impact on Military Training Areas:** TOWL consulted with the MoD for TOWF in accordance with the required consultation procedure determined by the MoD. The MoD confirmed that the TOWF would not have an effect on MoD operations. Vattenfall will consult with the MoD to confirm the position for Thanet Extension.

598. **Increased collision risk:** WTGs can be difficult to see from the air, particularly in poor meteorological conditions, and can increase the collision risk to aircraft operations at low altitudes.

2.13.2.3 Potential impacts during decommissioning

599. The infrastructure required in the process of WTG decommissioning, in particular large crane structures, may present a physical obstruction and effect operations of low flying aircraft, including SAR helicopters.

600. Any WTG within line of sight to current aviation radar infrastructure would potentially have an impact on the system when the wind farm is operating, unless a form of technical mitigation is utilised for its effect, until the sites are decommissioned.

2.13.2.4 Potential cumulative impacts

601. The presence of a number of offshore infrastructure development projects has the potential to decrease the area in which aviation activity can take place. However, given the relatively low height of the turbine blade tips it is unlikely to result in a significant impact.

2.13.2.5 Transboundary Impacts

602. There are no operational international airports within close proximity of the extension site and the location of the extension site (i.e. to an existing wind farm) is not expected to result in a significant impact.

2.13.2.6 Summary of potential impacts

Table 2.24 Summary of impacts relating to aviation and radar (scoped in (✓) and scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Impacts on aviation radar systems	×	✓	×
Impact on military training area	×	×	×
Increased collision risk	✓	✓	✓
Impact on SAR	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	×	×	×

2.13.3 Mitigation

2.13.3.1 Aviation Radar

603. Ongoing consultation with the relevant stakeholders will determine level of impact and appropriate mitigation if required.

2.13.3.2 Search and Rescue

604. An Emergency Response Co-operation Plan (ERCoP) would be compiled in conjunction with the MCA and would be in place for the construction, operation and decommissioning phases of the Project. The ERCoP would detail specific marking and lighting of the WTGs. The SAR helicopter bases would be supplied with an accurate Project GPS position and Development parameters.

2.13.3.3 Aviation Lighting and Marking

605. There would be a requirement for Aviation Obstruction Lighting on all or individual WTGs. Consultation with the CAA, MCA (SAR input to the ERCoP) and MoD would be required to establish acceptable aviation lighting to meet requirements, in particular to ensure aviation lighting is clearly distinguishable from maritime lighting.

606. There is a CAA requirement in the UK for all structures over 300ft (91.4m) high to be charted on civil aviation maps and documentation (the MoD uses a lower threshold height). Consequently, the Applicant would be required to provide details of the development to the Defence Geographic Centre (DGC).

2.13.4 Approach to assessment and data gathering

607. The EIA process is likely to be supported by further desk-based studies that will identify and examine in greater detail, sensitive aviation and MoD receptors. Studies will be undertaken in parallel with consultation and meetings with specific stakeholders in order to provide a detailed understanding of potential impacts.

608. The Aviation Industry and the provision of Air Navigation Services (including radar services) are regulated through extensive legislation; however, the main mechanism for regulating the relationship between aviation and offshore wind is through the consenting system and the guidance outlined below. The following documents, as a minimum, will be considered during the EIA process:

- CAA, CAP 764, Policy and Guidelines on Wind Farms 2016;
- CAA, CAP 670, Air Traffic Services Safety Requirements 2014;
- CAA, CAP 393, Air Navigation: The Order and the Regulations (known as the Air Navigation Order (ANO) 2016;
- MoD Obstruction Lighting Guidance (2014); and
- The Wind Energy, Defence and Civil Aviation Interests Working Group's 2002 Report on 'Wind Energy and Aviation Interests: Interim Guidelines' – this report details both military and independent airport operator issues and consultation procedures.

609. Other data sources and guidance considered as part of the desktop review of the baseline situation include the following:

- CAA, Visual Flight Rules Chart 2016;
- CAA, CAP 032, UK Integrated Aeronautical Information Package (UKIAIP). The UKIAIP is the main resource for information and flight procedures at all licensed UK airports as well as airspace, en-route procedures, charts and other air navigation information 2016;
- CAA, CAP 168, Licensing of Aerodromes 2014;
- CAA, CAP738, Safeguarding of Aerodromes 2011;
- Military Aeronautical Information Publication (Mil AIP) 2016; and
- MoD UK Low-Flying System (UKLFS) Priority Area Map 2011.

610. To inform the EIA process, consultation may be required with the following agencies:

- UK CAA;
- UK MCA (SAR and Lighting requirements);
- UK Meteorological Office;
- UK MoD; and
- UK NATS/NERL.

611. It is expected that consultation will be an iterative process, allowing for any concerns that are raised to be considered in the WTG layout and optimisation process of wind farm design.

612. The Applicant will submit standard offshore wind farm enquiries to relevant aviation stakeholders including UK, Dutch and French authorities which allows for a standardised approach to provision of data and assessment by the regulators and statutory consultees.

2.14 Infrastructure and Other Users

2.14.1 Baseline

2.14.1.1 Offshore wind farm developments

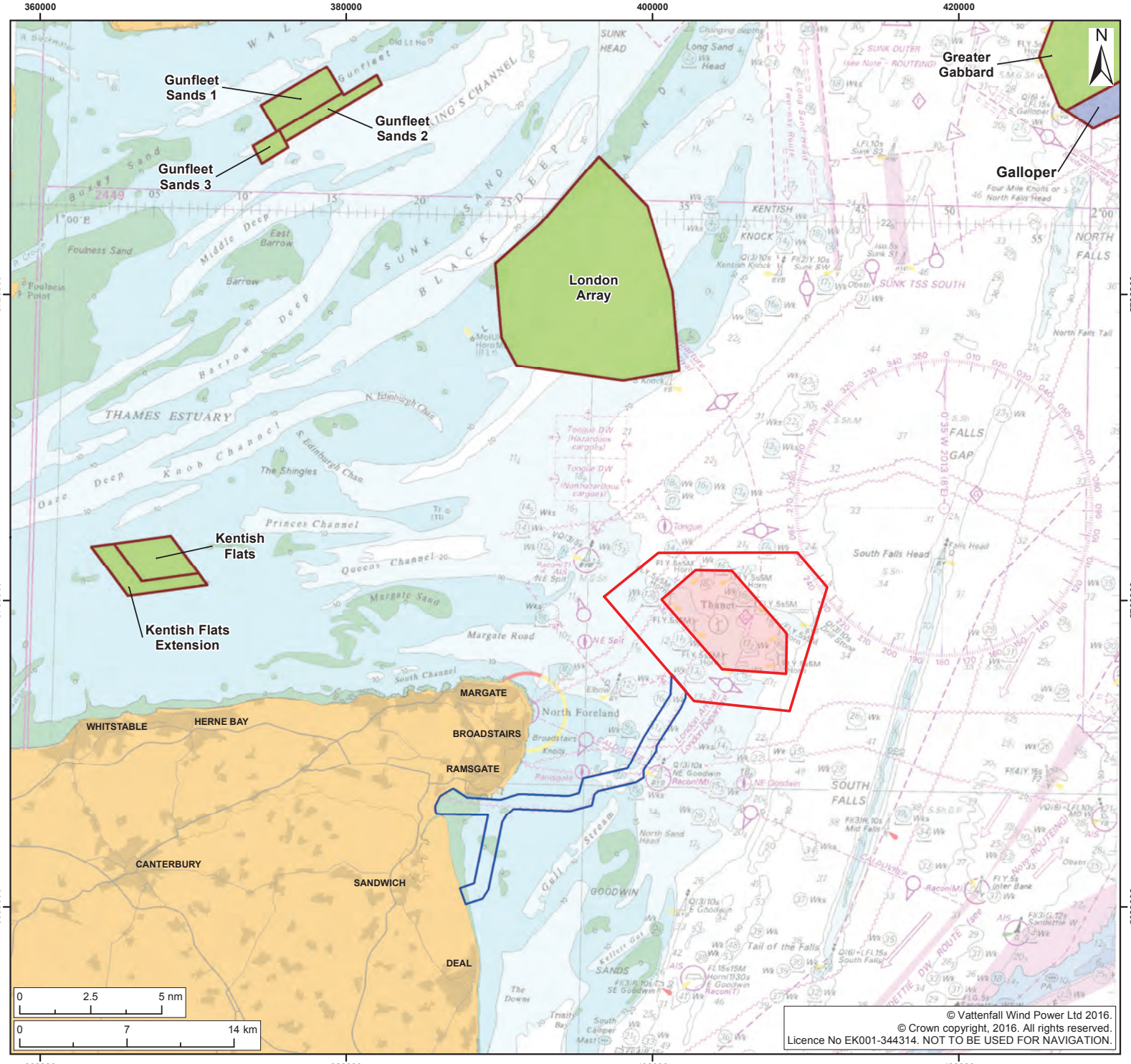
613. There are a number of offshore wind farm developments in the region (see Figure 2.12).

Table 2.25: Nearest offshore wind developments to Thanet Extension

Offshore wind farm	Thanet Extension
TOWF	1km
London Array	8km
Kentish Flats and Kentish Flats Extension	18km
Gunfleet Sands I, II & Demo	24km
Greater Gabbard	28km

Offshore wind farm	Thanet Extension
Galloper	30km
East Anglia Zone	50km

614. TOWF, London Array and Kentish Flats/Kentish Flats Extension Offshore Wind Farms operate their maintenance bases from Ramsgate. The vessel traffic associated with these is described in the Shipping and Navigation chapter (Section 2.10).



Thanet Extension Offshore Wind Farm

- Proposed Wind Farm Area
- Proposed Offshore Export Cable Corridor

Thanet Offshore Wind Farm - Operational

- TOWF

Other Wind Farms[1]

- Active/In Operation
- Under Construction

[1] Crown Estate, 2016.

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title: Other Activities - Offshore Wind Farms in region

Figure: 2.12 | Drawing No: PB5894-SCO-2-016

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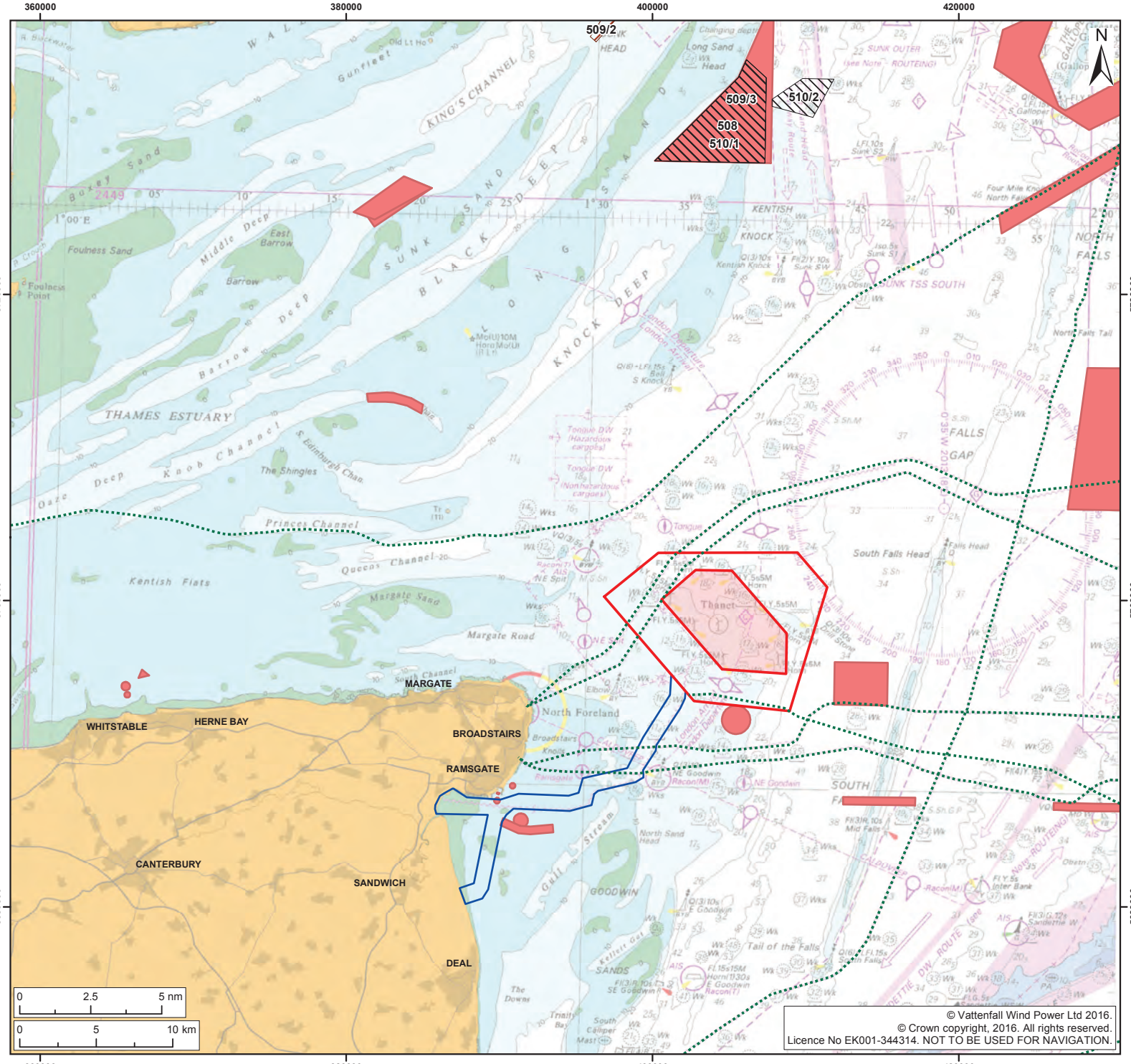

Thanet Extension Offshore Wind Farm

- Proposed Wind Farm Area
- Proposed Offshore Export Cable Corridor

Thanet Offshore Wind Farm - Operational

- TOWF
- Aggregate Application Area[1]
- Aggregate License Area[1]
- Disposal Sites[2]
- Subsea Cables[3]

[1] The Crown Estate, 2016.
[2] Cefas, 2016.
[3] KisOrca, 2016.

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title: Other Activities - Pipeline and Aggregate Disposal

Figure: 2.13 | Drawing No: PB5894-SCO-2-017

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Co-ordinate system: ETRS 1989 UTM Zone 31N **EPSG:** 25831

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2.14.1.2 Oil and Gas infrastructure

615. There are no O&G operations identified around the proposed Thanet Extension Wind Farm Area, and it is considered unlikely that any O&G reserves would be identified within this area in the future (RPS, 2009). Also see Shipping and Navigation Section 2.10.

2.14.1.3 Sub-sea cables

616. There are no in-service telecommunications cables in the proposed Thanet Extension Wind Farm Area. Outside of the site there are a couple of in-service cables which the TOWF offshore export cable crosses, and Option 1 for the proposed Offshore Export Cable Corridor would mainly follow (see Figure 2.13). These two in-service cables are:

- Tangerine, operated by Level 3 Communications Limited; and
- Pan European Crossing (PEC), operated by Global Crossing Limited.

617. The out-of-service UK-Belgium 5 cable operated by BT would also be crossed. To the west of the proposed Wind Farm Area are two more out-of-service telecommunications cables, known as Hermes 2 and Rembrandt 2, previously operated by KPNQwest Network Ireland Limited. These cables would not need to be crossed.

2.14.1.4 Aggregate Dredging

618. There are ongoing aggregate extraction activities 24km to the north of the proposed Thanet Extension Wind Farm Area at Kentish Knock and Long Sand. The navigation routes used by these vessels will be assessed as part of the Shipping and Navigation chapter (see Section 2.10).

2.14.1.5 Dumping / Disposal Sites

619. There is a marine disposal site in Pegwell Bay, which lies to the south of the proposed Offshore Export Cable Corridor, and another site at South Falls to the north east of the proposed Wind Farm Area. Silt from maintenance dredging at the Port of Ramsgate and sand from the Port of London Authority gets disposed of at these sites.

620. There are also two closed disposal sites near the proposed Wind Farm Area, one to the south and one to the east (see Figure 2.13).

2.14.1.6 Unexploded Ordinance (UXO)

621. The Kent coast and adjacent sea areas were well utilised for military activities during the first and second World Wars. As a result of the wartime activities, there is the potential for a number of unexploded ordnance to be present within the study area, including:

- Sunken sea mines;
- Unexploded bombs from bombing range;
- Discarded munitions of returning aircraft to RAF Manston;
- Munitions from breaking wrecks; and
- Weapons dumped in the 'Spoil Ground' area including bombs, mines, torpedoes and incendiary devices.

2.14.2 Potential Impacts

2.14.2.1 Potential impacts during construction

622. **Potential interference with other wind farms:** As there is no spatial overlap of wind farm infrastructure at the present time, there is no pathway for interference with other developments and therefore it is proposed to scope this impact out of the EIA. Crossing of other wind farms cables is discussed below.

623. **Potential interference with O&G operations:** None anticipated.

624. **Physical impacts on subsea cables and pipelines:** Existing cables and pipelines within TOWF would be avoided when siting the turbines and infrastructure. However inter-array cables may be required to cross the existing subsea cables and therefore cable crossing agreements with the operators of these would be sought. The proposed Thanet Extension Offshore Export Cable Corridor crosses several existing cables (Figure 2.13); therefore the final cable route would inevitably require cable crossings. Crossing agreements would therefore be prepared with the relevant owners of cables and pipelines and appropriate installation and protection measures developed.

625. **Impacts on aggregate dredging activities:** It is not anticipated that the proposed Thanet Extension Wind Farm Area or proposed Offshore Export Cable Corridor would impact existing aggregate sites. Impacts associated with vessels transiting between ports and sites will be assessed in the Shipping and Navigation chapter (see Section 2.10).

626. **Impacts on disposal sites:** None anticipated.

627. **Initiation of UXO:** Operations such as piling or cable installation works could result in the initiation of abandoned UXO if it were present and live. The consequences of such an initiation would depend upon the size of the explosive and the distance of targets from the explosive. However this issue would be dealt with prior to construction through detailed geophysical survey and investigations. This is a health and safety risk which would be carefully mitigated rather than being an environmental issue and this will not be assessed further within the EIA.

2.14.2.2 Potential impacts during operation

628. **Potential interference with other wind farms development:** As there is no spatial overlap of wind farm infrastructure at the present time, there is no pathway for interference with other developments and therefore the Applicant proposes to scope this out of the EIA. Navigation impacts will be covered in the Shipping and Navigation chapter.

629. **Potential interference with O&G operations:** None anticipated.

630. **Physical impacts on subsea cables and pipelines:** If cables require maintenance or replacement, standard industry techniques would be followed to ensure that other operators' cables and pipelines are not impacted by maintenance works. As a result, the Applicant proposes to scope this out of the EIA.

631. **Impacts on aggregate dredging activities:** Transit routes will be assessed as part of the Shipping and Navigation chapter (see Section 2.10).

632. **Impacts on disposal sites:** None anticipated.

2.14.2.3 Potential impacts during decommissioning

633. Impacts upon infrastructure and other users during decommissioning are anticipated to be similar to those discussed during construction of the wind farm, with an incremental reduction of impact as individual wind turbines are removed from the site. Impacts with other activities throughout all phases of the life of Thanet Extension would be mitigated by planning and design.

2.14.2.4 Potential cumulative impacts

634. Given that the impacts of the proposed Thanet Extension Wind Farm Area and proposed Offshore Export Cable Corridor on infrastructure and other users would be largely dependent upon physical overlap, non-significant or mitigated to no impact; it is unlikely that there would be pathways for cumulative or in-combination impacts.

2.14.2.5 Transboundary impacts

635. Transboundary impacts would not occur separately from the impacts discussed above as impacts are largely dependent upon physical overlap and no pathways exist for impacts beyond Thanet Extension.

2.14.2.6 Summary of potential impacts

Table 2.26 Summary of impacts relating to infrastructure and other users (scoped in (✓) or scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Potential interference with other wind farms development	×	×	×
Potential interference with O&G operations	×	×	×
Physical impacts on subsea cables and pipelines	✓	×	✓
Impacts on aggregate dredging activities	×	×	×
Impacts on disposal sites	×	×	×
Initiation of UXO	×	×	×
Impacts on MoD activities	×	×	×
Cumulative impacts	×	×	×
Transboundary impacts	×	×	×

2.14.3 Mitigation

636. Where conflicts between the proposed Thanet Extension Wind farm Area and proposed Offshore Export Cable Corridor and other infrastructure are identified, owners and operators would be consulted and legal agreements would be put in place.

2.14.4 Approach to assessment and data gathering

637. Vattenfall will undertake consultation with all relevant offshore developers, operators and marine users within the vicinity of Thanet Extension to ascertain any concerns relating to the project. Any areas of concern will be identified and considered within the EIA. However, it is likely that any impacts would either be non-significant or able to be fully mitigated after consultation with the relevant parties as discussed above.

2.15 Offshore Designated Sites Summary

638. This section provides an overview of the designated sites relevant to the offshore works.

2.15.1 Water Framework Directive (WFD)

2.15.1.1 Kent North WFD coastal water body

639. The proposed Thanet Extension Offshore Export Cable Corridor runs through the Kent North coastal water body (GB650704510000) Figure 2.2. There are bathing waters to the north (Ramsgate Western undercliffe) and south (Sandwich Bay) of the proposed north cable landfall site at Pegwell Bay, and are both classed as having excellent bathing water quality over the past 4 years of data collection (2012 – 2016) (Environment Agency, 2016a) (Environment Agency, 2016b). The proposed route of the north cable landfall option to Pegwell Bay passes through the Ramsgate Western Undercliffe bathing waters. The proposed south cable landfall option at Sandwich Bay passes through the Sandwich Bay bathing waters.

2.15.2 Natura 2000 sites

640. The sections below provide an overview of Natura 2000 sites designated under the Habitats Directive and Birds Directive (see Section 1.3.3). During the Habitats Regulations Assessment (HRA) Screening for Thanet Extension, a detailed review of Natura 2000 sites will be undertaken in consultation with key stakeholders.

2.15.3 Special Areas of Conservation (SACs)

641. SACs of relevance to the proposed Thanet Extension Wind farm Area and proposed Offshore Export Cable Corridor include (see Figure 2.14):

2.15.3.1 Thanet Coast SAC (approximately 9km from the proposed Thanet Extension Wind Farm Area).

642. This site is protected for two Annex I habitats; reefs and partially submerged sea caves. The site is primarily formed of a chalk wave cut platform around the coast of Thanet.

2.15.3.2 Sandwich Bay SAC (approximately 18km from the proposed Thanet Extension Wind Farm Area – the north landfall option at Pegwell Bay passes through the SAC).

643. This site is protected for its sand dune systems and comprises of four dune types which are Annex I habitats, embryonic shifting dunes, shifting dunes along the shoreline with *Ammophilla amonaria*, fixed coastal dunes with herbaceous vegetation and dunes with *Salix repens* ssp. *argentea*.

2.15.3.3 Margate and Long Sands Site of Community Importance (SCI) (approximately 7km from the proposed Thanet Extension Wind Farm Area).

644. Sites of Community Importance are sites that have been adopted by the European Commission but not yet formally designated by the UK government as an SAC. In 2011 the Margate and Long Sands SAC was ratified by the EC. This site is protected for the Annex I habitat; sandbanks which are slightly covered by seawater all of the time.

2.15.3.4 Southern North Sea pSAC (overlaps with the proposed Thanet Extension Wind Farm Area)

645. The southern North Sea site is proposed for designation as a pSAC for harbour porpoise. JNCC undertook consultation on the site in 2016, which is has been identified as being within the top 10% of persistently high density areas for harbour porpoise in UK waters (JNCC, 2016b). Vattenfall will be following the progress of the site designation and development of its conservation objectives to determine how the HRA is undertaken.

646. In addition, the potential impacts on EPS (Annex IV of the Habitats Directive) using the project area will be assessed.

2.15.4 Special Protection Areas (SPAs)

647. SPAs are designated under the European Union Directive on the Conservation of Wild Birds. Under the Directive, Member States of the European Union (EU) have a duty to safeguard the habitats of migratory birds and certain particularly threatened bird species. SPAs of relevance to the proposed Thanet Extension Wind Farm Area and proposed Offshore Export Cable Corridor include (see Figure 2.15):

2.15.4.1 Outer Thames Estuary SPA (approximately 7.5km from the proposed Thanet Extension Wind Farm Area).

648. This site is designated as it regularly supports more than 1% of the Great British overwintering population of red throated diver. The site covers a large area of the southern North Sea to protect foraging grounds for the birds.

2.15.4.2 Outer Thames Estuary pSPA (SPA extension to include additional areas and species) (approximately 7.5km from the proposed Thanet Extension Wind Farm Area).

649. This is a planned extension to the existing Thames Estuary SPA to include additional species within a revised site boundary. The extension is proposed as the site regularly supports more than 1% of the Great Britain breeding populations of three species listed in Annex 1 of the Birds Directive. The site is currently classified solely

for non-breeding red-throated divers. This extension will offer new protection for little and common tern foraging areas enhancing the protection already afforded to their feeding and nesting areas in the adjacent coastal SPAs (Foulness SPA, Breydon Water SPA and Minsmere to Walberswick SPA) (Defra, 2016b). The proposed extension to the site was put out to formal public consultation in January 2016, feedback from this consultation is currently being analysed by Defra before taking a decision on whether to formally designate the extension (Defra, 2016b). One a site has been put forward for formal consultation it is treated as if it were a fully designated SPA as a matter of policy.

2.15.4.3 Thanet Coast SPA and Ramsar (approximately 10.5km from the proposed Thanet Extension Wind Farm Area).

650. This site is designated as it regularly supports over 1% of the Great British population of the non-breeding population of European golden plover, ruddy turnstone, and breeding little tern.

2.15.5 Statutory National Designations

651. At a national level and within the study area, there are three types of designated site for nature conservation; these being Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR) and MCZ (see Figure 2.16). More particularly, the following national sites are found within a 2km radius around the landfall site:

2.15.6 Sites of Special Scientific Interest (SSSI):

2.15.6.1 Thanet Coast SSSI (approximately 10.5km from the proposed Thanet Extension Wind Farm Area).

652. This site is designated for aggregations of breeding (little tern) and non-breeding (grey plover, ringed plover, sanderling, ruddy turnstone) birds as well as assemblages of passage birds that use the habitats within the boundary of the site. The site includes a variety of coastal habitats including; saline coastal lagoons with shingle communities and sheltered muddy shores including zostera (seagrass) beds. These habitats support; plant, fungi and algal species. The site is also important for its geological and geomorphological interest (Natural England, 2016a).

2.15.6.2 Sandwich Bay to Hacklinge Marshes SSSI (approximately 18km from the proposed Thanet Extension Wind Farm Area – landfall Option 1 at Pegwell Bay passes through the SSSI).

653. This site is designated for aggregations of breeding birds that use the areas of lowland open water habitats within the site boundary and also aggregations of non-breeding bird species (golden plover, grey plover, ringed plover, sanderling). It

includes important sand dune and saltmarsh habitats which support invertebrate assemblages including the red data book bright wave moth and a number of Schedule 8 plant species (Natural England, 2016b).

2.15.6.3 Sandwich and Pegwell Bay National Nature Reserve (NNR) (approximately 20km from the proposed Thanet Extension Wind Farm Area, landfall Option 1 at Pegwell Bay passes through the NNR).

654. This site is important for its mosaic of coastal habitats including coastal mudflats and saltmarsh as well as ponds, woodland and grassland. These habitats support a number of important bird, reptile and invertebrate species as well as schedule 8 plant species including yellow horned poppy, lizard orchid and bee orchid (Natural England, 2014). Sandwich and Pegwell Bay is owned by a range of organisations including Kent Wildlife Trust, National Trust, RSPB, Thanet District Council, Dover District Council, and Kent County Council, with the management led by Kent Wildlife Trust.

2.15.7 Marine Conservation Zones (MCZs)

655. MCZs were put forward under the provisions of the Marine and Coastal Access Act (2009), with sites designated in a succession of tranches in 2013 and 2016 and a future tranche planned for 2017. These MCZs create a network of marine protected areas in England and provide protection to species and habitats that are either not covered by the Habitats Directive or for which the Directive is felt not to cover adequately. The program of consultation and designation of sites recommended to government is ongoing. Within the study area there is one fully designated MCZ and one MCZ which remains as a recommended site (rMCZ). It is likely that the rMCZ will be put forward for consultation to designate the site in early 2017. The sites of relevance to the proposed Thanet Extension Wind Farm Area and proposed Offshore Export Cable Corridor are:

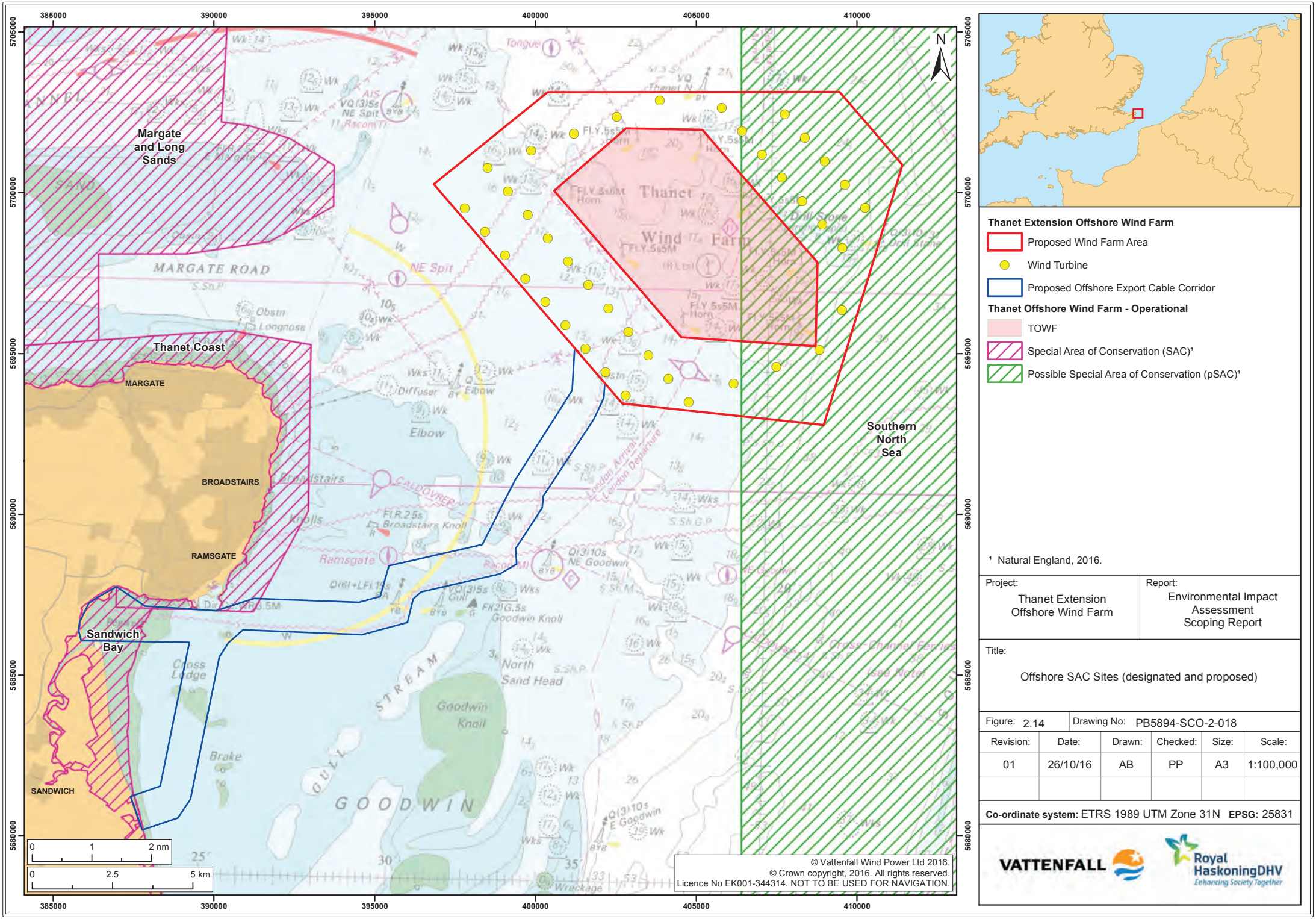
2.15.7.1 Thanet Coast MCZ (approximately 7km from the proposed Thanet Extension Wind Farm Area).

656. This is an inshore site located on the Kent coast. The site boundary stretches from the east of Herne Bay, around Thanet to the northern wall of Ramsgate harbour. This MCZ protects habitats and species in an area of subtidal chalk that extends seawards from the chalk reefs, cliffs and coves already afforded protection by the Thanet Coast SAC. The features of this site are; subtidal coarse sediment, subtidal mixed sediments, subtidal sand, moderate energy infralittoral rock, moderate energy circalittoral rock, blue mussel beds, peat and clay exposures, ross worm (*Sabellaria*

spinulosa) reefs, subtidal chalk and two species of stalked jellyfish (*Haliclystus auricular* and *Lucernariopsis cruxmelitensis*) (Natural England, 2013).

2.15.7.2 Goodwin Sands rMCZ (approximately 4km from the proposed Thanet Extension Wind Farm Area).

657. Goodwin Sands recommended MCZ is an entirely marine inshore site measuring 277km². The site is currently recommended for the designation of a number of marine habitats; subtidal coarse sediment, moderate energy infralittoral rock, moderate energy circalittoral rock, subtidal sand and native oyster beds (Defra, 2013).



Thanet Extension Offshore Wind Farm

- Proposed Wind Farm Area
- Wind Turbine
- Proposed Offshore Export Cable Corridor

Thanet Offshore Wind Farm - Operational

- TOWF
- Special Area of Conservation (SAC)[1]
- Possible Special Area of Conservation (pSAC)[1]

[1] Natural England, 2016.

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title: Offshore SAC Sites (designated and proposed)

Figure: 2.14 | Drawing No: PB5894-SCO-2-018

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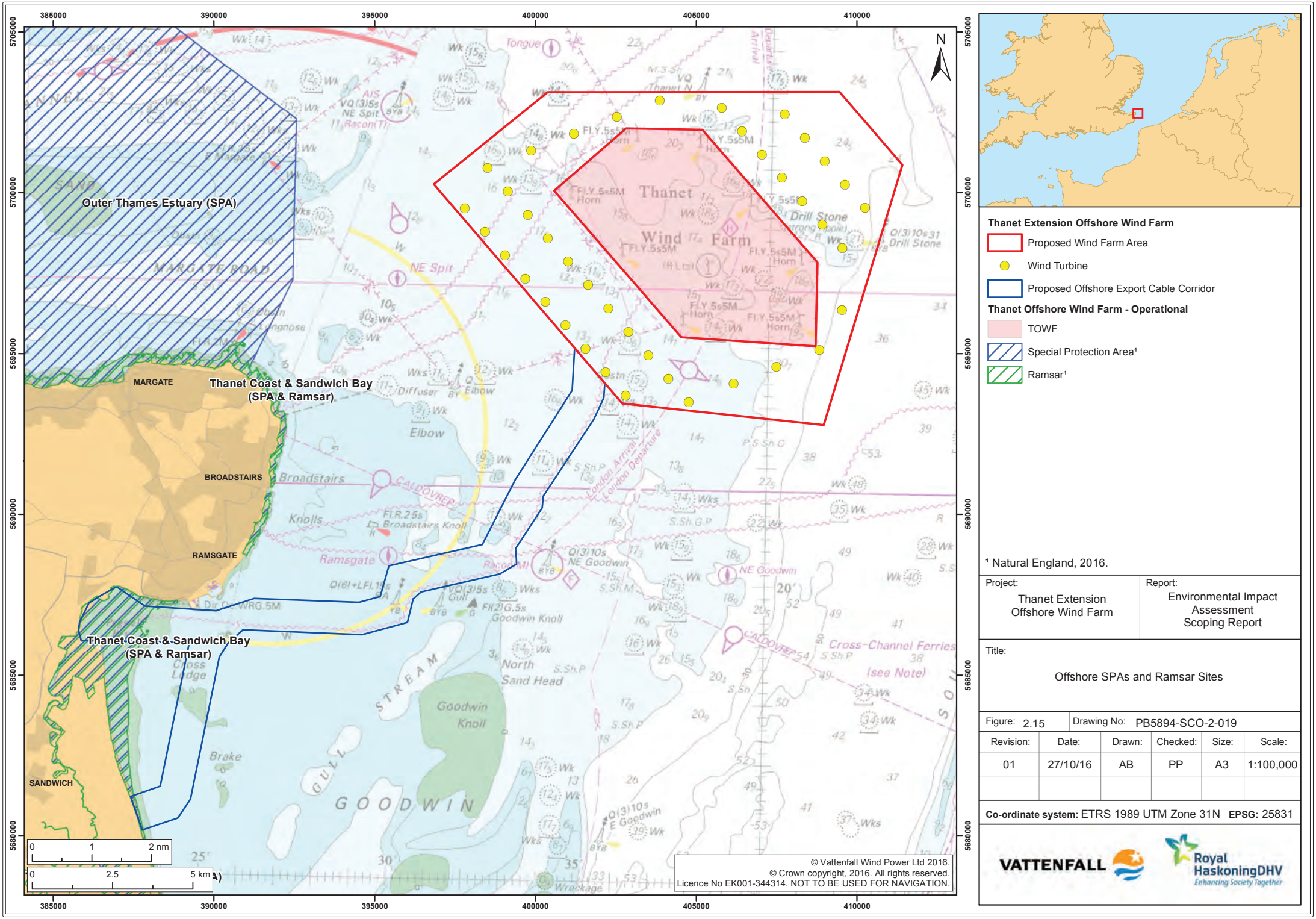

Thanet Extension Offshore Wind Farm

- Proposed Wind Farm Area
- Wind Turbine
- Proposed Offshore Export Cable Corridor

Thanet Offshore Wind Farm - Operational

- TOWF
- Special Protection Area[1]
- Ramsar[1]

[1] Natural England, 2016.

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title: Offshore SPAs and Ramsar Sites

Figure: 2.15 Drawing No: PB5894-SCO-2-019

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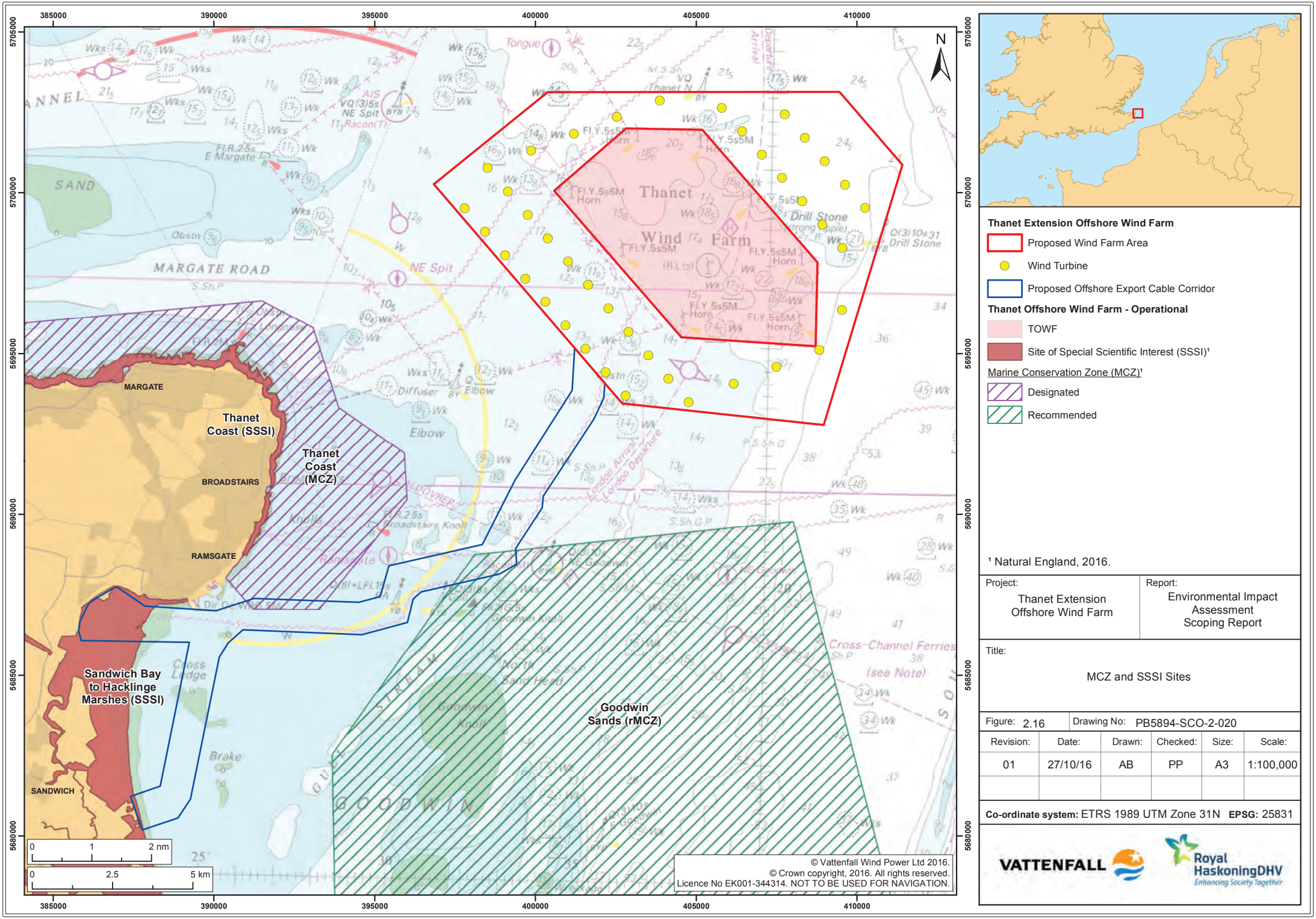

Thanet Extension Offshore Wind Farm

- Proposed Wind Farm Area
- Wind Turbine
- Proposed Offshore Export Cable Corridor

Thanet Offshore Wind Farm - Operational

- TOWF
- Site of Special Scientific Interest (SSSI)[1]

Marine Conservation Zone (MCZ)[1]

- Designated
- Recommended

[1] Natural England, 2016.

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title: MCZ and SSSI Sites

Figure: 2.16 | Drawing No: PB5894-SCO-2-020

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2.16 Offshore Inter-relationships

658. The EIA will identify inter-relationships which are likely to result from the construction, operation and decommissioning of Thanet Extension. The inter-relationships relevant to the offshore environment are outlined in Table 2.27.

Table 2.27 Offshore inter-relationships

Impact On	Affected By: Marine Geology, Oceanography and Physical Processes	Marine Water and Sediment Quality	Offshore Air Quality	Offshore Airborne Noise	Benthic and Intertidal Ecology	Fish and Shellfish Ecology	Marine Mammals	Offshore Ornithology	Commercial Fisheries	Shipping and Navigation	Offshore Archaeology and Cultural Heritage	Offshore Landscape and Visual Impacts	Aviation and Radar	Infrastructure and Other Users
Marine Geology, Oceanography and Physical Processes		X			X									
Marine Water and Sediment Quality														
Offshore Air Quality														
Offshore Airborne Noise														
Benthic and Intertidal Ecology	X													
Fish and Shellfish Ecology		X			X									
Marine Mammals		X				X				X				
Offshore Ornithology						X								
Commercial Fisheries						X				X				
Shipping and Navigation														
Offshore Archaeology and Cultural Heritage	X											X		
Offshore Landscape and Visual Impacts											X			
Aviation and Radar														
Infrastructure and Other Users														

659. The inter-relationships between receptors (shown in Table 2.27) are incorporated within the impacts identified in Sections 2.2 to 2.15, for example:

- Deterioration in water quality due to increased suspended sediment concentrations (Section 2.3);
- Impacts on benthic ecology as a result of increase suspended sediments (Section 2.5);
- Impacts on fish ecology as a result of increase suspended sediments and smothering (Section 2.6);
- Impacts on marine mammals as a result of impacts on prey species (Section 2.7);
- Impacts on marine mammals as a result of changes to water quality (Section 2.7;
- Vessel Interactions with marine mammals (Section 2.7);
- Impacts on commercially exploited fish and shellfish species (Section 2.6); and
- Increased collision risk for commercial fisheries (Section 2.9).

660. The inter-relationship in terms of the combination of all potential impacts on each receptor will also be considered where appropriate. In accordance with PINS (2012), this would not necessarily result in an increase in impact significance, particularly where an impact may counteract another. For example with regard to collision, an animal cannot be struck by a vessel if it has been displaced from an area by underwater noise.

661. The approach to offshore inter-relationships will be discussed with relevant stakeholders.

2.17 Cumulative and Transboundary Impacts Summary

662. This section collates the Scoping of cumulative and transboundary impacts discussed in Sections 2.2 to 2.17 (summarised in

663. Table 2.28).

664. During the EIA, a screening process will be undertaken, in consultation with key stakeholders during the EIA, to identify projects or plans that have potential to have a cumulative impact with Thanet Extension.

Table 2.28 Summary of offshore cumulative and transboundary impacts

Potential impacts	Construction	Operation	Decommissioning
Marine geology, oceanography and physical processes cumulative impacts	✓	✓	✓
Marine geology, oceanography and physical processes transboundary impacts	×	×	×
Marine water and sediment quality cumulative impacts	×	×	×
Marine water and sediment quality transboundary impacts	×	×	×
Offshore air quality cumulative impacts	x	x	x
Offshore air quality transboundary impacts	x	x	x
Offshore airborne noise cumulative impacts	✓	✓	✓
Offshore airborne noise transboundary impacts	×	×	×
Benthic and intertidal ecology cumulative impacts	✓	✓	✓
Benthic and intertidal ecology transboundary impacts	✓	✓	✓
Fish and shellfish ecology cumulative impacts	✓	✓	✓
Fish and shellfish ecology transboundary impacts	✓	✓	✓
Marine mammal ecology cumulative impacts	✓	✓	✓
Marine mammal ecology transboundary impacts	✓	✓	✓
Offshore ornithology cumulative impacts	✓	✓	✓
Offshore ornithology transboundary impacts	✓	✓	✓
Commercial fisheries cumulative impacts	✓	✓	✓
Commercial fisheries transboundary impacts	✓	✓	✓
Shipping cumulative impacts	✓	✓	✓
Shipping transboundary impacts	✓	✓	✓
Offshore archaeology and cultural heritage cumulative impacts	✓	✓	✓
Offshore archaeology and cultural heritage transboundary impacts	×	×	×
Aviation and radar cumulative impacts	×	×	×
Aviation and radar transboundary impacts	×	×	×
Infrastructure and other users cumulative impacts	x	x	x
Infrastructure and other users transboundary impacts	✓	✓	✓

3 PART 3: ONSHORE

3.1 Introduction

667. This section presents the main baseline characteristics of the environment within Thanet Extension Onshore Area of Interest (including the Landfall Options, Onshore Cable Route Options and Substation Area of Interest) as well as the surrounding area where relevant to each receptor. For the full assessment it may be necessary to split out the elements of the Thanet Extension Onshore Area of Interest for separate assessment (if they have different baseline characteristics or the potential impacts differ), however for the purposes of this report they are considered together. The potential impacts of the onshore elements of the Thanet Extension during construction, O&M, and decommissioning are considered. Where there is no pathway for a potential impact, impacts are proposed to be scoped out and not considered further within the EIA process. Where impacts are proposed to be scoped out, these are clearly identified within the relevant section of this report. Where impacts are proposed to be scoped in to the full EIA, an overview of the approach to the EIA is provided along with potential mitigation measures.

668. The following questions are suggested for consideration while reviewing each onshore section and providing responses for inclusion in the Scoping Opinion:

Q1. Please tell us about further data sources that could be reviewed as part of the site characterisation for each topic?

Q2. Tell us about any other relevant potential impacts for each topic?

Q3. Do you agree with the potential impacts that have been scoped out for each topic? If not, please provide details.

Q4. Have the relevant potential cumulative impacts been identified? If not, please provide details

Q5. Do you agree the proposed approach to assessing each impact is appropriate? If not, please provide details.

Q6. Is there any further guidance relating to each topic that we should be aware of? If so, please provide details.

Q7. Do you agree with the proposed extent of the study area for the individual topic? If not, please provide details.

Q8. Please tell us your comments for each topic regarding the search areas and sectors for the following project infrastructure:

- ***Landfall Options (Figure 1.3)***
- ***Onshore Cable Route Options (Figure 1.5); and***
- ***Substation Area of Interest (Figure 1.6)***

3.2 Ground Conditions and Contamination

3.2.1 Baseline

3.2.1.1 Data Sources

667. The data sources used to inform the ground conditions and contamination baseline are shown in Table 3.1 below.

Table 3.1 Data sources

Source number	Data	Source	Date
1	Geology	British Geological Survey (BGS) online viewer: www.mapapps.bgs.ac.uk	2016
2	Landfills and mining	Environment Agency, 'What's in your back yard' website: www.environment-agency.gov.uk	2016
3	WFD Classification	Thanet EIA	2005

668. Any additional data sets will be identified through feedback from stakeholders following this request for a Scoping Opinion.

3.2.1.2 Geology

669. The Isle of Thanet lies on a layer of Upper Chalk which is a soft limestone comprised of microscopic plankton algae. The chalk cliffs can be seen at the coastline from Grenham Bay to Ramsgate. There is also the Thanet Sand Formation which comprises fine grained grey and brown sands with local silty clays and abundant marine shells. The juncture between the Upper Chalk and Thanet Sand Formation at Cliffs End is a nationally important geological SSSI and can be seen at Pegwell Bay cliffs to the north of the landfall site. The geology of Pegwell Bay is characterised by marine beach deposits and tidal flats, with silty clay deposits further inland.

670. The Thanet Sand Formation is classified as a minor aquifer by the Environment Agency, whilst the Upper Chalk is classified as a major aquifer of regional importance. It is considered that the groundwater in the area is likely to be tidally influenced.

3.2.1.3 Designated geological sites

671. The coast from Pegwell Bay to Hacklinge Marshes is designated as Sandwich Bay and Hacklinge Marshes SSSI its biology and geology. With respect to geology, Pegwell Bay is of geological importance for the following reasons:

"The Thanet Formation contains an important fish fauna…. there is no other Thanetian site in Western Europe with this diversity of fauna, which includes many, as yet undescribed species plus the earliest records of other known Tertiary forms. The outcrop has very great significance because it is the only outcrop, which shows the bottom living fish assemblage, which was subsequently destroyed by the North Sea volcanicity, for the ash falls by these volcanoes brought about an extinction event…"

"At Pegwell Bay the Upper Chalk is overlain by the basal Tertiary beds of the Thanet Sands. The junction is marked by the celebrated "Bull-head Bed", an in situ weathering residue of unabraded flint nodules. This is a key section showing a demonstrable and regionally significant unconformity. Pegwell Bay is also the most important site for loess studies in Britain. The section shows up to 4m of Devensian loess overlying Upper Chalk and Thanet Beds. The loess, an accumulation of wind-blown dust produced under periglacial conditions during the Ice Age, is probably thicker here than at any other site in Britain, and is certainly the most closely studied example. …" (Pegwell Bay to Hacklinge Marshes SSSI citation, Nature Conservancy Council 1981).

672. The location of the site is shown on Figure 3.1.

3.2.1.4 Hydrology and hydrogeology

673. Surface water and groundwater features within the Onshore Area of Interest are discussed within Section 3.4 Water Resources and Flood Risk.

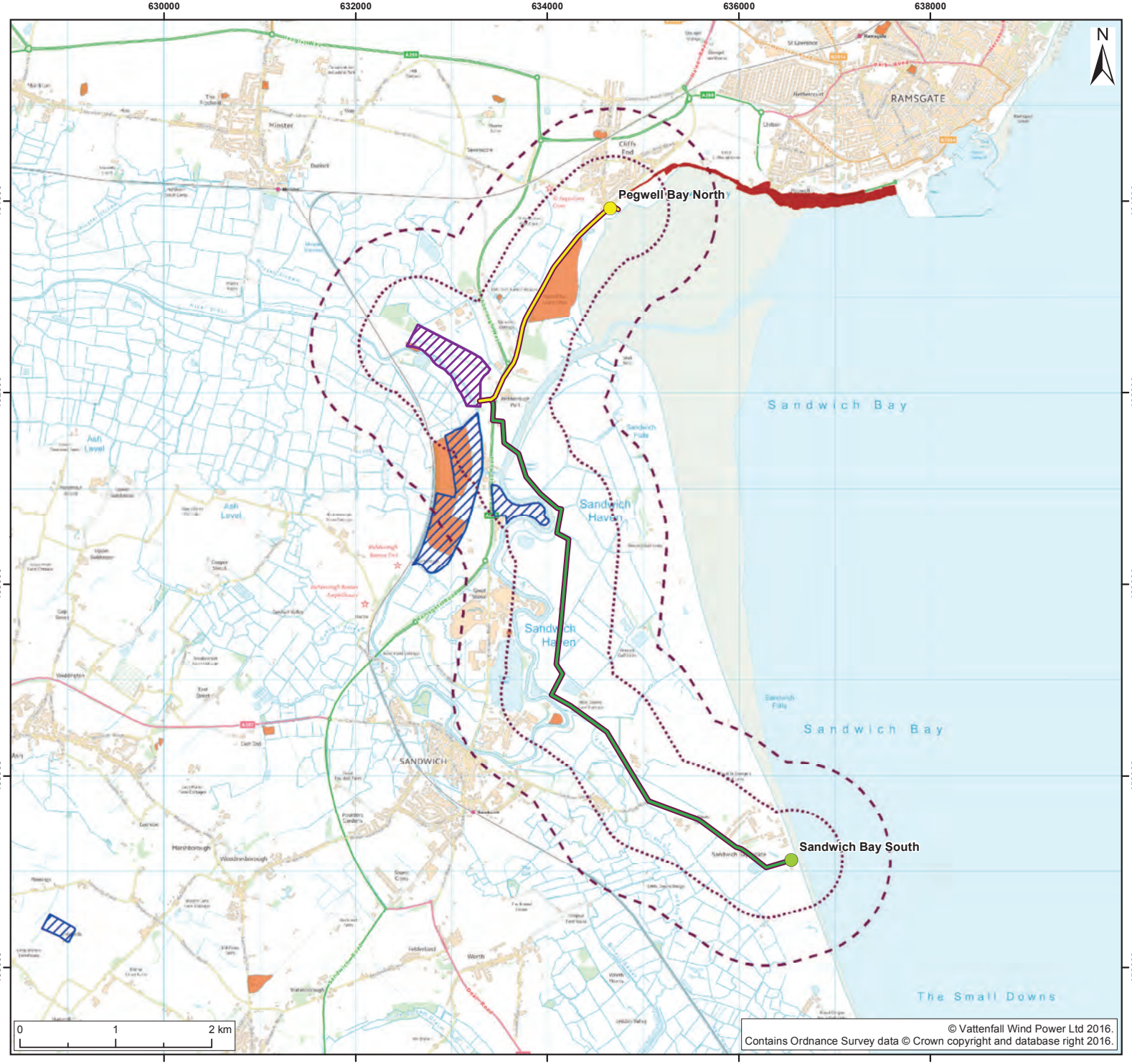
3.2.1.5 Land quality

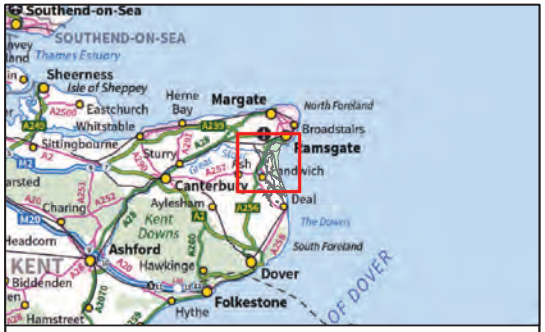
There are series of historic and active landfill sites located within the Onshore Area of Interest. These sites are summarised in Table 3.2, and shown on Figure 3.1.

Table 3.2 Landfill sites within the Onshore Area of Interest

Site name	Active or historic (*including date of last waste received*)	Waste types	Location
Cliffsend	Historic (1972)	Inert: Household	TR 34225 63199
Ebbsfleet - Ovenden	Historic (1991)	Inert	TR 33504 62994
Richborough Power Station	Historic (1987)	Inert	TR 32578 62487
Old CEGB Site at Richborough	Historic (1990)	Commercial; Household	TR 33012 61195
Richborough landfill	Active	Household; Commercial; Industrial	TR 33208 61068
Back Sand Point Landfill Site	Active	Industrial (Factory curtilage)	TR 33563 60841
Sandwich Marina	Historic (1986)	Inert	TR 34102 58625

674. There is also a disused hoverport in the northern part of Pegwell Bay which was reclaimed from mudflats using engineered colliery shale waste. It was reported in the TOWF ES (TOWL, 2005a) that ground contamination had been reported on the site through ground investigations using borehole and spike samples. There is evidence of former fuel storage and vehicle maintenance areas from elevated concentrations of hydrocarbons detected in the ground water (TOWL, 2005a). The site was considered likely to be classified as Contaminated Land under Part IIa of the Environment Act due to the risks associated with groundwater contamination discharging to coastal waters. Impacts from TOWF were avoided by locating the cable landfall away from areas considered to be contaminated.





- Landfall Option 1
- Landfall Option 2
- Onshore Cable Route Option 1 (25m
- Onshore Cable Route Option 2 (25m
- Onshore Substation Area of
- 500m Buffer Around 25m
- 1000m Buffer Around 25m
- Authorised LandFill[1]
- Historic LandFill[1]
- Geological features of the Sandwich Bay and Hacklinge Marshes SSSI[2]

[1] Environment Agency, 2016
[2] Natural England, 2016

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title: Landfill Sites and Geological SSSIs

Figure: 3.1 Drawing No: PB5894-SCO-3-021

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3.2.2 Potential Impacts

3.2.2.1 Potential impacts during construction

675. The excavation of the cable trench and soil/spoil handling procedures, and the excavation and stockpiling of soils has the potential for mobilisation of contaminants which could result in potential human health impacts to construction workers and pollution risks to controlled waters.

676. It is anticipated that potential risks to human health from ground contamination would be avoided by the use of appropriate personal protective equipment and by adopting appropriate working practices. Furthermore, any potential risk to controlled waters would be avoided by adopting appropriate working practices. There is potential for remobilisation of contaminants from the disused hoverport at Pegwell Bay dependent upon the location of the cable landfall. This potential impact will be further assessed once the landfall location is defined. Other mitigation measures would be adopted if any other impacts are identified on further stages of the assessment.

677. A Code of Construction Practice (CoCP) would be employed during site works to ensure that all appropriate and good practice guidelines (including the now withdrawn Pollution Prevention Guidelines (PPG)) are followed.

3.2.2.2 Potential impacts during operation

678. There are unlikely to be any significant impacts from the operation of the proposed project as there would be no requirement for new excavations or major works. O&M activities would follow standard procedures therefore minimising any potential impacts. Non-routine maintenance would be subject to robust and effective planning and risk assessment procedures. Given that these standard procedures would be followed to avoid or mitigate any impact, it is suggested that, subject to consultation with relevant consultees (i.e. the Environment Agency and Local Authorities) and feedback from this Scoping Report, this impact will be scoped out from further consideration within the EIA.

3.2.2.3 Potential impacts during decommissioning

679. It is proposed that the substation electrical infrastructure and building foundations would be removed as part of the decommissioning phase, with the cables, jointing pits and transition pits remaining in situ. The potential impacts during decommissioning would be similar to any impacts identified for the construction phase. The decommissioning methodology cannot be finalised until immediately

prior to decommissioning; but would be in line with relevant policy and industry best practice at that time.

680. It is therefore considered that impacts during decommissioning would be similar in nature to those during construction but would be more limited in geographical extent and timescale.

3.2.2.4 Potential cumulative impacts

681. Any project with the potential to act cumulatively and/or in combination with Thanet Extension will be identified during consultation and following a review of published information. Any projects identified will be included in the CIA. Projects which may result in cumulative impacts associated with potential construction or operation ground conditions and contamination impacts include other developments within 1km of the Onshore Area of Interest which may result in exposing or mobilising ground contaminants.

3.2.2.5 Summary of potential impacts

Table 3.3 Summary of impacts relating to ground conditions and contamination (scoped in (✓) and scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Ground Conditions and Contamination	✓	×	✓
Human health (construction workers)	✓	×	✓
Human health (residents)	✓	×	✓
Designated geological sites	✓	×	✓
Cumulative impacts	✓	×	✓

3.2.3 Mitigation

682. At this stage, no mitigation measures are expected to be needed beyond those embedded in the design of the proposed project.

683. Embedded mitigation is likely to include the following:

- 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. HDD at sensitive points); and
- Development and compliance of a Code of Construction Practice (CoCP).

3.2.4 Approach to assessment and data gathering

684. For the purposes of the assessment, the study area for obtaining relevant information for direct impacts to land quality will be up to a 500m buffer along the proposed Onshore Cable Route and up to a 1km buffer for the substation.

685. The approach and methodologies to be used within the assessment will be in accordance with the guidance contained within CLR 11: Model Procedures for the Management of Land Contamination (Defra, 2004).

686. The assessment will support the ES and will include the following aspects:

- Completion of a contaminated land Phase 1 desk based study and (and potentially a walkover); and
- Development of Conceptual Site Model (CSM).

687. The approach to assessment and data gathering will be discussed and agreed with relevant bodies prior to commencement. Consultation will be undertaken at key stages throughout the EIA process.

3.3 Air Quality

3.3.1 Baseline

3.3.1.1 Data Sources

688. The data sources used to inform the air quality baseline are listed below:

- Defra – Interactive Air Quality Management Area (AQMA) Boundaries map (Defra, 2016a); and
- Local Air Quality Management (LAQM) reports from Thanet District Council (Thanet District Council, 2014).

689. Any additional datasets will be identified through feedback from stakeholders following this request for a Scoping Opinion.

3.3.1.2 Baseline

690. Existing emissions sources within the Thanet Extension Onshore Area of Interest are likely to be the road network, especially the A256 dual carriageway.

691. The Thanet Extension Onshore Area of Interest is not located within any AQMAs, but is located adjacent to the Thanet Urban AQMA. The Thanet Urban AQMA has been designated since 2011 for Nitrogen dioxide (annual mean concentration). For the most recent available Nitrogen dioxide monitoring data (2012-2013), the annual mean UK Air Quality Strategy objectives for Nitrogen dioxide were exceeded in four

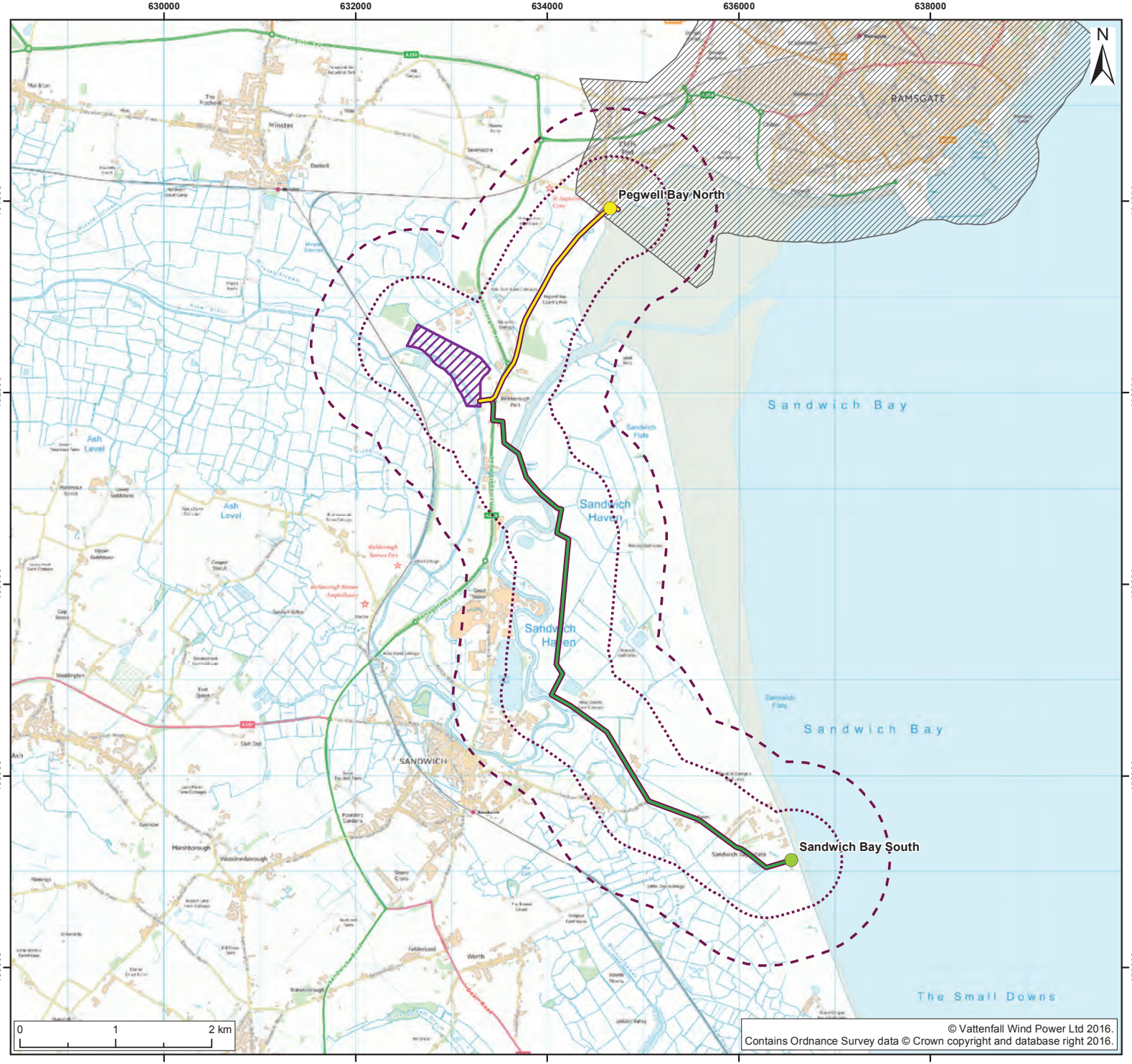
locations within the AQMA, the nearest of which (High Street St. Lawrence) is located approximately 3km from the Onshore Area of Interest. No exceedances have been recorded outside of the AQMA within Thanet district (Thanet District Council, 2014). The Thanet AQMA is shown on Figure 3.2.

692. Air quality and dust sensitive receptors within the Onshore Area of Interest include the following:

- Human receptor locations sensitive to dust within 350m of proposed construction phase activities;
- Receptors sensitive to air pollution situated within 200m of the road network to be utilised by construction traffic; and
- Ecological receptor locations sensitive to dust within 50m of the proposed construction phase activities.

693. Air quality and dust sensitive receptors in the area include residential properties close to the proposed Onshore Cable Route in the villages of Cliffs End, Stonelees, Sandwich Bay Estate, and the properties of New Downs Farm Cottage and Tollgate Cottages. Non-residential receptors include users of the St Augustine's golf course, Stonelees golf course, nature conservation designation located at Pegwell Bay (NNR, SPA, Ramsar site, SSSI, SAC) Pegwell Bay Country Park, the Thanet Coast Path, Stour Valley Walk, Saxon Shore Way and local PRoW within the Onshore Area of Interest.

694. Depending on the proposed HGV haul routes, other receptors may need to be included within this assessment.



- Landfall Option 1
- Landfall Option 2
- Onshore Cable Route Option 1 (25m Corridor)
- Onshore Cable Route Option 2 (25m Corridor)
- Onshore Substation Area of Interest
- 500m Buffer Around 25m Corridor
- 1000m Buffer Around 25m Corridor
- Thanet Urban Air Quality Management Area

Project: Thanet Extension Offshore Wind Farm	Report: Environmental Impact Assessment Scoping Report

Title: Air Quality Management Areas

Figure: 3.2 | Drawing No: PB5894-SCO-1-022

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3.3.2 Potential Impacts

3.3.2.1 Potential impacts during construction

695. The potential impacts associated with the construction phase of the proposed project are:

- Construction dust impacts - the generation of dust and particulates (e.g. from excavation or movement of dry materials) potentially having an adverse impact on sensitive receptors; and
- Increase in traffic based air quality pollutant concentrations - exhaust emissions from construction traffic having the potential to contribute to local ambient concentrations of nitrogen dioxide (NO_2), and particulate matter (PM_{10} and $PM_{2.5}$).

696. Dust emitted by construction activities has the potential to cause nuisance at nearby receptors, such as residential properties through:

- Soiling of surfaces; and
- Effects on human health through fine particulate matter.

697. Exhaust emissions emitted by construction activities has the potential to cause nuisance at nearby receptors, such as residential properties through:

- Effects on human health; and
- Exceeding critical loads for nitrogen deposition on sensitive habitats.

3.3.2.2 Potential impacts during operation

698. The potential impacts during the operational phase of the development are likely to be negligible. Operation of the proposed built infrastructure (the substation) and maintenance activities would not lead to a significant change in vehicle flows within the study area.

699. Operational air quality impacts are therefore likely to be negligible and therefore it is suggested that, subject to consultation with relevant consultees (i.e. the Environment Agency and Local Authorities) and feedback from this Scoping Report, this impact will be scoped out from further consideration within the EIA.

3.3.2.3 Potential impacts during decommissioning

700. It is proposed that the substation electrical infrastructure and building foundations would be removed as part of the decommissioning phase, with the onshore cables, jointing pits and transition pits remaining in situ. The decommissioning phase of the

Thanet Extension may therefore result in fugitive dust emissions and a temporary increase in vehicle movements (including HGVs) on the local road network.

701. It is therefore considered that impacts during decommissioning would be similar in nature to those during construction but would be more limited in geographical extent and timescale.

3.3.2.4 Potential cumulative impacts

702. Cumulative impacts could occur where construction or decommissioning phase activities are undertaken concurrently with other similar activities associated with other developments within the study area. Cumulative impacts will be considered as part of the air quality assessment. Projects which may result in cumulative impacts associated with potential construction or operation air quality impacts include other developments within 1km of the proposed Onshore Area of Interest which involve changes to traffic flows and or increases in dust or air pollutant emissions.

3.3.2.5 Summary of potential impacts

Table 3.4 Summary of impacts relating to air quality (scoped in (✓) and scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Increase in traffic based air quality pollutant concentrations – human receptor locations	✓	×	✓
Increase in traffic based air quality pollutant concentrations – ecological habitats	✓	×	✓
Construction dust impacts – human receptors	✓	×	✓
Construction dust impacts – ecological habitats	✓	×	✓
Cumulative impacts	✓	×	✓

3.3.3 Mitigation

703. Embedded mitigation is likely to include the following:

- Construction and decommissioning works would be undertaken in accordance with best practice measures and proportional to the likely impacts; and
- An Air Quality Management Plan would be developed as part of the Code of Construction Practice (CoCP).

704. Any requirement for additional air quality and dust mitigation measures will be determined through liaison with stakeholders such as the Environmental Health Officer (EHO) as part of the air quality impact assessment.

3.3.4 Approach to assessment and data gathering

705. Baseline air quality conditions will be assessed by evaluation of the most recent Local Air Quality Management (LAQM) reports published by Thanet District Council. The

assessment will also consider the air pollution background concentration maps published by Defra.

706. A risk based approach will be used to assess the impacts of construction activities. The assessment will be carried out in accordance with guidance provided by the Institute for Air Quality Management (IAQM) in the 'Guidance on the Assessment of Dusts from Demolition and Construction, February 2014' document. The dust assessment will also define the suitable level of mitigation required based upon the risk of dust impacts.

707. An initial screening assessment will be conducted to determine positions where detailed assessment of road traffic emissions is required. The assessment will use the screening criteria provided in IAQM & Environmental Protection UK (EPUK), Planning for Air Quality (2015) guidance to determine where detailed assessment of road traffic emissions is required. The technical approach to the air quality assessment will be in accordance with Defra (2016b), Local Air Quality Management Technical Guidance.

708. The approach to assessment and data gathering will be discussed and agreed with relevant bodies prior to commencement. Consultation will be undertaken at key stages throughout the EIA process.

3.4 Water Resources and Flood Risk

3.4.1 Baseline

3.4.1.1 Data sources

709. The data sources used to inform the water resources and flood risk baseline are listed below (available from http://apps.environment-agency.gov.uk/wiyby/):

- Environment Agency's Flood Map for Planning;
- Environment Agency's Risk of Flooding from Surface Water;
- Environment Agency's Risk of Flooding from Rivers and Sea; and
- Environment Agency's aquifer and source protection zone (SPZ)mapping;
- Environment Agency's Catchment Data Explorer for WFD River Basin Districts Management Catchments, Operational Catchments and WFD water bodies.

710. Any additional data sets will be identified through feedback from stakeholders and the public following this request for a Scoping Opinion.

3.4.1.2 Groundwater

711. The underlying geology beneath the Thanet Extension Onshore Area of Interest is described in Section 3.2 Ground Conditions and Contamination.

712. The surface drift deposits present along the Thanet Extension Onshore Area of Interest (Thanet Sand Formation) have a high capacity to transmit water, and are classified by the Environment Agency as a minor aquifer. The chalk bedrock is classified as a major aquifer of regional importance.

713. Regional groundwater flow in the area is directed towards the east and the English Channel. However, close to the substation, the groundwater flow may be locally diverted towards the west and the River Stour. In general it is likely that the groundwater in the area is tidally influenced.

714. No groundwater SPZs are found along the proposed Onshore Cable Route Options and Substation Extension. In fact, given the proximity to the coast, it is possible that the groundwater underlying the area is brackish.

3.4.1.3 Surface water

715. The hydrology in the area consists of surface watercourses at the River Stour and its tributaries the Minster Stream, located close to the former Richborough Power Station, and North Stream and Vigo Sprong, located east of Sandwich town. The River Stour joins Pegwelll Bay at the village of Stonelees. All of these watercourses are classified as main rivers by the Environment Agency. There are also networks of drains to the west of the former Richborough Power Station and to the east of the River Stour. The River Stour is tidally influenced from approximately downstream of the Richborough Industrial Estate.

716. The following surface water WFD water bodies are located within the Thanet Extension Onshore Area of Interest:

- River Stour (Kent) (GB520704004700)
- Monkton and Minister Marshes (GB107040019621)
- North and South Streams in the Lydden Valley (GB107040019550)

717. The following groundwater WFD water bodies are located within the Onshore Area of Interest:

- East Kent Tertiaries (GB40702G501600)
- East Kent Chalk – Stour (GB40701G501500)

718. Figure 3.3 shows the location of these WFD water bodies. It is necessary to undertake an assessment of the implications of the proposed project on the current and future potential status of water bodies classified under the WFD.

719. Water bodies are selected for inclusion in the initial screening stages of the WFD compliance assessment using the following criteria:

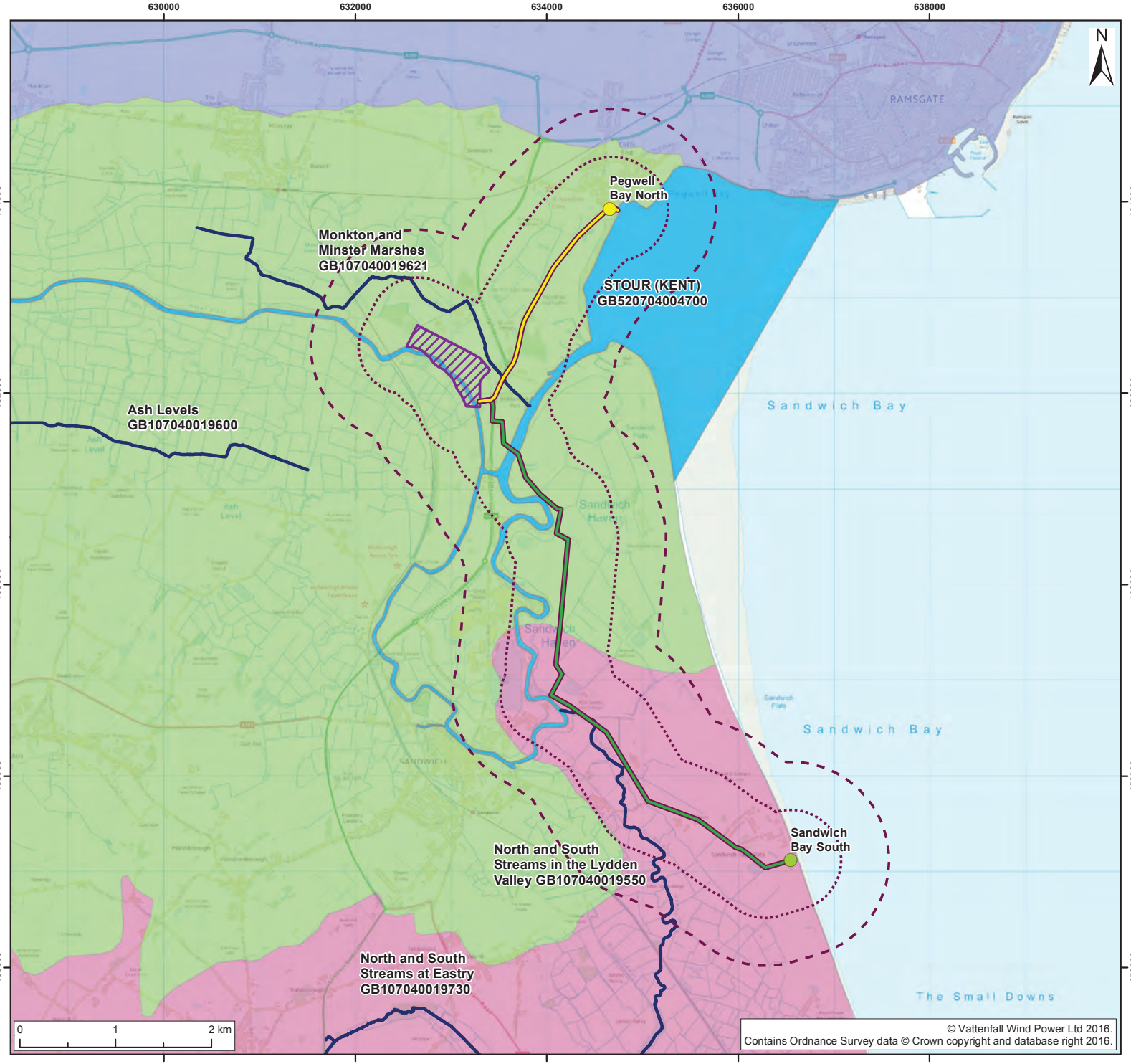
- All surface water bodies that could potentially be directly impacted by the scheme (i.e. those within the project footprint).
- Any surface water bodies further upstream that have direct connectivity and could potentially be affected by the proposed works.
- Any surface water bodies downstream that have direct connectivity and could potentially be affected by the proposed works.
- Any groundwater bodies that underlie the proposed project.

720. The water bodies listed above are identified in the proposed Onshore Area of Interest and are listed within the River Basin Management Plan 2015 (Environment Agency, 2016b).

3.4.1.4 Flood zones

721. The Thanet Extension Onshore Area of Interest covers land classified as within all three flood zones (1, 2 and 3)[9]. In addition, there are flood defences in place around the River Stour north-east of Sandwich town which prevent land from being flooded by the River Stour, North Stream and Vigo Sprong (as shown on Figure 3.4).

[9] Flood zone 3 covers land which has a 1 in 200 or greater chance of being subject to a flood event from the sea or a 1 in 100 or greater chance of being subject to a flood event from a river each year. Flood zone 2 covers land which has a 1 in 1000 (i.e. an extreme event) or greater chance of being subject to a flood event from the rivers or the sea each year.



- Landfall Option 1
- Landfall Option 2
- Onshore Cable Route Option 1 (25m Corridor)
- Onshore Cable Route Option 2 (25m Corridor)
- Onshore Substation Area of Interest
- 500m Buffer Around 25m Corridor
- 1000m Buffer Around 25m Corridor
- WFD Fluvial Water body[1]
- WFD Transitional Water body[1]

WFD Groundwater body[1]

- East Kent Chalk - Stour
- East Kent Tertiaries
- Kent Isle of Thanet Chalk

[1] Environment Agency, 2016.

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title: Water Framework Directive Waterbodies

Figure: 3.3 | Drawing No: PB5894-SCO-3-024

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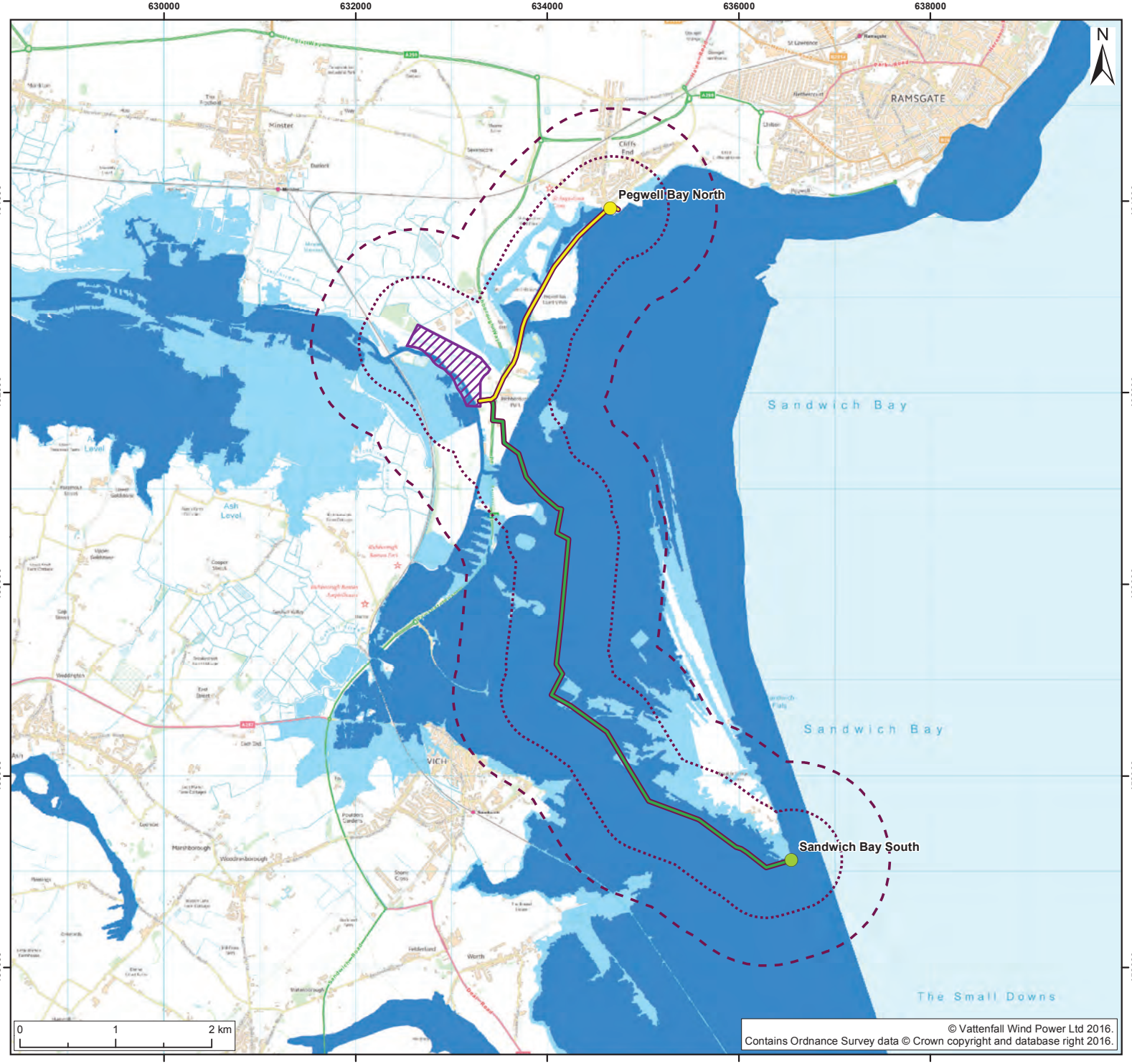

- Landfall Option 1
- Landfall Option 2
- Onshore Cable Route Option 1 (25m Corridor)
- Onshore Cable Route Option 2 (25m Corridor)
- Onshore Substation Area of Interest
- 500m Buffer Around 25m Corridor
- 1000m Buffer Around 25m Corridor
- Flood Zone 3[1]
- Flood Zone 2[1]

[1]Environment Agency, 2016.

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title: Flood Zones

Figure: 3.4 | Drawing No: PB5894-SCO-3-025

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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3.4.2 Potential Impacts

3.4.2.1 Potential impacts during construction

Water resources

722. Potential water resource impacts of the project include changes in the supply of groundwater and surface water resources due to the presence of construction activities. Impacts may also arise as a result of changes in the distribution network (drainage) in order to facilitate the installation and maintenance of the onshore cable.

723. Construction activities with the potential to disturb the local water resources are outlined as follows:

- Excavation within permeable superficial drift deposits could adverse effect the groundwater flows within these deposits.
- Spills and leaks of contaminants directly into surface waters could adversely affect the water quality and chemical and ecological status of surface water features.
- The requirement may exist to dewater excavations when rainfall or surface water runoff has to be removed or shallow perched groundwater is encountered. There is the risk that dewatering of trenches may lead to the discharge of potentially contaminated water or sediment laden runoff entering nearby surface watercourses or surface water features.
- Soil compaction by construction vehicles and creation of trench and buried concrete jointing bays has the potential to alter or remove surface drainage routes unless formally reinstated or undertaken sensitively.

Flood risk

724. The construction works may include diversion/over-pumping works and/or use of open-cut techniques. These works may have a temporary impact on watercourses, drainage infrastructure and as a result have an effect on the associated flows and flood risk.

3.4.2.2 Potential impacts during operation

Water resources and flood risk

725. There are unlikely to be any significant impacts from the operation at the landfall or within the Thanet Extension Onshore Area of Interest as there would be no requirement for new excavations or major works, therefore it is suggested that, subject to consultation with relevant consultees (i.e. the Environment Agency and

Local Authorities) and feedback from this Scoping Report, this impact will be scoped out from further consideration within the EIA.

726. The change in land use as a result of the permanent above ground infrastructure, at the substation, has the potential to result in increased flood risk during operation.

3.4.2.3 Potential impacts during decommissioning

727. It is proposed that the substation electrical infrastructure and building foundations would be removed as part of the decommissioning phase, with the onshore cables, jointing pits and transition pits remaining in situ. The decommissioning methodology cannot be finalised until immediately prior to decommissioning; but would be in line with relevant policy at that time.

728. It is therefore considered that impacts during decommissioning would be similar in nature to those during construction but would be more limited in geographical extent and timescale.

3.4.2.4 Potential cumulative impacts

729. Any project with the potential to act cumulatively and/or in combination with Thanet Extension will be identified during consultation and following a review of published information. Any projects identified will be included in the CIA. Projects which may result in cumulative impacts associated with potential construction or operation water resource or flood risk impacts include other developments within River Stour catchment.

3.4.2.5 Summary of potential impacts

Table 3.5 Summary of impacts relating to water resources and flood risk (scoped in (✓) and scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Impacts on water resources	✓	x	✓ (Substation only)
Impacts on WFD surface water bodies	✓	x	✓ (Substation only)
Impacts on WFD groundwater bodies	✓	x	✓ (Substation only)
Flood risk	✓	✓ (Substation only)	✓ (Substation only)
Cumulative impacts	✓	✓ (Substation only)	✓ (Substation only)

3.4.3 Mitigation

730. Embedded mitigation is likely to include the following:

- Avoidance of impact through methodology selection (e.g. HDD to directionally drill under water bodies and other sensitive receptors); and
- Development of a Code of Construction Practice (CoCP).

731. In addition to embedded mitigation, potential further mitigation measures will be identified in consultation with the Environment Agency, Thanet and Dover District Councils, Kent County Council and the River Stour Internal Drainage Board.

732. Additional mitigation measures would be discussed and agreed with stakeholders depending on any potential impacts identified.

3.4.4 Approach to assessment and data gathering

733. The assessment would be informed by desk-based assessment and review of available data from the Environment Agency and Lead Local Flood Authority (LLFA), site visits and consultation with relevant statutory consultees (Local Authority LLFA, Environment Agency, Natural England and the appropriate Water Authority).

734. The desk based assessment would involve a review of publicly available information sources, such as:

- Historical maps;
- Geological maps;
- BGS borehole records and ground water levels;
- Topographical survey data;
- Any previous site investigation data obtained from the local authority and the Environment Agency;
- Abstraction licence records;
- Public sewer records; and
- Flood mapping and hydrological investigations carried out by the Environment Agency.

735. A Flood Risk Assessment (FRA) would also be undertaken in accordance with the National Planning Policy Framework (NPPF) to assess the flood risk to the development and surrounding areas. This would inform the identification of any required mitigation measures. Furthermore, a WFD compliance assessment would be undertaken to evaluate whether the proposed development is likely to cause deterioration in the WFD status of any water bodies.

736. The WFD compliance assessment would be undertaken to assess compliance with the requirements of the WFD, in line with The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003.

737. As part of the application the assessment will need to consider:

- Detailed appraisal of river crossings (as required by the Water Resources Act (1991)); and
- Any works within nine metres of a flood defence will require Flood Defence Consent.

738. The approach to assessment and data gathering will be discussed and agreed with relevant bodies prior to commencement. Consultation will be undertaken at key stages throughout the EIA process.

3.5 Land Use

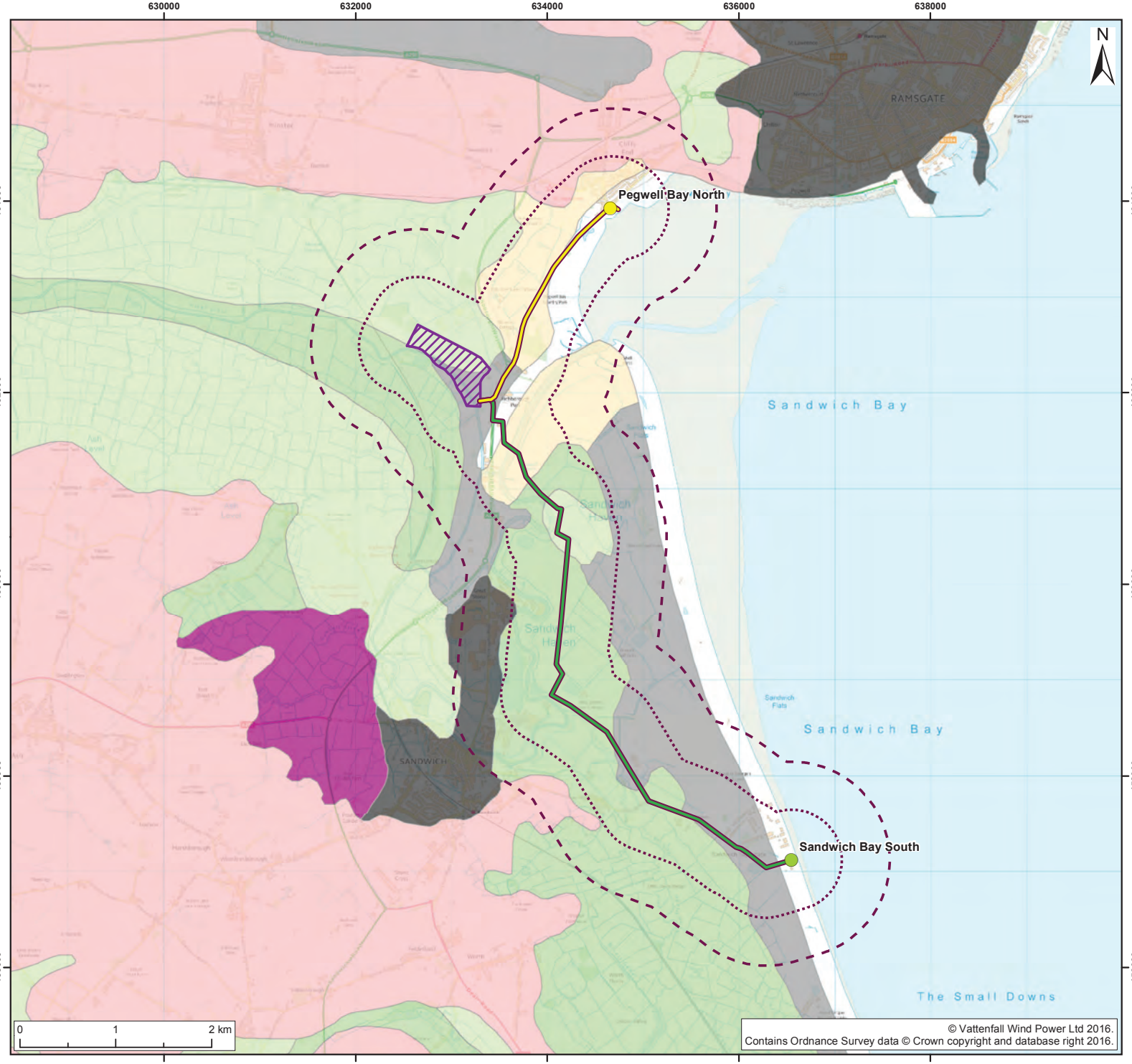
3.5.1 Baseline

3.5.1.1 Data Sources

739. The data sources used to inform the land use baseline are listed below:

- Ordnance Survey (2016) 'A' Roads, Railway Lines, Urban Areas, PRoW;
- Natural England (2016c) Coastal Paths;
- Natural England (2011) Agriculture Land Classifications;
- Sustrans (2015) Regional and National Cycle Routes; and
- National Grid (2015) High Pressure Gas Pipelines and Buried High Voltage Electricity High Voltage Cable Locations.

740. The assessment to be undertaken as part of the EIA will use the Natural England Agricultural Land Classification (ALC) system. This system grades agricultural land from Grade 1 (best quality) through to Grade 5 (poorest quality) based on factors including climate, nature of the soil and site-based factors. The predominant land use types, including ALC baseline information is shown in Figure 3.5.



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Agricultural Land Classification

- GRADE 1
- GRADE 2
- GRADE 3
- GRADE 4
- GRADE 5
- NON AGRICULTURAL
- URBAN

[1] Natural England, 2016.

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Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title: Main Land Use Types

Figure: 3.5 | Drawing No: PB5894-SCO-3-026

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3.5.1.2 Land uses within the Onshore Area of Interest

741. There is a mix of land use within the Onshore Area of Interest, with urban (including roads, brownfield land and developed land), agricultural, and other 'non-agricultural' land uses, including water bodies and coastal landscapes.

742. The Onshore Area of Interest comprises land of a mix of agricultural grades, with no single ALC grade dominating. ALC Grade 2 (very good quality), ALC Grade 3 (moderate) and ALC Grade 5 (poor) agricultural land present within the Onshore Area of Interest. There is also land classed as 'non-agricultural' within the Sandwich Flats along the Kent coastline.

743. Saxon Shore Way, Stour Valley Walk and Thanet Coast Path Long Distance Paths all pass through the Onshore Area of Interest, as do National Cycle Route 1 and Regional Cycle Route 15. The England Coast Path runs through the Onshore Area of Interest, although is diverted at Richborough Port until July 2018 (Case ref: 2015047704).

744. There are existing overhead lines which connect into the former Richborough Power Station.

745. The town of Sandwich and the village of Cliffs End are located within the Onshore Area of Interest. There are commercial and industrial parks located within the Onshore Area of Interest also, in particular at Great Stonar, and the former Richborough Power Station and existing Wastewater Treatment Works.

746. The A256 dual carriageway is present within the Onshore Area of Interest, as are several local roads.

3.5.1.3 Local planning policies and designations

747. The Onshore Area of Interest lies within Thanet District Council and Dover District Council. Developments within Thanet District are currently subject to the Saved Policies from the 2006 Thanet Local Plan (the Plan itself expired in 2009). A draft Thanet Local Plan to 2031 is under development, timetabled to be adopted in February 2017. Developments within Dover District are subject to the Core Strategy adopted February 2010, which covers developments up to 2026, the Saved Policies from the 2002 Dover local Plan, and the Land Allocations Local Plan adopted on 2015.

3.5.2 Potential Impacts

3.5.2.1 Potential impacts during construction

Agricultural productivity

748. There is potential for adverse impacts to soil structure and future agricultural productivity of soils impacted during construction through the use of heavy machinery. Ground conditions and potential contamination is discussed further in Section 3.2 Ground Conditions and Contamination.

Drainage

749. There is potential to impact on the natural and artificial field drainage systems during construction works. Construction methods will follow best practice and appropriate procedures to reduce this risk. Drainage is discussed further in Section 1.4.5

Disruption to farming practices

750. There is potential for impacts on farming and other land use practices through the temporary loss of land availability, restricted access caused by working areas and construction traffic during the construction period

Temporary closure of PRoWs/cycle paths

751. Closures and diversions of long distance paths, local PRoW and cycle routes may be necessary during the construction phase. Any potential closures will be discussed in advance with the appropriate consultees and advertised accordingly.

Existing utilities

752. During the construction phase, cable installation activity has the potential to impact on local water, power and gas infrastructure. Construction methods will follow best practice and appropriate procedures to reduce this risk.

Public health and safety

753. The EIA will focus on elements which could be of concern to members of the public, for example issues relating to invasive plant species, notifiable scheduled diseases and procedures required to prevent any health or safety issues arising in relation to existing buried gas, electric and water services. Issues relating to public health are considered in Section 3.12 Health.

3.5.2.2 Potential impacts during operation

Permanent loss of land

754. The proposed permanent above ground infrastructure is proposed to be located on primarily on existing hardstanding at the former Richborough Power Station, however the substation footprint may also involve development and permanent loss of approximately 8ha of existing land adjacent to the former Richborough Power Station to the north. This land is classified at the broad scale as ALC Grade 2 (very good quality).

Disruption to farming practices

755. There is the potential for farming practices to be restricted due to the presence of cables and access restrictions.

Permanent closure of PRoW/cycle paths

756. No PRoW or cycle routes are located beneath any proposed above ground infrastructure. There would be no requirements for temporary or permanent closures of these routes during operation.

Public health and safety

757. Issues of public concern and health such as EMF arising in relation to buried cables will be considered further in Section 3.12 Health.

Drainage

758. The presence of buried cables has the potential to impact upon land drainage.

3.5.2.3 Potential impacts during decommissioning

759. It is proposed that the substation electrical infrastructure and building foundations would be removed as part of the decommissioning phase, with the onshore cables, jointing pits and transition pits remaining in situ. The decommissioning methodology cannot be finalised until immediately prior to decommissioning; but would be in line with relevant policy at that time.

760. It is therefore considered that impacts during decommissioning would be similar in nature to those during construction but would be more limited in geographical extent and timescale.

3.5.2.4 Potential cumulative impacts

761. For a cumulative impact to arise as a result of impacts during construction to land use, a development would have to share a boundary with the onshore project area and could therefore potentially affect the same areas of land during construction. At this stage it is not known which projects might share a boundary with the Onshore Area of Interest. Any potential cumulative impacts will be agreed in consultation with stakeholders and local authorities and therefore will be considered further in the EIA.

3.5.2.5 Summary of potential impacts

Table 3.6 Summary of impacts relating to land use (scoped in (✓) and scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Agricultural productivity	✓	×	✓
Drainage	✓	✓	✓
Disruption to farming practices	✓	✓	✓
Existing utilities	✓	×	✓
Public health and safety	✓	✓	✓
Loss of land	✓	✓	✓
Closure/diversion of PRoWs/cycle paths	✓	×	✓
Cumulative impacts	✓	✓	✓

3.5.3 Mitigation

3.5.3.1 Agricultural productivity and drainage

762. Where practicable Thanet Extension Onshore Area of Interest would be optimised to minimise effects upon agriculture. Soils would be handled in accordance with best practice, in order to minimise the risk to integrity of soil resource and land quality during construction and reinstatement. This could include the development of a soil and drainage management strategy based on the results of pre-construction surveys for the restoration of the potential Onshore Cable Route. All drainage systems would be fully reinstated in consultation with landowners and specialist drainage contractors.

3.5.3.2 Disruption to farming practices

763. Early and ongoing consultation through land agents will ensure that farmers' concerns are well understood and that site specific conditions can be taken into account so that potential impacts upon farming practices can be minimised as far as is possible from the outset.

3.5.3.3 Temporary closure of PRoWs/cycle paths

764. PRoWs will be identified and classified in consultation with the relevant local authorities. Any PRoW that may be affected by the proposed project would be considered on a case by case basis, with diversions or closures agreed with the local public rights of way officer. The requirement for permanent closures/diversions would be minimised as far as possible.

3.5.3.4 Existing utilities

765. Potential mitigation may be required for the cable route crossings with existing pipelines and cables, these crossings would be monitored where required. Major utilities would be covered by identifying protective provisions in the drafting of the DCO document, and with the use of crossing agreements.

3.5.3.5 Public health and safety

766. Through designing the project the depth of buried cables would mitigate impacts associated with EMF, however the outcomes of similar infrastructure developments in relation to EMF will be reviewed during the EIA. A desk based assessment will identify local invasive plants and notifiable diseases (see Section 3.6 Onshore Ecology for more information on proposed ecological surveys on invasive plant species). These would be managed through the use of construction method statements and management plans.

3.5.3.6 Soil heating

767. Detailed design would ensure an appropriate burial depth and use of imported backfill material (if required). This would be captured in the Soils Management Plan which would be adhered to during construction.

3.5.4 Approach to assessment and data gathering

768. The assessment of effects in relation to land use will include a desk-based assessment of:

- A review of local and national planning policy documents and guidance;
- ALC;
- Environmental Stewardship Schemes;
- Notifiable Scheduled Diseases;
- Injurious weeds and invasive plant species;
- Open access and common land;
- Existing utilities;
- EMF;

- Soil resources affected by construction activities;
- Likely effects on agricultural practices (including land quality and soil types) and other land uses during the construction phase; and
- Likely effects on PRoWs, roads and cycle routes during the construction phase.

769. The EIA for land use will identify the likely impacts of Thanet Extension, assess the effects and identify appropriate mitigation measures if required. This process will lead to an assessment of residual effects. The assessment will consider both direct and indirect impacts.

770. The methodology for the assessment of the effects on land use will be informed by the following current guidance and information sources:

- Ordnance Survey (OS) 1:50,000, 1:25,000 and 1:10,000 scale mapping;
- Natural England – Nature on the Map (Natural England, 2012a);
- NE124 – Look after your land with Environmental Stewardship (Natural England, 2012b);
- National Soil Resource Institute;
- Public consultation events and questionnaires;
- Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 6 (Land Use);
- DEFRA guidance including the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (2009b);
- Aerial photography;
- DEFRA farming statistics; and
- Land Registry information.

771. The approach to assessment and data gathering will be discussed and agreed with relevant bodies prior to commencement. The scope of assessment will also be discussed with the relevant local landowners. Consultation will be undertaken at key stages throughout the EIA process.

3.6 Onshore Ecology

3.6.1 Baseline

3.6.1.1 Data sources

772. The Scoping assessment has been undertaken using ecological data collected for the TOWF ES (TOWL, 2005a). This data relates to Onshore Cable Route Option 1 (Pegwell Basy) only. These data includes:

- Biological records from English Nature, Kent Wildlife Trust, The Royal Society for the Protection of Birds (RSPB), Kent Mammal Group, Butterfly Conservation, Kent Reptile and Amphibian Group (KRAG) and Kent Ornithological Society (KOS);
- Ecological survey data collected for the TOWF ES during 2005. This survey data includes information on habitats, flora, great crested newts, reptiles, bats, badgers, water voles and birds within 30m of the TOWF onshore export route (500m for great crested newts). An Updated Extended Phase 1 Habitat Survey was also undertaken during 2008.

773. Following the development of TOWF, post-construction monitoring was undertaken to collect data on the recovery of the saltmarsh within Pegwell Bay SSSI following the construction of the TOWF landfall site. Data was collected with monthly surveys from March – August 2010, followed by annual surveys in August 2011 and September 2012. This monitoring data has also been used to inform this Scoping assessment.

774. The information collected with respect to TOWF has been supplemented within desk-based ecological data collected during September 2016. This data includes the location of statutory designated sites for nature conservation and UK Habitats of Principal Importance.

775. These data sources are summarised in Table 3.7.

Table 3.7 Data sources

Data	Source	Coverage	Date
European designated sites (*SPA, SAC, Ramsar sites*)	JNCC	Onshore Area of Interest	2016
UK designated sites (*SSSI, NNR, LNR*)	JNCC Natural England	Thanet Extension Onshore Area of Interest	2016
UK Habitats of Principal Importance	JNCC	Thanet Extension Onshore Area of Interest	2016
Biological records	English Nature, Kent Wildlife Trust, RSPB, Kent Mammal Group, Butterfly Conservation, KRAG and KOS	Onshore Cable Route Option 1 only	2005
Extended Phase 1 Habitat Survey	TOWF EIA	Onshore Cable Route	2005

Data	Source	Coverage	Date
(September 2005)		Option 1 only	
Great Crested Newt Presence Absence Survey (April-May 2005)	TOWF EIA	Onshore Cable Route Option 1 only	2005
Updated Extended Phase 1 Habitat Survey	TOWF EIA	Onshore Cable Route Option 1 only	2008
TOWF ES	TOWF EIA	Onshore Cable Route Option 1 only	2005
Saltmarsh Re-colonisation Survey (2010-2012)	TOWF EIA	Onshore Cable Route Option 1 only	2013

3.6.1.2 Baseline

Statutory Designated Sites

776. There are a number of designated sites within the vicinity of the Onshore Area of Interest, including:

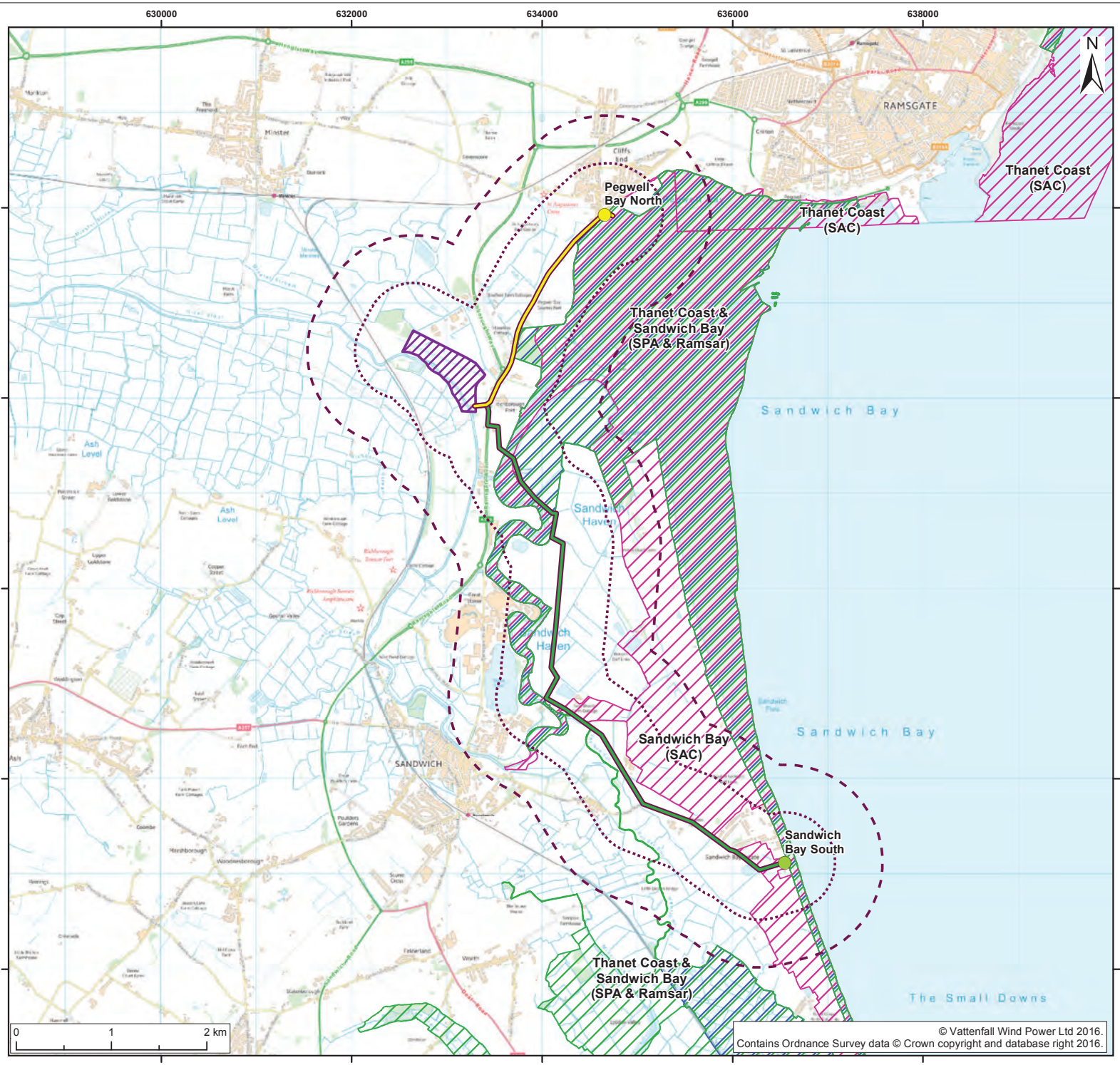
- Thanet Coast and Sandwich Bay SPA and Ramsar;
- Sandwich Bay SAC;
- Sandwich Bay to Hacklinge Marshes SSSI;
- Pegwell and Sandwich Bay NNR;
- Prince's Beachland LNR.

777. Table 3.8 lists the five statutory designated sites that are located within the Onshore Area of Interest, as shown on Figure 3.6, Figure 3.7 and Figure 3.8. Table 3.8 also provides a summary of the qualifying features / reasons for notification of these designated sites. The legislation underpinning statutory designated sites is discussed in Section 1.3 Policy and Legislative Context.

Table 3.8 Designated sites for nature conservation of relevance to onshore ecology

Name	Design-ation	Location (NGR) / size (ha)	Qualifying features / reasons for notification
Thanet Coast and Sandwich Bay	SPA, Ramsar site	TR 352 592 1870ha	This site qualifies under **Article 4.2** of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species: **Over winter;** Ruddy turnstone *Arenaria interpres*, 1,340 individuals representing at least 2% of the East Atlantic Flyway population (5 year peak mean 1986/87 - 1990/91) **Ramsar site** ***Criterion 2*** Supports 15 British Red Data Book wetland invertebrates. ***Criterion 6*** Qualifying Species/populations (as identified at designation):

Name	Design-ation	Location (NGR) / size (ha)	Qualifying features / reasons for notification
			Species with peak counts in winter: Ruddy turnstone, *Arenaria interpres*, NE Canada, Greenland/W Europe & NW Africa individuals, representing an average of 1% of the population (5 year peak mean 1998/9- 2002/3).
Sandwich Bay	SAC	TR 348 711 2816ha	**SAC** Annex I habitats that are a primary reason for selection of this site: • Embryonic shifting dunes • "Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes")" • "Fixed coastal dunes with herbaceous vegetation ("grey dunes")" [priority feature] • Dunes with *Salix repens ssp. argentea* (*Salicion arenariae*) Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: • Humid dune slacks
Sandwich Bay to Hacklinge Marshes	SSSI	TR 352 592 1790ha	This site contains the most important sand dune system and sandy coastal grassland in South East England and also includes a wide range of other habitats such as mudflats, saltmarsh, chalk cliffs, freshwater grazing marsh, scrub and woodland. Associated with the various constituent habitats of the site are outstanding assemblages of both terrestrial and marine plants with over 30 nationally rare and nationally scarce species having been recorded. Invertebrates are also of interest with recent records including 19 nationally rare, and 149 nationally scarce species. These areas provide an important landfall for migrating birds and also support large wintering populations of waders, some of which regularly reach levels of national importance. ***Key features***: sand dune and coastal grassland habitat (supporting nationally rare flora and invertebrates), cave habitats (supporting marine algal communities), saltmarsh habitat (supporting nationally rare flora), grazing marsh and dyke habitat, winter and passage birds
Pegwell and Sandwich Bay	NNR	TR 352 592 629ha	Natural habitats include: eroding chalk cliffs and wave cut platforms to the north of Pegwell Bay, intertidal mudflats, developing beaches, sand dunes and saltmarsh. Semi-natural habitats include: ancient dune pasture and coastal scrubland while the re-created grassland of the Pegwell Bay Country Park, along with ponds, dykes and ditches are artificial habitats. The intertidal mudflats support nationally and internationally important numbers of waders and wildfowl, both on migration and over-winter. The sand dunes and ancient dune pasture contain large numbers of southern marsh orchid, marsh helleborine, pyramidal orchid and the occasional lizard orchid.
Prince's Beachland	LNR	TR 353 613 6ha	A complex mosaic of habitats of international importance for its bird population. Butterflies, fungi and reptiles also present.



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- Special Area of Conservation (SAC)[1]
- Special Protection Area (SPA)[1]
- Ramsar[1]

[1] Natural England, 2016.

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Title: Onshore Natura Sites

Figure: 3.6 | Drawing No: PB5894-SCO-3-027

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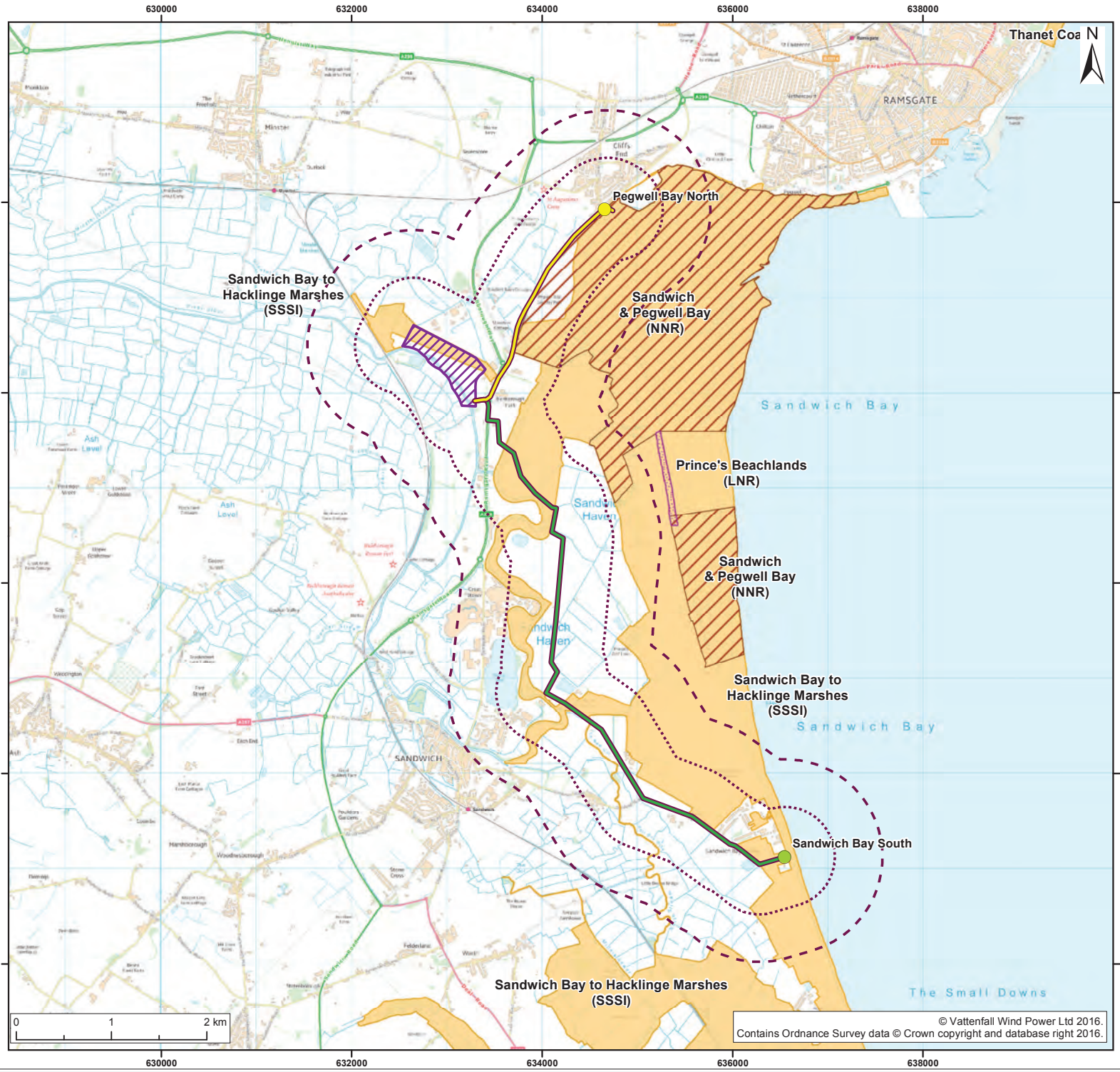

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- 1000m Buffer Around 25m Corridor
- Site of Special Scientific Interest[1]
- Local Nature Reserve[1]
- National Nature Reserve[1]

[1] Natural England, 2016.

Project:	Report:
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Title: Other Onshore Designated Sites

Figure: 3.7 | Drawing No: PB5894-SCO-3-028

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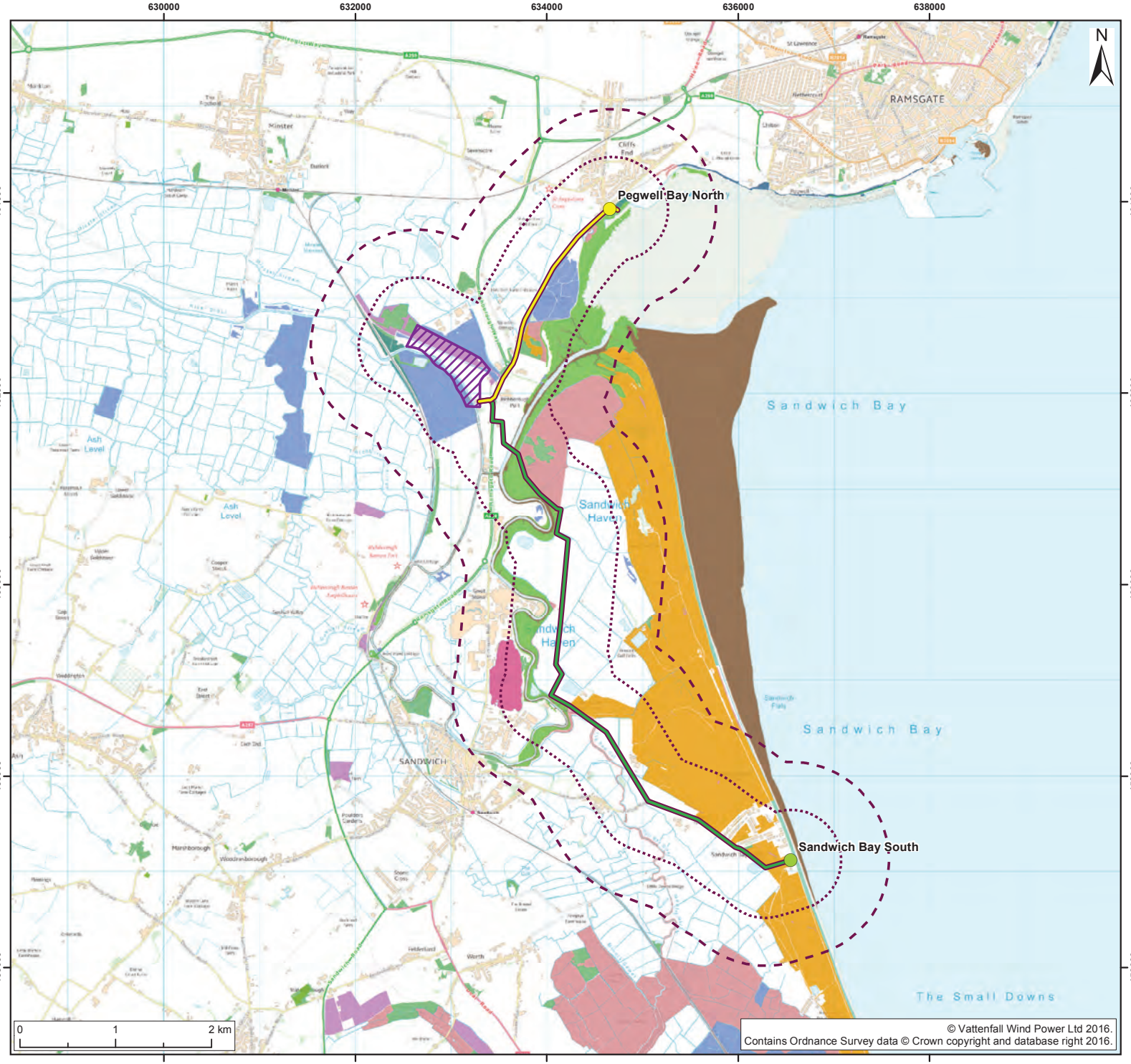

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UK BAP Priority Habitats[1]

- Coastal and floodplain grazing marsh
- Coastal saltmarsh
- Coastal sand dunes
- Coastal vegetated shingle
- Deciduous woodland
- Good quality semi-improved grassland
- Lowland fens
- Maritime cliff and slope
- Mudflats
- Reedbeds
- Saline lagoons
- Traditional orchard

[1] Natural England, 2016.

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title: UK Habitats of Principle Importance

Figure:	Drawing No:
3.8	PB5894-SCO-3-029

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Non-statutory Designated Sites

778. Ash Level and South Richborough Pasture Site of Nature Conservation Importance (SNCI) and a Roadside Nature Reserve (RNR) on Sandwich Road situated near to the onshore works (TOWL, 2005a).

Terrestrial Habitats

779. UK Habitats of Principal Importance recorded within the Thanet Extension Onshore Area of Interest, as shown on Figure 3.8 include the following:

- Coastal saltmarsh
- Lowland fen
- Reedbed
- Coastal and floodplain grazing marsh
- Coastal sand dunes
- Coastal vegetated shingle
- Mudflat
- Deciduous woodland
- Good quality semi-improved grassland

780. The legislation underpinning UK Habitats of Principal Importance is discussed in Section 1.3 Policy and Legislative Context.

781. The Extended Phase 1 Habitat survey was originally undertaken in 2005 to set a baseline for the TOWF onshore area of interest and a number of discrete habitats were identified within the study area, which was 1km either side of the onshore cable route. This survey area includes Onshore Cable Route Option 1 for the Thanet Extension. The key habitat types present within the onshore site and surrounding land included:

- Saltmarsh across Pegwell Bay;
- Semi-improved grassland;
- Rough grassland;
- Amenity grassland;
- Arable;
- Open water;
- Reedbed;
- Broadleaf woodland;
- Broadleaf plantation;
- Individual trees;
- Dense scrub;

- Wasteland vegetation; and
- Watercourses.

782. In 2008 the Extended Phase 1 Habitat was updated to incorporate the revised cable route (TOWL, 2008). The results of this survey were found to be similar to the original Phase 1 with vegetation type and species composition remaining much the same as in 2005 with the main difference being the development of scrub vegetation which has become denser in places and reduced the width of the grassy roadside verge (TOWL, 2008). Some plant species were noted, such as sharp rush and bulbous meadow-grass, along with stands of the invasive Japanese knotweed.

783. The 2010-2012 Saltmarsh Monitoring Surveys undertaken at the TOWF landfall site in Pegwell Bay assessed the success of natural re-colonisation of the coastal saltmarsh habitat following temporary loss during the construction of TOWF (TOWL, 2013b). During the 6 months following construction of the landfall site for TOWF in March – August 2010, there was a significant change in flora community indicating the initial stages of saltmarsh re-colonisation of the cable route. Since the 2010 monitoring survey, the saltmarsh has continued to develop and become more established within the cable route. Quadrat assessments undertaken in 2011 and 2012 indicated that whilst there are still some minor differences in saltmarsh coverage between the cable route and the wider area, particularly in the lower zones, the cable route has recolonised with saltmarsh and has become analogous with the surrounding area. Predominantly, all the saltmarsh species recorded within the wider saltmarsh areas have been recorded within the cable route.

784. The areas of saltmarsh within Pegwell Bay can be classified as a mix of pioneer and lower saltmarsh plant communities. These are typically early stage saltmarsh communities and not considered highly diverse. However, due to external conditions the progression to middle and higher saltmarsh communities may not occur, as is the case within the wider Pegwell Bay saltmarsh.

Protected, Notable and Invasive Species

785. A review of biological data records indicates that prior to 2005 there are records for the following legally protected or notable species within the proposed Thanet Extension Onshore Cable Route Option 1:

- Pipistrelle *Pipistrellus pipistrellus*
- Pipistrelle *P. pygmaeus*
- Whiskered bat *Myotis mysticanus*
- Daubenton's bat *M. daubentonii*
- Brown long-eared bat *Plecotis auritus*

- Noctule bat *Nycatalus noctula*
- Serotine bat *Eptesicus serotinus*
- Brown hare *Lepus europaeus*
- Water vole *Arvicola terrestris*
- Otter *Lutra lutra*
- Marsh warbler *Acrocephalus palustris*
- Shining ram's-horn snail *Segmentia nitida*
- Slow worm *Anguis fragilis*
- Grass snake *Natrix natrix*
- Common lizard *Zootoca vivipara*
- Deptford pink *Dianthus armeria*
- Lizard orchid *Himantoglossum hircinum*
- Bedstraw broomrape *Orobanche caryophyllacea*
- Bright wave moth *Idaea ochrata catiata*
- Dune tiger beetle *Cicindela maritima*
- Heath tiger beetle *Cicindela sylvatica*
- Solitary wasp *Cerceris quadricinata*

786. From the faunal surveys undertaken in 2005 for the TOWF ES, a number of sites were identified as suitable for supporting great-crested newts although none were recorded on any of the site visits. The onshore area is considered to be good reptile habitat and 16 common lizards were found on both sides of the road during the course of the surveys in 2005 (TOWL, 2005b). The update survey in 2008 recorded four common lizards from both sides of the road (TOWL, 2008).

787. Eight trees or groups of trees on the west side of the Sandwich Road were identified as having the potential to support bats in 2005. The petrol station, derelict buildings and pillbox were, however, identified as having little potential to support roosting bats (TOWL, 2005b).

788. Water voles were sighted or evidence of their presence was recorded at nine ponds in the study area, and an otter footprint was found within the boundaries of the former Richborough Power Station in 2005 (TOWL, 2005b). In 2008 there were numerous signs of water vole activity in the ditches along the TOWF onshore cable route, but there was no evidence of otter (TOWL, 2008). There was no evidence of badgers in the survey area in 2005 or 2008.

789. No ecological survey data has been collected to date for the Onshore Cable Route Option 2.

3.6.2 Potential Impacts

790. Potential impacts have been identified from the information available at the time of preparing this document and based on the project description as set out in Section 1.4. The key aspects of construction with respect to onshore ecological receptors are the construction of the substation and the excavation works and supporting activities associated with the Onshore Cable Route and landfall during construction.

791. Potential impacts upon onshore ornithology including impacts upon breeding, passage and wintering birds are discussed separately within Section 3.7 Onshore Ornithology, and are not considered within this section.

3.6.2.1 Potential impacts during construction

Impacts to statutory and non-statutory designated sites

792. There is likely to be temporary loss of habitats within the Thanet Coast and Sandwich Bay SPA and Ramsar site, Sandwich Bay SAC and Sandwich Bay to Hacklinge Marshes SSSI during construction for both Onshore Cable Route Options, and temporary loss of habitats within Sandwich and Pegwell Bay NNR for Onshore Cable Route Option 1.

793. There is also likely to be temporary disturbance to interest features of the Thanet Coast and Sandwich Bay SPA and Ramsar site, Sandwich Bay SAC and Sandwich Bay to Hacklinge Marshes SSSI during construction for both Onshore Cable Route Options, and temporary disturbance to disturbance to interest features of the Sandwich and Pegwell Bay NNR for Onshore Cable Route Option 1.

794. The area of search for the substation construction footprint overlaps with the boundary of the Sandwich Bay to Hacklinge Marshes SSSI.

795. Prince's Beachland LNR is located more than 1km from the Onshore Area of Interest and is outside the likely buffer zone from disturbance impacts from air or noise pollution, or changes to local drainage patterns. As such it is recommended that this site is scoped out of further assessment.

Permanent and temporary loss of habitats

796. At the substation there is potential for the permanent loss of Coastal and Floodplain Grazing Marsh UK Habitats of Principal Importance due to the construction footprint of this element of the project. The construction of the substation would result in permanent habitat loss of approximately 12ha, approximately 2h ha of which is Coastal and Floodplain Grazing Marsh, and the rest comprising Good Quality Semi-improved Grassland (not a UK Habitat of Principal Importance).

797. Several UK Habitats of Principal Importance would potentially be impacted along the Onshore Cable Route Options. Onshore Cable Route Option 1 would pass through Coastal Saltmarsh, while Onshore Cable Route Option 2 would pass through Mudflat, Coastal vegetated Shingle, Coastal Sand Dunes, Lowland Fen and Coastal Saltmarsh. There is likely to be temporary loss of Habitats of Principal Importance during cable trenching activities and at the landfall sites. Key considerations are likely to be habitats which support protected and notable species such as bat, water vole, otter, badger, reptiles and great crested newt and potentially invertebrates.

Temporary habitat fragmentation and species isolation

798. There is potential for temporary habitat fragmentation and species isolation as a result of construction, particularly with regard to the Onshore Cable Route. As part of embedded mitigation habitat removal would be restricted to a minimum working width where possible, and habitats would be reinstated upon completion.

Impacts upon protected species or upon their resting or breeding sites

799. The potential exists for protected species to be impacted by construction activities either physically or from disturbance. Of key concern would be water vole, otter, bats, badger, great crested newt, reptiles and certain invertebrates, however prior to the completion of detailed ecological field surveys all UK legally protected and notable species must be assumed to be potentially affected by the project.

Spread of non-native, invasive species

800. There is potential for the presence of non-native invasive species, which could be spread by construction activities. Control of invasive species, where required, would be incorporated in a project specific Ecological Management Plan.

3.6.2.2 Potential impacts during operation

801. The substation footprint would potentially include a permanent loss of land within the boundary of the Sandwich Bay to Hacklinge Marshes SSSI.

802. Planned maintenance at the substation is likely to be highly localised with a minimal likelihood of disturbance expected to the adjacent habitats and species. During operation of the substation there may be continual operational noise and lighting which have the potential to cause disturbance and illumination on adjacent habitats and species.

803. In the unlikely event of a cable failure there may be a need to access the buried cables to enable the replacement of a failed cable section. Such reactive repairs are

expected to have potential impacts similar to those of construction, however they would be expected to be more localised, of smaller scale and temporary in nature.

3.6.2.3 Potential impacts during decommissioning

804. It is proposed that the substation electrical infrastructure and building foundations would be removed as part of the decommissioning phase, with the onshore cables, jointing pits and transition pits remaining in situ. The decommissioning methodology cannot be finalised until immediately prior to decommissioning; but would be in line with relevant policy at that time.

805. It is therefore considered that impacts during decommissioning would be similar in nature to those during construction but would be more limited in geographical extent and timescale.

3.6.2.4 Potential cumulative impacts

806. Cumulative impacts will be considered as part of the EIA process. This will require a desk-top exercise and consultation with stakeholders to identify relevant potential projects with which there could be interactions. Any developments within 2km of the proposed works could give rise to cumulative impacts upon ecological receptors.

3.6.2.5 Summary of potential impacts

Table 3.9 Summary of impacts relating to onshore ecology (scoped in (✓) and scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Impacts to statutory and non-statutory designated sites	✓	✓	✓
Permanent and temporary loss of habitats	✓	✓	✓
Temporary habitat fragmentation and species isolation	✓	✓	✓
Impacts upon protected species or upon their resting or breeding sites	✓	✓	✓
Spread of non-native, invasive species	✓	✓	✓
Cumulative impacts	✓	✓	✓

3.6.3 Mitigation

807. Embedded mitigation is likely to include the following:

- Avoidance of impact through cable route selection (e.g. avoiding designated sites or areas of important habitat, woodland areas, water bodies and agricultural ditches);
- Avoidance of impact through methodology selection (e.g. HDD at sensitive points, in particular river crossing and at coastal designated sites);

- Ensure seasonal constraints in relation to specific species are adhered to where possible (e.g. undertaking vegetation clearance outside if bird nesting season);
- Development of species-specific mitigation based on the findings of ecological Scoping surveys;
- Ensuring a minimum working width for habitat removal;
- All habitats removed during construction to be reinstated upon completion of works;
- Development of a Code of Construction Practice (CoCP); and
- Development of an Ecological Management Plan (EMP).

808. Additional mitigation measures would be discussed and agreed with stakeholders depending on any potential impacts identified.

3.6.4 Approach to assessment and data gathering

809. This Scoping assessment has been undertaken based on desk-based information. Detailed survey information is required to identify the potential impacts upon onshore ecology in relation to the Scoping area. This includes an Updated Extended Phase 1 Habitat Survey of the Onshore Area of Interest followed by targeted species-specific surveys scoped by the findings of the Extended Phase 1 Habitat Survey, if required.

810. The following additional data sources are anticipated to be required to establish the baseline ecological environment:

- An Updated Extended Phase 1 Habitat Survey of the Thanet Extension Onshore Area of Interest, checking and updating the areas surveyed in 2005 and 2008, and the previously unsurveyed areas along Onshore Cable Route Option 2 and the substation site;
- Further targeted species-specific ecological surveys for the Onshore Area of Interest (if recommended by the findings of the Updated Extended Phase 1 Habitat Survey); and
- An updated ecological desk-based assessment, including a protected and notable species records and non-statutory designated sites information request from Kent and Medway Biological Records Centre.

811. This baseline data would be used to undertake an Ecological Impact Assessment (EcIA).

812. The EcIA would be undertaken following CIEEM's Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (Second Edition) (2016).

813. The approach to assessment and data gathering would be discussed and agreed with relevant bodies prior to commencement. The scope of assessment would also be discussed with the relevant local landowners. Consultation will be undertaken at key stages throughout the EIA process.

3.7 Onshore Ornithology

814. The section considers the impacts of the proposed onshore elements of the project on onshore ornithology, including impacts on sensitive receptors (i.e. bird species) from construction, operational and decommissioning activities.

815. This assessment considers ornithological receptors associated with terrestrial and coastal habitats only. Potential impacts upon ornithological receptors arising from the project seaward of the coastal zone are considered in Section 2.8 Offshore Ornithology.

3.7.1 Baseline

3.7.1.1 Data sources

816. The Scoping assessment presented below has been undertaken based on a high-level desk-based review of onshore ornithological information related to breeding, passage and overwintering ornithological receptors conducted in August 2016.

817. The data sources used to inform this high-level desk-based review are shown in Table 3.10.

Table 3.10 Data sources

Data	Source	Coverage	Date
European designated sites (*SPA, SAC, Ramsar sites*)	JNCC	Thanet Extension Onshore Area of Interest	2016
UK designated sites (*SSSI, NNR, LNR, RSPB Reserves*)	JNCC Natural England	Thanet Extension Onshore Area of Interest	2016
Extended Phase 1 Habitat Survey (September 2005)	TOWF EIA	Onshore Cable Route Option 1 only	2005
Updated Extended Phase 1 Habitat Survey	TOWF pre-construction	Onshore Cable Route Option 1 only	2008
TOWF ES	TOWF EIA	Onshore Cable Route Option 1 only	2005
Bird Atlas 2007-2011	BTO	Thanet Extension Onshore Area of Interest	2011

818. The walkover survey for the TOWF ES in 2005 recorded 50 bird species around the onshore study area, which was originally 1km either side of the original cable route. Cetti's warbler *Cettia cetti* , peregrine *Falco peregrinus* and hobby *Falco subbuteo* were also recorded, which are listed on Schedule 1 to the Wildlife and Countryside

Act 1981, and all of which could potentially breed in or close to the Onshore Cable Route Option 1 (TOWL, 2005a).

819. An additional walkover survey was undertaken in 2008 for TOWF, prior to construction, to cover the revised onshore cable route. The survey recorded a total of 24 species. The Cetti's warbler *Cettia cetti* and peregrine *Falco peregrinus* were both recorded again in 2008 (TOWL, 2008). Other BAP species recorded in the survey were starling and house sparrow.

3.7.1.2 Designated sites

820. There are a number of designated sites within ornithological interest features within the within or adjacent to the Onshore Area of Interest, including:

- Thanet Coast and Sandwich Bay SPA and Ramsar;
- Sandwich Bay to Hacklinge Marshes SSSI;
- Pegwell and Sandwich Bay NNR;
- Lydden Valley RSPB Reserve
- Prince's Beachland LNR.

821. The ornithological interest features of these designated sites are described below.

Thanet Coast and Sandwich Bay SPA

822. Thanet Coast and Sandwich Bay SPA is located within the Thanet Extension Onshore Area of Interest. The site is designated for the following features:

Table 3.11 Qualifying features of the Thanet Coast and Sandwich Bay SPA (*population counts are derived from the SPA citation*)

This site qualifies under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species:
Over winter; Ruddy turnstone *Arenaria interpres*, 1,340 individuals representing at least 2% of the East Atlantic Flyway population (5 year peak mean 1986/87 - 1990/91)

Thanet Coast and Sandwich Bay Ramsar site

823. Thanet Coast and Sandwich Bay Ramsar site is located within the Thanet Extension Onshore Area of Interest. The site is designated for the following features:

Table 3.12 Qualifying features of the Broadland Ramsar site (*population counts are derived from the Ramsar Information Sheet*)

Ramsar criterion 6 – species/populations occurring at levels of international importance. Qualifying Species/populations (as identified at designation):
Species with peak counts in winter: Ruddy turnstone, *Arenaria interpres*, NE Canada, Greenland/W Europe & NW Africa individuals, representing an average of 1% of the population (5 year peak mean 1998/9- 2002/3).

Sandwich Bay to Hacklinge Marshes SSSI

824. Sandwich Bay to Hacklinge Marshes SSSI is located within the Thanet Extension Onshore Area of Interest

825. The ornithological interest of Sandwich Bay and Hacklinge Marshes is centred on the large numbers of waders and wildfowl which use the area in winter and during the spring and autumn migrations. Dunlin *Calidris alpina* is usually the most common wader present, found particularly on the mudflats where the rich invertebrate fauna also attracts a wide range of other common species such as oystercatcher *Haematopus ostralegus*, curlew *Numenius arquata*, and redshank *Tringa totanus*. Grey plover *Plurialis squatarola* and sanderling *Calidris alba* both overwinter in nationally important numbers, whilst ringed plover *Charadrius hiaticula* also occurs in nationally important numbers during migration. Wildfowl that occur on the site include mallard *Anas platyrhynchos*, shelduck *Tadorna tadorna* and occasionally Brent goose *Branta bernicla*.

826. Many of the birds use more than one habitat, some for example feed on the mudflats at low tide and then move up to roost on the saltmarsh or grazing marsh

827. Breeding birds include ringed plover, oystercatcher and little tern *Sterna albifrons*, a species specially protected by law and listed on Schedule 1 of the Wildlife and Countryside Act 1981. Inland areas are also of interest supporting two nationally rare species of breeding birds.

Lydden Valley RSPB Reserve

828. Lydden Valley RSPB Reserve is located to the south of the Onshore Area of Interest just outside of the boundary.

829. The Lydden Valley RSPB Reserve is a new reserve, under development to return the site to grazing marsh and wetland habitat. There is an intention to recreate suitable habitat for little bittern *Ixobrychus minutus*, spotted and Baillon's crakes *Porzana porzana* and *P. pusilla*. The habitat is intended to support a variety of other grazing marsh and wetland birds, including marsh harrier, lapwing and red bunting.

Pegwell and Sandwich Bay NNR

830. Pegwell and Sandwich Bay NNR is located within the Onshore Area of Interest. This NNR sits within the Thanet Coast and Sandwich Bay SPA and Ramsar site.

831. The intertidal mudflats support nationally and internationally important numbers of waders and wildfowl, both on migration and over-winter.

Prince's Beachland LNR

832. Pegwell and Sandwich Bay NNR is located more than 1km outside the Onshore Area of Interest. This NNR sits within the Thanet Coast and Sandwich Bay SPA and Ramsar site.

833. The LNR contains a complex mosaic of habitats of international importance for its bird population.

3.7.1.3 Birds of Conservation Concern 4 (BoCC4) 'Red list' Species

834. Species listed on the Birds of Conservation Concern 4 (BoCC 4) 'Red list' are those identified by the UK's leading bird conservation organisations as being those of greatest conservation concern, based on quantitative criteria including historical decline, trends in population and range, population size, localisation and international importance of each species as well as their global and European threat status. Data from the BTO UK Bird Atlas 2007-2011 has been studied to identify those species which are present within the Scoping area during the breeding season and over winter (BTO, 2013).

835. Table 3.13 shows the Red list species which have been recorded within the Scoping area over winter and during the breeding season.

Table 3.13 BoCC4 Red List species within the Onshore Area of Interest

Species	Present during winter	Present during the breeding season (*(*) indicates also possibly breeding within this grid square*)	Species	Present during winter	Present during the breeding season (*(*) indicates also possibly breeding within this grid square*)
White-fronted goose	Y	N	Marsh tit	Y	Y
Pochard	Y	Y*	Skylark	Y	Y*
Scaup	Y	Y	Wood warbler	N	Y
Common scoter	Y	Y	Grasshopper warbler	N	Y*
Velvet scoter	Y	Y	Marsh warbler	N	Y*
Grey partridge	Y	Y*	Starling	Y	Y*
Baleric shearwater	N	Y	Ring ouzel	Y	Y
Shag	Y	N	Fieldfare	Y	Y
Slavonian grebe	Y	N	Song thrush	Y	Y*
Hen harrier	Y	Y	Redwing	Y	Y
Lapwing	Y	Y*	Mistle thrush	Y	Y*
Ringed plover	Y	Y*	Spotted flycatcher	N	Y*
Whimbrel	Y	Y	Nightingale	N	Y*
Curlew	Y	Y	Pied flychatcher	N	Y
Black-tailed godwit	Y	Y	Black redstart	Y	Y*

Species	Present during winter	Present during the breeding season (*(*) indicates also possibly breeding within this grid square*)	Species	Present during winter	Present during the breeding season (*(*) indicates also possibly breeding within this grid square*)
Ruff	Y	Y	Whinchat	N	Y
Woodcock	Y	Y	House sparrow	Y	Y*
Arctic skua	N	Y	Tree sparrow	Y	Y
Roseate tern	N	Y	Yellow wagtail	N	Y
Kittiwake	Y	Y	Grey wagtail	N	Y
Herring gull	Y	Y*	Tree pipit	N	Y
Turtle dove	N	Y*	Hawfinch	N	Y
Cuckoo	N	Y*	Linnet	Y	Y*
Lesser spotted woodpecker	N	Y*	Twite	Y	Y
Merlin	Y	Y	Lesser redpoll	N	Y
Golden oriole	N	Y	Yellowhammer	Y	Y*
Red-backed shrike	N	Y	Corn bunting	Y	Y*
Willow tit	N	Y			

3.7.1.4 UK Habitats of Principal Importance

836. UK Habitats of Principal Importance are recorded within Thanet Extension Onshore Area of Interest, as shown on Figure 3.8 Selected habitats provide important habitat for breeding, passage and wintering birds. The following habitats have been recorded within Thanet Extension Onshore Area of Interest which have suitability to support breeding and passage / wintering bird species:

- Coastal saltmarsh;
- Lowland fen;
- Reedbed;
- Coastal and floodplain grazing marsh;
- Coastal sand dunes;
- Coastal vegetated shingle;
- Mudflat;
- Deciduous woodland; and
- Good quality semi-improved grassland.

837. The following additional habitats with suitability to support breeding birds were recorded during the Extended Phase 1 Habitat Survey for the Onshore Cable Route Option 1:

- Semi-improved grassland;
- Rough grassland;
- Arable;

- Open water;
- Broadleaf woodland;
- Broadleaf plantation;
- Individual trees;
- Dense scrub; and
- Watercourses.

838. Farmland (pasture and arable), although not a UK Habitats of Principal Importance could also support breeding and passage / wintering bird species.

3.7.2 Potential Impacts

3.7.2.1 Potential impacts during construction

839. The potential impacts associated with construction may include:

- Temporary loss of habitat suitable for nesting, roosting and foraging birds along the Thanet Extension Onshore Area of Interest. Habitats can be affected physically or from disturbance associated with the construction works.
- Noise and visual disturbance to birds due to construction activities along the Onshore Cable Route. There is potential for increased levels of disturbance caused by the presence and movements of construction vehicles, equipment and personnel. Disturbance can have negative effects on nesting, roosting and foraging and may result in increased energy expenditure, potentially leading to reduced survival rates.

3.7.2.2 Potential impacts during operation

840. The potential impacts associated with operation may include:

- Potential permanent loss of coastal and floodplain grazing marsh habitat at the construction site for the substation.
- Operational noise and lighting associated with the substation. During operation there would be operational noise and lighting impacts which have the potential to impact on birds through disturbance to adjacent habitats.
- Temporary disturbance associated with cable repair/maintenance. In the unlikely event of cable failure access to buried cables may be required. Maintenance and repair would have similar potential impacts to those set out above for cable installation however they are likely to be more localised and smaller in scale.

3.7.2.3 Potential impacts during decommissioning

841. It is proposed that the substation electrical infrastructure and building foundations would be removed as part of the decommissioning phase, with the onshore cables, jointing pits and transition pits remaining in situ. The decommissioning methodology

cannot be finalised until immediately prior to decommissioning; but would be in line with relevant policy at that time.

842. It is therefore considered that impacts during decommissioning would be similar in nature to those during construction but would be more limited in geographical extent and timescale.

3.7.2.4 Potential cumulative impacts

843. Cumulative impacts will be considered within the ES and will involve a desk-top exercise together with consultation with local stakeholders to identify projects where there could be interactions with a potential impact on birds. Any developments within 2km of the proposed works could give rise to cumulative impacts upon ecological receptors.

3.7.2.5 Summary of potential impacts

Table 3.14 Summary of impacts relating to onshore ornithology (scoped in (✓) and scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Temporary and permanent loss of habitat suitable for nesting, roosting and foraging birds	✓	✓	✓
Noise, vibration and visual disturbance to birds	✓	✓	✓
Cumulative impacts	✓	✓	✓

3.7.3 Mitigation

844. Embedded mitigation is likely to include the following:

- Avoidance of sensitive habitats for birds through cable route selection where possible.
- Use of Best Practicable Means (BPM) to limit the impacts of noise at sensitive receptors (see Section 3.10.3).
- Timing of works with the aim of minimising disturbance to birds during most sensitive periods (e.g. breeding season).
- Development of an Ecological Management Plan (EMP) to include mitigation measures for birds.

3.7.4 Approach to assessment and data gathering

845. The impact assessment will be undertaken using CIEEM's guidance for ecological impact assessment in the UK (CIEEM, 2016).

846. An initial desk assessment of existing ornithological data will be undertaken. Wetland Bird Survey (WeBS), local or regional bird atlases and biological records centre data for the search areas will be obtained and assessed in relation to breeding birds and to supplement the data already gathered in relation to passage and wintering birds.

847. An Updated Extended Phase 1 Habitat Survey of the Thanet Extension Onshore Area of Interest would be conducted to assess the suitability of the habitats within the Onshore Area of Interest to support qualifying features of the Thanet Coast and Sandwich Bay SPA and Ramsar site, notified features of the Sandwich Bay to Hacklinge Marshes SSSI, and legally protected breeding birds. If suitable habitats are found, dedicated ornithological surveys may be required to identify whether these habitats are being used by qualifying features of the Thanet Coast and Sandwich Bay SPA and Ramsar site, notified features of the Sandwich Bay to Hacklinge Marshes SSSI, and legally protected breeding birds.

848. The approach to assessment and data gathering would be discussed and agreed with relevant bodies prior to commencement. The scope of assessment would also be discussed with the relevant local landowners. Consultation will be undertaken at key stages throughout the EIA process.

3.8 Onshore Archaeology and Cultural Heritage

3.8.1 Baseline

3.8.1.1 Data Sources

849. The baseline information obtained to support the Scoping study for Thanet Extension has come from freely available online data sources including:

Table 3.15 List of available online data sources

Source	Data Viewed
Kent Historic Environment Record	Online map and list of all recorded archaeological sites and find spots within the County.
The National Record for the Historic Environment (NRHE) maintained by Historic England.	A list of all recorded archaeological sites across England.
National Heritage List online maintained by Historic England	A list of all designated heritage assets across England.
Thanet District Council / Dover District Council	List of all Conservation Areas within the district.

850. This section has also been informed by the findings of the TOWF ES (TOWL, 2005a).

851. This section presents a high level summary of the existing archaeological and cultural heritage baseline conditions recorded within the onshore project area in relation to the Thanet Extension. The offshore archaeology and cultural heritage baseline is set out in Section 2.11 Offshore Archaeology.

Background historic environment

852. The Isle of Thanet is situated on a promontory separated from north Kent by the Wantsum Channel. The land generally slopes westwards from the chalk cliffs along the North Sea coast and southwards to the low lying marshland around Pegwell Bay. The south side of the Isle of Thanet features three low hills rising out of a flat plain of alluvium, including Ebbsfleet Hill and Cottington Hill. These hills formed a low peninsula known as the Ebbsfleet Peninsula during the active life of the Wantsum Channel. Ebbsfleet was a port during the times when the Wantsum Channel was open and navigable.

853. The evidence for prehistoric and Romano-British activity in and to the north of the Ebbsfleet peninsula, as well as its historic role as the primary landing place for early Anglo-Saxon settlers, make the area one of high archaeological potential. The sides of the Ebbsfleet peninsula to the east and west formed two natural havens for cross Channel sea traffic and resulted in prolonged human occupation of the area. Designated heritage assets are shown in Figure 3.9.

World Heritage Sites

854. There are no UNESCO world heritage sites within the Onshore Area of Interest.

Scheduled Monuments

855. There is one scheduled monument within the 500m Onshore Area of Interest: Site of medieval port, Stonar (NRHE List Entry 1003120) towards the south-west corner of the 500m scoping area.

Listed Buildings

856. There are no Grade I or Grade II* Listed buildings Within the Thanet Extension Onshore Area of Interest, and there are seven Grade II listed buildings:

- Wickhurst;
- Kentlands and the Lodge;
- Fairway;
- Restharrow;
- Sandilands and the Backs;
- World War II anti-tank pimples and associated pillbox at Pegwell Bay; and
- 53 and 55 Foad's Lane.

Conservation Areas

857. There are no conservation areas within Thanet Extension Onshore Area of Interest.

Registered Parks and Gardens

858. There are no registered parks and gardens within Thanet Extension Onshore Area of Interest.

Non-designated heritage assets

859. There are no Palaeolithic sites or monuments within the area, and very little material of this date has been found in the Isle of Thanet as a whole.

860. There are numerous finds within Thanet Extension Onshore Area of Interest from Late Upper Palaeolithic to modern period. These include finds from the Mesolithic, Neolithic and Bronze Age, Roman period, early medieval and mediaeval period, and from the modern period.

Unknown buried heritage

861. High levels of sediment have been deposited in the Stour valley since the Roman period. These deposits have been reworked by the course of fluvial action, including several marine transgressions. Wave and tidal action are likely to have repeatedly eroded and deposited former terrestrial material, washing out fine sediment, abrading otherwise robust artefacts and exposing organic materials to chemical and biological delay.

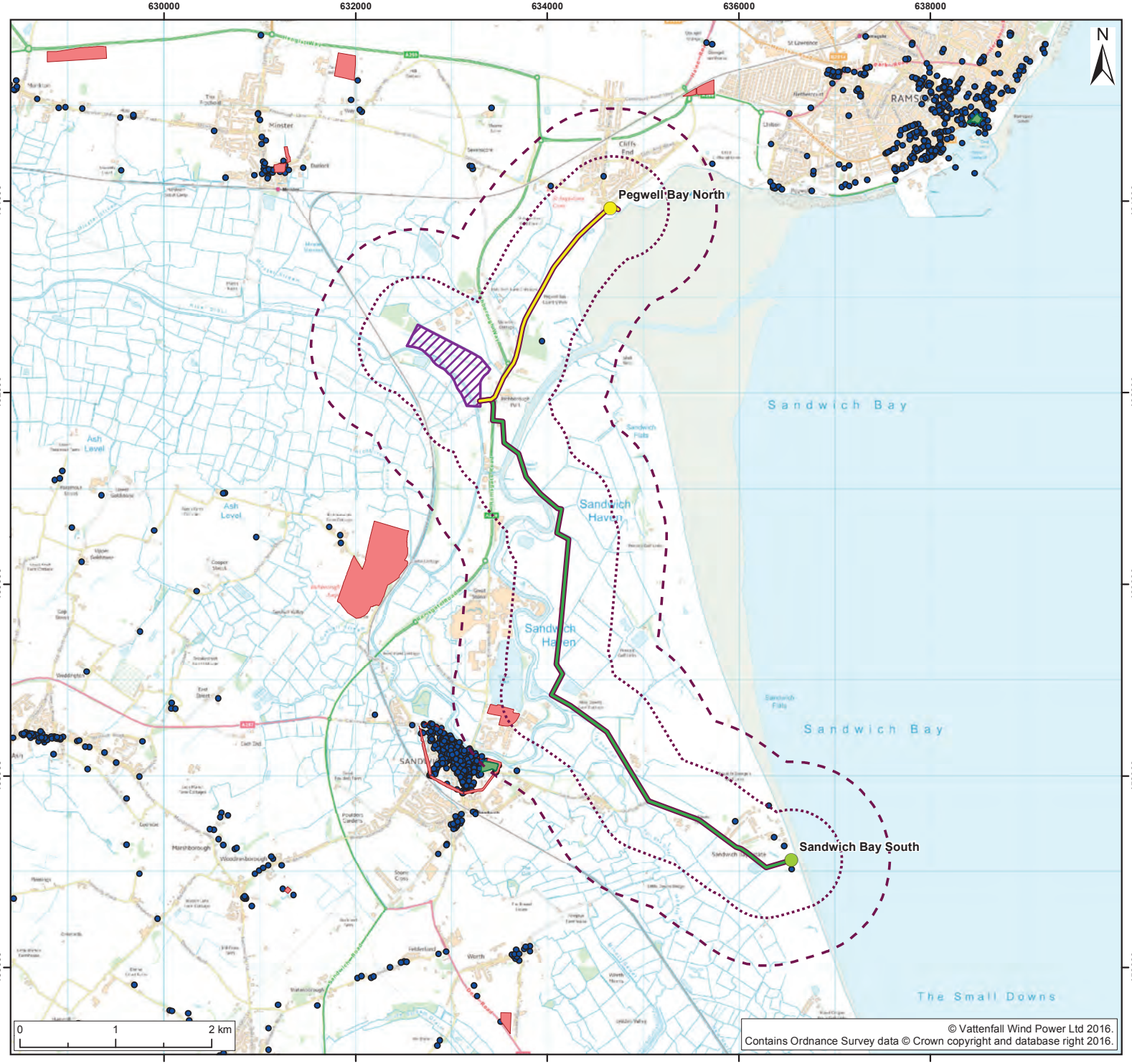
862. This suggests that prehistoric deposits are likely to be buried deep within the alluvium. Any archaeological remains dating from this period are therefore unlikely to be disturbed by this development, although any finds present would be of high national and local significance.

863. The 1965 Admiralty Chart indicates a number of obstructions, stakes and posts across the Sandwich Flats and Pegwell Bay that may prove of archaeological interest. The remains of former timber structures are still present on the beach in Pegwell Bay.

864. Three site excavations have been undertaken within the Thanet Extension Onshore Area of Interest between 2004 and 2005 namely:

- Weatherlees Wastewater Treatment Works, Ebbsfleet, Kent;
- Housing development at Cliffs End; and
- Margate to Weatherlees Hill Wastewater Treatment Works (TOWL, 2005a).

865. These sites yielded a number of archaeological finds from various time periods and confirm the presence of archaeology within the Thanet Extension Onshore Area of Interest.



- Landfall Option 1
- Landfall Option 2
- Onshore Cable Route Option 1 (25m Corridor)
- Onshore Cable Route Option 2 (25m Corridor)
- Onshore Substation Area of Interest
- 500m Buffer Around 25m Corridor
- 1000m Buffer Around 25m Corridor
- Scheduled Monument[1]
- Registered Park and Gardens[1]
- Listed Building[1]

[1] Historic England, 2016.

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title: Designated Heritage Assets within the Onshore Scoping Area

Figure: 3.9 | Drawing No: PB5894-SCO-3-30

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	28/10/16	AB	PP	A3	1:40,000

Co-ordinate system: British National Grid **EPSG:** 27700

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3.8.2 Potential Impacts

3.8.2.1 Potential impacts during construction

866. The extent of any impact on buried archaeological remains would depend on the presence, nature and depth of any such remains, in association with the depth of the proposed construction-related groundworks. Any adverse effect would likely be permanent and irreversible in nature.

867. It is likely that the shallow trenching of 1m along Sandwich Road for the Onshore Cable Route Option 2 would only cut through layers of made ground and debris associated with road construction, and as such there would be no impact on the archaeological resource within this area. However Onshore Cable Route Option 1 runs through alluvium and there is a risk of uncovered buried heritage during trenching for this option. There is potential for uncovering buried heritage assets at landfall for both Onshore Cable Route Options.

868. Potential impacts upon the setting of built heritage assets (both designated and non-designated) and the historic landscape could occur through the presence of machinery, construction traffic and general construction activities taking place within the onshore project area. The sight, noise and smell as well as any dust and vibration created during the construction phase could have an indirect impact upon built heritage assets and their settings. Where the works are buried any adverse effect would be likely to be temporary and reversible in nature.

3.8.2.2 Potential impacts during operation

869. There would be no physical impacts to the buried archaeological remains during the operation phase as any such impacts would have occurred during the construction phase. Subject to consultation with relevant consultees (i.e. the Historic England and Local Authorities) and feedback from this Scoping Report, this impact will be scoped out from further consideration within the EIA.

870. The completed development at the substation would be situated on brownfield land and is unlikely to have an effect on any buried archaeological resource; however, there is the potential for setting effects on certain heritage assets and the historic landscape, which would be ascertained further during the EIA process. The onshore cable would not impact upon the setting of built heritage assets or the historic landscape as this will be buried.

3.8.2.3 Potential impacts during decommissioning

871. There would be no physical impacts to the buried archaeological remains during the decommissioning phase as any such impacts would have occurred during the construction phase.

872. The potential impact upon the setting of built heritage assets and the historic landscape would be the same as those identified at the construction phase.

3.8.2.4 Potential cumulative impacts

873. For a cumulative impact to arise as a result of impacts during construction to buried archaeological remains, a development would have to share a boundary with the onshore project area and could therefore potentially affect the same buried archaeological resource during construction.

3.8.2.5 Summary of potential impacts

Table 3.16 Summary of impacts relating to onshore archaeology and cultural heritage (scoped in (✓) and scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Direct impacts upon buried archaeological remains	✓	×	×
Indirect impacts through the alteration of the settings of built heritage assets	✓	✓	✓
Indirect impacts through the alteration of the setting of the historic landscape	✓	✓	✓
Cumulative impacts	✓	✓	✓

3.8.3 Mitigation

874. The information obtained from the desk based study and evaluation stages would inform the EIA process, and mitigation would be embedded in the design and siting of the onshore infrastructure areas (both temporary and permanent) in order to, as far as possible, avoid impacts to known heritage assets. Where impacts upon known heritage assets are unavoidable, a series of mitigation measures would be put in place to reduce the scale of the impact, such as preservation by record (archaeological excavation).

875. A staged approach to archaeological evaluation and mitigation would be undertaken; this would involve the production of a desk based assessment which would assess the significance of known heritage assets, and their settings, and the potential to uncover buried archaeological remains which are, at present, unknown.

876. Depending on the findings of the desk based assessment, there is the potential to use a combination of non-intrusive and/or intrusive archaeological investigations (as outlined below) in order to evaluate the presence/absence and significance of the buried archaeological remains. However, the archaeological evaluation approach would be discussed and agreed with the relevant statutory consultees where required. The methodology for each type of investigation would be set out within a survey specific Written Scheme of Investigation (WSI).

877. In consultation with the Kent County Council Historic Environment Service and Historic England (and where required, including the Historic England Regional Science Advisor) a mitigation strategy would be prepared outlining a programme of further archaeological investigations, including excavation and watching brief (archaeological monitoring) requirements as well as preservation *in situ* where warranted and appropriate, prior to and during the construction phase.

3.8.4 Approach to assessment and data gathering

878. As part of the EIA process, an onshore Historic Environment (Archaeology, Built Heritage and Historic Landscape) Baseline Assessment will be undertaken, including, but not limited to the following:

- Description of the known and potential past human activities that were undertaken overtime, based on available records which will be obtained from the Kent Historic Environment Record (KHER), Historic England's National Record for the Historic Environment and the National Heritage List online, and the archives contained at the Kent Record Office;
- An assessment of the significance (heritage value) of the assets identified in the baseline assessment.

879. The Archaeology and Cultural Heritage ES Chapter will identify the potential onshore impacts of Thanet Extension, and assess the effects and any appropriate mitigation measures required. This process will lead to an assessment of residual impact of the project on archaeological resources, built heritage assets and the historic landscape.

880. The assessment will consider direct impacts, and indirect impacts (including setting impacts).

881. The assessment will be undertaken in accordance to relevant standards and guidance provided by the Chartered Institute for Archaeology (CIfA) and Historic England. Specific reference will be made to a range of guidance including, but not limited to, the following:

- CIfA (2014) Standards and guidance for historic environment desk-based assessment;
- Historic England (2015) The Setting of Heritage Assets: Historic Environment Good Practice Advice in Planning Note 3; and
- English Heritage (2008) Conservation Principles: Policy and Guidance for the Sustainable Management of the Historic Environment.

882. As discussed above, the scope of archaeological fieldwork could entail a programme of non-intrusive (i.e. field walking, metal detecting, geophysical survey) and intrusive (i.e. trial trenching) archaeological investigations to inform the EIA process or prior to the construction phase. All works would be proportionate to the scale of likely impacts.

883. The approach to assessment and data gathering will be discussed and agreed with relevant bodies prior to commencement. Consultation will be undertaken at key stages throughout the EIA process.

3.9 Onshore Landscape and Visual Impact Assessment

884. A Landscape and Visual Impact Assessment (LVIA) will be undertaken as part of the EIA in order to identify the likely significant effects of the Thanet Extension on landscape and visual amenity within the onshore LVIA study area (including the landfall options, onshore cable route options and onshore substation Area of Interest) and the surrounding area.

885. This section is based on the onshore LVIA study area shown in Figure A15 and the project characteristics for the onshore substation Area of Interest set out in the project description of this Scoping Report. Two options are identified for the landfall at Pegwell Bay North and Sandwich Bay South, with the onshore cable route options taking a route from each landfall option to the Onshore Area of Interest at Richborough Energy Park (Figure A15). The proposed substation is assumed to have a compound footprint of up to 200m x 130m, within which there would be substation buildings with a height up to 16m and outdoor electrical equipment compounds up to the height of 13m.

886. This section provides an initial overview of the baseline landscape and visual environment; the potentially significant effects of development in the onshore LVIA study area to this baseline; the methods proposed to predict these impacts; and an outline of the primary mitigation proposed to avoid, reduce or offset seascape, landscape and visual effects.

3.9.1 Baseline

3.9.1.1 Study Area for LVIA

887. The onshore LVIA study area (including the landfall options, onshore cable route options and onshore substation Area of Interest) is shown in Figure A15.

888. The proposed onshore LVIA study area for the Thanet Extension Onshore Area of Interest would extend to define a limit beyond which professional judgement considers it would be unlikely for significant effects to arise. This judgement is based on knowledge of similar projects, an understanding of the character of the local landscape and scale of the construction and development of the onshore components of Thanet Extension.

889. The proposed study area for the LVIA of the onshore cable route options extends to a 1km buffer around the centre line of the onshore cable route options and location of the cable landfall options (Figure A15). The proposed study area for the LVIA of the onshore substation Area of Interest extends to a 5km radius around the onshore substation Area of Interest (Figure A15). Together, these form the onshore LVIA study area for Thanet Extension (Figure A15).

3.9.1.2 Landscape Character

890. The main physical landscape elements such as woodlands, trees and hedgerows within the onshore LVIA study area will be identified as part of the baseline survey.

891. There is a hierarchy of published Landscape Character Assessments that describe the baseline landscape character of the onshore LVIA study area, at the National, County and District level.

892. At the National level, the onshore LVIA study area is located within the *North Kent Plain National Character Area* (NCA, 113).

893. At the County level, as defined in the Landscape Assessment of Kent (Kent County Council, 2004), the onshore substation Area of Interest and onshore cable route options are located within the *The Wantsum and Lower Stour Marshes LCA* (15). Areas to the north of the onshore LVIA study area are defined by the *Thanet LCA* (12).

894. At the District level, the onshore substation Area of Interest is located within the *Former Wantsum Channel LCA*, as defined in the Thanet District Council Landscape Character Areas (Thanet District Council, August 2012), with the onshore cable route options extending mainly across the *Sandwich Bay LCA* as defined in the Dover District Landscape Character Assessment (Dover District Council, 2006) (Figure A16).

895. Thanet District Council area does not currently have a published landscape character assessment; however this is due to be published in late 2016. If the Thanet District Landscape Character Assessment is not available during the SLVIA, then the countywide Landscape Assessment of Kent (Kent County Council, 2004) will inform the baseline for the Thanet area.

896. The landscape of the onshore cable route options is primarily rural and coastal in character around Sandwich Bay, Pegwell Bay and the River Stour, until it reaches the industrial landscape around Richborough Energy Park and Port Richborough. The character of the area immediately around the onshore substation Area of Interest is defined by this industrial landscape context at Richborough Energy Park, on the site of the former Richborough power station. There are existing and proposed energy developments at this location, including the existing TOWF substation, Ebbsfleet Farm Solar Park and proposals for the National Grid Interconnector and peaking plant.

897. The SLVIA will prepare a baseline description of relevant LCAs within the onshore LVIA study area and focus on assessing the likely significant effects on the LCAs considered most susceptible to changes as a result of the Onshore Area of Interest of Thanet Extension. These LCAs are likely to be those, as identified above, where the Onshore Area of Interest of the development result in physical changes to landscape elements during construction of the onshore substation Area of Interest and onshore cable route options; and/or changes to the perception of landscape character during operation of the onshore substation Area of Interest.

3.9.1.3 Landscape Designations

898. There are no international, national or regional landscape designations within the landfall options, onshore cable route options or onshore substation Area of Interest, as shown in Figure A17. There is only one Registered Parks and Gardens (RPG) in the wider onshore LVIA study area (Figure A17), located at the Salutation, within the village of Sandwich. The remainder of the onshore LVIA study area is not subject to landscape designation.

3.9.1.4 Visual Receptors and Views

Visual Baseline

899. Visual effects will occur when the introduction of the Onshore Area of Interest of Thanet Extension change or influence the visual amenity and views experienced by people in the onshore LVIA study area. The visual baseline will be defined by a Zone of Theoretical Visibility (ZTV) for the onshore substation Area of Interest and visual appraisal of the onshore cable route options and landfall options.

900. The onshore cable route options construction works will be viewed in a mainly rural coastal setting until the route approaches the more industrial area near Richborough Energy Park. In respect of the cable landfall options and onshore cable route options, the principal visual receptors for the Pegwell Bay North option will be residents of Cliffs End and the Pegwell/Chilton area of Ramsgate; motorists using Sandwich Road; people engaged in recreational activity at Pegwell Bay Country Park; walkers on the Thanet Coastal Path; and visitors to Viking Ship Hugin at Pegwell Bay. For the Sandwich Bay South option, the principal visual receptors will be residents of Sandwich Bay Estate, Sandwich and Great Stonar; people engaged in recreational activity at Sandwich Bay beach; walkers using the network of rights of way, including the Saxon Shore Way, White Cliffs Trail and Stour Valley Walk; and people golfing at the adjacent golf links including Prince's and Royal St George.

901. The onshore substation Area of Interest is proposed within Richborough Energy Park, a site of low carbon renewable energy generation, on the site of the former Richborough power station, close to the mouth of the River Stour near Sandwich. The proposed substation will be seen in the context of the existing and proposed energy developments within Richborough Energy Park, including the existing TOWF substation, Ebbsfleet Farm Solar Park and proposals for the National Grid Interconnector and peaking plant. In respect of the onshore substation Area of Interest, the principal visual receptors will be residents of Richborough; Cliffs End; and potentially Minster and Pegwell (Ramsgate); motorists using the A256 and A299; rail passengers on the railway line to the west of the site; people engaged in recreational activity at Pegwell Bay Country Park; walkers on the Saxon Shore Way along the River Stour; and visitors to Richborough Castle.

Viewpoints

902. Representative viewpoints proposed for the visual assessment of the onshore substation are identified in Table 3.17 and mapped in Figure A.18.

Table 3.17 Viewpoints proposed for the LVIA of onshore substation

	Viewpoint	Easting	Northing
1	Richborough Castle	632348	160134
2	A256 Richborough Way	633430	162665
3	Pegwell Bay Country Park (Thanet Coastal Path)	634082	162786
4	Saxon Shore Way (River Stour)	632945	162208
5	Cliffs End, Sandwich Road	634593	163868

903. Feedback and agreement with stakeholders on these viewpoint locations for the onshore substation is requested as part of the Scoping Opinion.

3.9.2 Potential Impacts

3.9.2.1 Potential impacts during construction

904. The potential impacts of the onshore components of the Thanet Extension during construction would occur in relation to the construction of the landfall, onshore cable route and substation. These would include potential impacts on the physical elements of the sites where construction would take place, as well as impacts on the landscape character and visual amenity of the site and surrounding area. The impacts would relate principally to the construction process, associated plant, materials, infrastructure and temporary structures, as well as the presence of emerging structures, where they would be visible above ground.

3.9.2.2 Potential impacts during operation

905. The potential impacts of the Thanet Extension during operation would relate principally to the presence of the onshore substation. The effect of the Thanet Extension on landscape character and visual amenity will be assessed, with particular consideration of sensitive receptors such as valued landscapes, residents, recreational users of the countryside and road-users. It is anticipated that once operational, the potential impacts of the landfall options and Onshore Cable Route Options would be greatly reduced by their presence under ground level with a minimum amount of associated development visible above ground.

906. The potential impacts during operation would be moderated by the presence and growth of mitigation planting around the onshore substation Area of Interest. The gradual reduction in potential impacts during the operational period of would be considered in the LVIA.

3.9.2.3 Potential impacts during decommissioning

907. The potential impacts of the Thanet Extension during decommissioning would relate principally to the removal of the onshore substation. The decommissioning of the cable landfall options and onshore cable route options would have lesser impact, as the ducts would be left in-situ underground, while only the cables would be removed to be recycled. Decommissioning would include potential impacts on the landscape character and visual amenity of the sites and surrounding area. The impacts would relate principally to the decommissioning process, associated plant, materials, infrastructure and temporary structures, as well as the presence of dismantled structures, where they would be visible above ground.

3.9.2.4 Potential cumulative impacts

908. Potential cumulative effects are likely to arise due to the addition of the proposed substation to the existing and proposed electrical grid infrastructure and energy developments in the area of Richborough Energy Park and the degree to which the substation has additional effects on views and landscape character.

909. The LVIA will consider the potential for significant cumulative impacts to arise as a result of the addition of the proposed substation in the context of other large scale developments that are existing, consented or at application stage, that are located or proposed within the 5km study area for the onshore substation Area of Interest.

910. In respect of the landfall options and onshore cable route options, the relatively small scale of the construction and limited residual effects of buried cables during the operational stage, limit the potential for significant cumulative effects to arise, and it is considered that cumulative landscape and visual effects of the onshore cable route options and landfall options can be scoped out of the LVIA.

3.9.2.5 Summary of potential impacts

Table 3.18 Summary of impacts relating to landscape and visual impacts (scoped in (✓) and scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Landscape and visual impacts of landfall options (within 1km radius study area)	✓	×	×
Landscape and visual impacts of onshore cable route options (within 1km buffer study area)	✓	×	×
Landscape and visual impacts of onshore substation Area of Interest (within 5km radius study area)	✓	✓	✓
Cumulative landscape and visual impacts of landfall options	×	×	×
Cumulative landscape and visual impacts of onshore cable route options	×	×	×
Cumulative landscape and visual impacts of onshore substation Area of Interest (within 5km radius study area)	✓	✓	✓
Landscape and visual, and cumulative impacts, of landfall options and onshore cable route options (outwith 1km buffer study area)	×	×	×
Landscape and visual, and cumulative impacts, of onshore	×	×	×

substation Area of Interest (outwith 5km radius study area)			

3.9.3 Mitigation

911. Primary mitigation in respect of the Onshore Area of Interest of Thanet Extension will involve the sensitive siting and design of the onshore infrastructure during site selection, to ensure the potential impacts are avoided or reduced.

912. The site selection process will consider constraints relating to physical landscape elements (such as woodlands, trees and hedgerows), landscape character and visual amenity, together with other environmental and technical constraints. The sensitivity of the surrounding landscape and of residents, road-users, workers and recreational users of the landscape will be a key consideration in the siting and design of the proposed substation.

913. The capacity of the landscape to accommodate the proposed substation will be assessed in relation to the natural screening afforded by landform and woodlands, trees and hedgerows. If further mitigation of landscape and visual effects is required, an outline landscape strategy will be prepared to set out suitable mitigation proposals for the landfall options, onshore cable route options and substation. Mitigatory tree/woodland planting and landscape design proposals for the onshore substation Area of Interest will be proposed and illustrated in the LVIA, which would contribute to the mitigation of landscape and visual effects.

914. Mitigation measures would be set out in the LVIA and taken into account in the assessment of potential impacts, with consideration given to the growth rate of new planting and how this would affect impacts during the operational stage.

3.9.4 Approach to assessment and data gathering

915. Vattenfall will be undertaking consultation with relevant consultees, including Thanet District Council, Dover District Council, Kent County Council and Natural England, in order to define the scope of the LVIA required for the Onshore Area of Interest of Thanet Extension. The LVIA will be undertaken in accordance with the methods outlined in the following best practice guidance documents:

- The Landscape Institute with the Institute of Environmental Management and Assessment (2013). Guidelines for the Assessment of Landscape and Visual Impacts. Third Edition;
- Landscape and Seascape Character Assessments published by Natural England and the Department for Environment, Food and Rural Affairs (2014);
- An Approach to Landscape Character Assessment (2014). Natural England;

- The Landscape Institute (2011). Landscape Institute Advice Note 01/11, Photography and photomontage in landscape and visual impact assessment.

916. Data would be gathered from official, reliable and the most up-to-date sources. This would include Ordnance Survey map based data, as well as data on landscape characterisation, landscape designations and other Governmental and local authority data of relevance.

3.9.4.1 Methodology

917. This section provides a summary of the methodology that would be used to carry out the LVIA of the Thanet Extension to form a chapter in the ES. The full methodology would be agreed through further consultations with Thanet District Council, Dover District Council, Kent County Council and Natural England. This methodology reflects the 'Guidelines for the Assessment of Landscape and Visual Impacts: Third Edition'.

918. The objective of the assessment of the proposed development is to predict the significant effects on the landscape and visual resource. In accordance with the Environmental Impact Assessment Regulations 2011, the LVIA effects are assessed to be either significant or not significant.

919. The significance of effects is assessed through a combination of two considerations – the sensitivity of the landscape or visual receptor and the magnitude of change that will result from the proposed development. In accordance with the Landscape Institute's GLVIA3, the LVIA author's methodology requires the application of professional judgement, but generally, the higher the sensitivity and the higher the magnitude of change the more likely a significant effect will be.

920. The objective of the cumulative LVIA is to describe, visually represent and assess the ways in which the proposed development will have additional effects when considered together with other existing, consented or application stage developments and to identify related significant cumulative effects arising from the proposed development. The guiding principle in preparing the cumulative LVIA is to focus on the likely significant effects and in particular, those which are likely to influence the outcome of the consenting process.

921. The LVIA will determine whether effects are beneficial, neutral or adverse in accordance with defined criteria.

922. The effects of the proposed development are of variable duration, and are assessed as short-term or long-term, and permanent or temporary/reversible.

3.10 Onshore Noise and Vibration

923. The onshore noise and vibration assessment will cover the impacts upon receptors from both offshore and onshore noise sources.

3.10.1 Baseline

3.10.1.1 Data Sources

924. The Scoping assessment presented below has been undertaken based on a desk-based assessment conducted in September 2016. This desk-based assessment has used existing available geographical information to identify noise sensitive receptors and noise sources present within the Thanet Extension Onshore Area of Interest.

925. The data sources used to inform this desk-based assessment are shown in Table 3.19.

Table 3.19 Data sources

Data	Source	Date
Location of noise sources and sensitive receptors within the Scoping area	Google Maps Aerial Photography	2016

Offshore noise

926. Offshore airborne noise sources are likely to arise from existing high levels of vessel traffic in the area and natural sources (e.g. wind and waves).

Onshore noise

927. The Onshore Cable Route Option 1 for the Thanet Extension is proposed to follow the same onshore cable route as used for TOWF. This cable route is in a predominantly rural / industrial environment and as identified in the TOWF ES, the only significant contribution to background noise levels is from road traffic on the A256 dual carriageway (constructed since the TOWF EIA and on Sandwich Road (TOWL, 2005a). The Onshore Cable Route Option 2 is located near the A256 dual carriageway also. No other noise sources have been identified within the vicinity of this route option.

928. Noise receptors in the area include residential properties close to the cable route in the villages of Cliffs End, Stonelees, Sandwich Bay Estate, and the properties of New Downs Farm Cottage, Sandown Lees properties and Tollgate Cottages. Little Cliffend Farm, scoped into the TOWF EIA, is 1,016m from the Onshore Cable Route as such has been scoped out of this assessment. Non-residential receptors identified within the TOWF EIA included users of the St Augustine's golf course, Stonelees golf course,

nature conservation designation located at Pegwell Bay (NNR, SPA, Ramsar site, SSSI, SAC) Pegwell Bay Country Park. In addition, the Thanet Coast Path, Stour Valley Walk, Saxon Shore Way long distance paths and local PROW within the Thanet Extension Onshore Area of Interest have been identified as additional non-residential receptors.

929. The estimated distances of the sensitive residential receptors from the Thanet Extension Onshore Area of Interest are displayed in Table 3.20. The table also includes additional residential receptors identified during the September 2016 desk study. The distance is shown in metres from the Thanet Extension Onshore Area of Interest to the nearest and furthest building at each receptor site, and the mean distance between the two.

Table 3.20 Distance of residential receptors to the Thanet Extension Onshore Area of Interest

Location	Distance from the Thanet Extension Onshore Area of Interest	
	Nearest	Furthest
Cliffs End Village	0m	677m
Stonelees	0m	169m
Sandwich Bay Estate	8m	567m
New Downs Farm Cottage	106m	251m
Sandown Lees properties	390m	685m
Tollgate Cottages	7m	64m

3.10.2 Potential Impacts

930. The assessment would consider the impacts of the proposed offshore and onshore elements of the project on noise and vibration, including impacts on ecological and other sensitive receptors from construction and operational activities.

3.10.2.1 Potential impacts during construction

931. The potential temporary impacts of offshore construction noise may arise from:

- Pile driving;
- Vessel movements; and
- Cable laying.

932. It is considered that any vessel or cable laying noise would be indistinguishable from background, therefore the construction phase assessment will only consider potential impacts from piling noise.

933. The potential temporary impacts of onshore construction noise may arise from:

- Activities carried out on the surface along the proposed Onshore Cable Route (mainly earth moving and excavation);
- Construction activities at the substation site including any potential landscaping;
- HDD activities;
- Heavy goods vehicles servicing the proposed Onshore Cable Route and substation, delivering or removing materials (including spoil and fill) and plant; and
- Vibration would only be considered as an issue where significant piling works are required.

3.10.2.2 Potential impacts during operation

934. During operation, turbine movement would cause low levels of airborne noise. Given the distance of the wind farm site from shore it is not considered that this would be audible to shore-based receptors during operation. This impact will be scoped out from further consideration within the EIA.

935. The potential permanent impacts of operational noise from the substation may arise from:

- The inherent operational noise from the proposed substation, and its characteristics, upon noise sensitive premises (including residential properties at Stonelees) and noise sensitive areas (including Stonelees golf course, Pegwell Bay Country Park, long distances paths and other local PRoW);
- The proximity of the proposed development to quiet places and other areas that are particularly valued for their acoustic environment or landscape quality; and
- The proximity of the proposed development to designated sites where noise may have an adverse impact on protected species or other wildlife (nature conservation designation located at Pegwell Bay (NNR, SPA, Ramsar site, SSSI, SAC)).

936. There are unlikely to be any noise and vibration impacts relating to operational or maintenance vehicular traffic but operational noise impacts may arise from the operation of equipment within the substation (e.g. reactors and transformers). An assessment would be undertaken to determine the likely environmental and health impacts due to operational noise emissions on identified sensitive receptors.

937. There are considered to be no significant sources of vibration associated with the operational scheme and operational vibration impacts have therefore been scoped out of further assessment.

3.10.2.3 Potential impacts during decommissioning

938. Increased airborne noise levels may arise from the removal of offshore structures during decommissioning. The potential impact during decommissioning is likely to

be less than during construction due to the absence of piling during decommissioning

939. It is proposed that the substation electrical infrastructure and building foundations would be removed as part of the decommissioning phase, with the onshore cables, jointing pits and transition pits remaining in situ. The decommissioning methodology cannot be finalised until immediately prior to decommissioning; but would be in line with relevant policy at that time.

940. It is therefore considered that impacts during decommissioning would be similar in nature to those during construction but would be more limited in geographical extent and timescale.

3.10.2.4 Potential cumulative impacts

941. It is anticipated that as part of the planning application for schemes running concurrently with the development, a construction noise and vibration assessment would be undertaken, in accordance with BS 5228:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites* (British Standards Institute, 2014), to specify best practice mitigation to reduce the impacts at nearby receptors. Mitigation measures would also be specified to reduce construction noise and vibration impacts of the development. Details of the cumulative impacts and appropriate mitigation will be discussed within the ES.

3.10.2.5 Summary of potential impacts

Table 3.21 Summary of impacts relating to onshore noise and vibration (scoped in (✓) and scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Noise affecting human and ecological receptors (offshore sources	✓	×	✓
Noise affecting human and ecological receptors (onshore sources)	✓	✓	✓
Vibration affecting human and ecological receptors (onshore sources)	✓	×	✓
Cumulative impacts	✓	×	✓

3.10.3 Mitigation

942. The construction works would use Best Practicable Means (BPM) to limit the impacts of noise at sensitive receptors. Those measures would be set out in the Code of Construction Practice.

943. Operational mitigation measures likely to be considered as part of this scheme (if required) would involve:

- Selection of quieter equipment;
- Installation of acoustic enclosures;
- Installation of acoustic barriers;
- Silencing of exhausts/outlets for air handling/cooling units; and
- Locating equipment to take advantage of screening inherent in the design, i.e. from the substation hall(s) or control room buildings.

3.10.4 Approach to assessment and data gathering

944. Noise and vibration issues associated with the offshore and onshore elements of the Thanet Extension construction works including cable installation, substation and access roads construction would be assessed using the guidance contained in BS 5228:2009+A1:2014, which defines the accepted prediction methods and source data for various construction plant and activities.

945. Construction noise impacts would be based on the likely construction programme and associated activities, including offshore pile driving, cable laying and HDD works, construction traffic and access routes.

946. The spatial scope of the construction noise assessment would include the following geographic coverage:

- 400m from the cable routes where significant activities could affect noise sensitive receptors; and
- Traffic routes and routes subject to significant changes in traffic flows (and / or percentage HGV) associated with the construction of the project.

947. Operational impacts would include noise impacts associated with the substation. The guidance and methodology contained in BS 4142:2014 would be used to assess noise impacts arising from the substation.

948. The tasks required to progress the EIA will include:

- Initial liaison with the local authorities to agree approach, methodology and criteria to be used for the noise assessment;
- Baseline noise surveys along the cable route consisting of daytime and night-time attended noise measurements at locations representative of sensitive receptors;
- Baseline noise surveys in the area of the substation consisting of unattended, continuous noise measurements at locations representative of sensitive receptors;

- Noise assessment for the cable laying activity (including at the cable landfall) and the construction of the substation;
- Assess construction and operational noise impacts on any nature conservation areas in the vicinity of the cable route and the substation;
- Assess construction traffic noise impacts; and
- Assess operational noise impacts of the substation.

949. The approach to assessment and data gathering will be discussed and agreed with relevant bodies prior to commencement. Consultation will be undertaken at key stages throughout the EIA process.

3.11 Traffic and Transport

3.11.1 Baseline

950. Two potential landfall locations are currently being considered for the Thanet Extension (Pegwell Bay (Option 1) and Sandwich Bay (Option 2) from these landfall locations the Onshore Cable would route to the substation at Richborough. Further details are provided within Section 1.4 Project Description and Section 1.5 Site Selection and Outline Assessment of Alternatives.

951. The onshore cables would be installed via an open cut method and be buried to a minimum depth of 1.1m, with the Pegwell Bay option expected to be installed entirely within the highway boundary whilst the Sandwich Bay option would predominantly follow a cross country route.

952. The Pegwell Bay Option 1 would route along Sandwich Road towards the A256 before following the A256 to the proposed substation, whilst the Sandwich Bay Option 2 would route along Guilford Road before heading north cross country towards the proposed substation at Richborough.

953. Access to the proposed Richmond substation site would be provided from the existing roundabout junction with the A256.

954. The key routes for traffic within the study area are likely to be the A256, A257 and A299.

955. The A299 provides an east west link between Ramsgate to the east and Whitstable and Herne Bay to the west before joining up with the M2 and A2 close to Faversham. In the vicinity of the study area the A299 is a modern dual carriageway and passes to the north of Cliffs End carrying in the region of 25,137 vehicles per day[10].

[10] Department for Transport (2015), Traffic Counts - count poit 6821. http://www.dft.gov.uk/traffic-counts/cp.php?la=Kent

956. To the west of Cliffs End the A299 intersects with the A256 which provides a north south link between Ramsgate and Dover bypassing Sandwich to its west. Within the vicinity of the study area the A256 is a modern dual carriageway and carries in the region of 20,198[11] vehicles per day and is subject to a 50mph speed limit.

957. Heading south from Great Stonar the A256 becomes single carriageway subject to the national speed limit. To the west of Sandwich the A256 intersects with the A257 which head west towards Canterbury. In the vicinity of the study area the A257 is a modern single carriageway road subject to the national speed limit.

958. To access the landfall location at Pegwell Bay traffic would utilise Sandwich Road from the A256.

959. Sandwich Road is a single carriageway road and with the exception of a small section at 40mph (within Cliffs End) the road is subject to the national speed limit. Prior to the opening of the Cliffs End bypass in 2012 the Sandwich Road formed the A256 and carried in the region of 23,000 vehicles per day (TOWL, 2005a), however, this number is expected to have decreased significantly.

960. To access the landfall location at Sandwich Bay traffic would route from the A256 through Sandwich towards Guilford Road.

961. Guilford Road heads south from Sandwich as a narrow two lane rural carriageway subject to the national speed limit. There are no footways or cycleway provided along this road. To the south of Newcut Bridge Guilford Road becomes a private toll road.

962. Regional cycle route 15 follows a parallel route to Sandwich Road providing a remote off road route, close to the junction with the A256 the cycle route is then provided as an off road shared use surface adjacent to the road (on both sides) following the A256 to the south past Great Stonar before again following a remote off road route into Sandwich.

963. A signalised crossing is provided close to the junction of the A256 and Sandwich Road to allow pedestrians and cyclists to cross from one side of the A256 to the other.

964. Sandwich Road and the A256 are used by the 87 and 88/88A bus services, no scheduled bus services operate along Guilford Road.

[11] Department for Transport (2015), Traffic Counts - count poit 17864. http://www.dft.gov.uk/traffic-counts/cp.php?la=Kent

965. The 87 bus services routes between Dover and Ramsgate with approximately six services per day (Monday – Saturday) in each direction, whilst the 88/88A services route between Dover – Sandwich and Ramsgate with approximately three services per day (Monday – Saturday) in each direction.

966. An overarching review of collisions (between 2011 and 2015) for key links and junctions within the study areas has been undertaken, these are summarised in Table 3.22.

Table 3.22 Summary of collisions

Key link and junctions	Number of collisions (2011 – 2015) *				Summary
	Fatal	Serious	Slight	Total	
Sandwich Road	0	2	3	5	Three of the collisions are clustered around the junction with Foabs Lane.
Junction of Sandwich Road and A256	0	1	2	3	Collision rates lower than averages for similar sized roundabouts[12]
Junction of A256 and substation	0	1	7	8	
Guilford Road south of St George's Road	0	0	3	3	No pattern to the location of the collisions.
** data sourced from www.crashmap.co.uk*					

3.11.2 Potential Impacts

3.11.2.1 Potential impacts during construction

967. The construction phase would result in a requirement for the import of materials and plant to the Thanet Extension Onshore Area of Interest and for lane/highway closures to install cabling in the highway between the landfall sites and the substation.

968. At this Scoping stage, no information is available with regards to likely material quantities, workforce numbers or proposed cable installation methods. However it is envisaged that:

- Daily traffic demand may be significant with a large component being HGV deliveries and also the potential requirement for abnormal loads to consider; and
- Delays and diversions to highway users as a result of road works during the cable installation may be significant.

[12] Department for Transport (August 2007). Design Manual for Road and Bridges, TD16/07 Geomtric Design of Roundabout, Table 2/1.

969. A review of the baseline situation outlined in Section 3.11.1 indicates potential impacts resulting from additional traffic and construction activities fall in to the following two broad categories:

- Increasing traffic congestion impacting upon commuters and seasonal tourist traffic with associated effects including:
    - Driver delay;
    - Severance;
    - Pedestrian/cycle amenity; and
    - Air quality, and noise and vibration (considered separately in Section 3.3 and paragraph 850).
- Road safety:
    - Construction traffic impacting sites with a history of existing road safety issues;
    - Introducing new risks with the formation of new construction accesses; and
    - Suitability of delivery routes for HGVs, plant and abnormal loads.

970. In addition to considering the onshore impacts there is also the potential for impacts associated with employee movements to the primary base port for the construction of the offshore elements of Thanet Extension.

3.11.2.2 Potential impacts during operation

971. The substation would not be permanently manned. However, O&M staff would visit on a regular basis (e.g. monthly) to carry out routine checks and maintenance and occasional access would be required at those joint bays with link boxes

972. As with the construction phase, in addition to considering the onshore impacts there is also the potential for impacts associated with employee and HGV movements to the primary port base for the offshore wind farm operations and maintenance activities.

3.11.2.3 Potential impacts during decommissioning

973. It is proposed that the substation electrical infrastructure and building foundations would be removed as part of the decommissioning phase, with the onshore cables, jointing pits and transition pits remaining in situ. The decommissioning methodology cannot be finalised until immediately prior to decommissioning; but would be in line with relevant policy at that time.

974. It is therefore considered that impacts during decommissioning would be similar in nature to those during construction but would be more limited in geographical extent and timescale.

3.11.2.4 Potential cumulative impacts

975. Onshore cumulative impacts will be considered as part of the EIA process. Projects that may act cumulatively with Thanet Extension will be identified during consultation and following a review of available information. These projects will then be included in the CIA and therefore are scoped into the assessment.

976. The assessment would consider the potential for significant cumulative impacts to arise as a result of the construction and decommissioning of Thanet Extension in the context of other developments that are consented or at application stage.

3.11.2.5 Summary of potential impacts

Table 3.23 Summary of impacts relating to traffic and transport (scoped in (✓) and scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Highway safety	✓	✓ *	✓
Driver delay	✓	✓ *	✓
Pedestrian amenity	✓	×	✓
Severance	✓	×	✓
Abnormal loads	✓	×	✓
Cumulative impacts	✓	×	✓
** Base port only*			

3.11.3 Mitigation

977. The EIA will determine the requirement for the implementation of mitigation measures to reduce the significance of the impact to transport receptors. Where possible mitigation measures would be embedded into the project design to reduce the residual impacts, and could include:

- Identify suitable access points and identification of optimum routes and times for construction traffic to use (minimising the impact on sensitive receptors);
- Reducing disruption to traffic in Sandwich and along the A256 through the adoption of a haul road and horizontal directional drilling under roads (Sandwich Bay option only);

- Consolidating HGV and employee movements at a consolidation area close to main roads (likely at the substation) to reduce vehicle movements along more sensitive local routes;
- Committing to the development of a Construction Traffic Management Plan to manage road works, employee and HGV movements. The plan would also set out sensitive times to be avoided, which routes to use and strategies to continually monitor and enforce; and
- Committing to repair or make good any damage caused to existing highways due to construction traffic movements.

978. If it is assessed that there is the potential for significant impacts to arise despite the embedded mitigation, the following additional mitigation measures could be introduced to reduce the significance of the impact to an acceptable level (however this will be fully investigated during the environmental assessment):

- Planning to cable installation works to avoid peak periods/hours and work offline where possible;
- Scheduling of deliveries to avoid peak periods/hours; and
- Localised temporary speed limits and traffic management measures e.g. warning signs.

979. The above lists are not intended to be exhaustive, however such mitigation measures have potential to effectively manage the risk to transport receptors.

3.11.4 Approach to assessment and data gathering

980. The principle guidelines for the assessment of the environmental impacts of road traffic associated with new developments are the 'Guidelines for the Environmental Assessment of Road Traffic' (GEART) published by the Institute of Environmental Assessment in January 1993. The guidance provides a framework for the assessment of traffic borne environmental impacts, such as pedestrian severance and amenity, driver delay, accidents and safety; and noise, vibration and air quality.

981. GEART suggests the following rules to define the extent and scale of the assessment required:

- Rule 1: Include highway links where traffic flows are predicted to increase by more than 30% (or where the number of HGVs is predicted to increase by more than 30%).
- Rule 2: Include any other specifically sensitive areas where traffic flows (or HGV component) are predicted to increase by 10% or more.

982. The above criterion applied to the proposed scheme traffic demand will dictate the extent of the study area and the scale of the impact assessment.

983. Traffic demand will be derived by way of a 'first principles' approach whereby traffic generation is calculated from an understanding of likely material demand and resourcing requirements. These numbers will be informed by industry experts, drawing on their experience of delivering and operating offshore windfarm projects.

984. The project's traffic demand would be assigned to the highway links within the study area and the increase in traffic flow to baseline conditions determined. This would facilitate an assessment of the magnitude of effect.

985. Magnitude of effect is established by applying GEART, which sets out considerations and, in some cases, thresholds in respect of changes in the volume and composition of traffic to facilitate a subjective judgement of traffic impact and significance as set out in Table 3.24.

Table 3.24 Magnitude of effects thresholds

Effect	Very Low	Low	Medium	High
Highway safety	Informed by a review of existing collision records within the study area to identify any areas with a pattern of collisions that could be exacerbated by the increase in traffic from the development			
Driver delay	Informed by the following assessments: • Modelled delays at critical junctions; • Modelled delays at road works; and • Measured delays for diversion routes.			
Pedestrian amenity	Change in traffic flow (or HGV component) less than a 100%	Greater than 100% increase in traffic (or HGV component) and a review based upon the quantum of vehicles, vehicle speed and pedestrian footfall		
Severance	Change in total traffic flow of less than 30%	Change in total traffic flows of 30-60%	Change in total traffic flows of 60-90%	Changes in total traffic flows of over 90%

986. The magnitude of effect would then be combined with the sensitivity of each discrete highway link within the study area to determine the overall impact of the project's traffic.

987. The sensitivity would be determined by the concentration of sensitive receptors and the highway environment. For example, pedestrians are less sensitive to changes in traffic if there are adequate footways, and crossing facilities. However links where there are high concentrations of sensitive locations (such as Hospitals, Schools and Tourist Attractions) are likely to be highly sensitive to changes in traffic flow unless there is separation from traffic.

988. In addition, all proposed delivery routes will be assessed for their suitability to accommodate forecast HGV traffic and abnormal loads.

989. Once more detail of the proposed traffic demand is known a more detailed transport Scoping note would be prepared and submitted to the highway authority (Kent County Council) to confirm the scope of impact assessment included in the EIA.

990. To facilitate the impact assessment, the following data will be obtained:

- Baseline traffic flow data within the study area, including seasonal traffic fluctuations;
- Details of sensitive receptors (such as district centres, schools, leisure facilities etc.) within the study area;
- Collison data within the study area;
- Existing pedestrian/cycle/bus routes serving the study area;
- Detail of abnormal load routes; and
- Details of extant permissions and permitted movements traffic at the preferred port location.

991. The approach to assessment and data gathering will be discussed and agreed as part of the consultation. Consultation will be undertaken at key stages throughout the EIA process.

3.12 Health

992. The consideration of human health will be considered within the relevant onshore chapters of the ES, including flood risk, air quality, noise and vibration, traffic and transport, tourism and recreation and socio-economics. However, in order to provide a single overview of this topic, a review of the health interactions of the project and those in the receiving environment will be provided within a Health Impact Report (HIR) provided as an appendix to the ES.

3.12.1 Baseline

993. The HIR will identify potential impacts on the health of the local population in relation to the proposed project. The review will only consider the onshore components of the project, including landfall, as there are no human health receptors that would be affected by offshore aspects of the project.

994. The areas associated with the Thanet Extension Onshore Area of Interest are predominantly rural in nature typified by small villages and isolated residential properties. They include major roadways (the A256) and recreation features (e.g. Pegwell Bay Country Park).

995. Receptors that are sensitive to potential health impacts will be identified within the topic specific ES chapters, and a review of these will be presented within the HIR.

3.12.2 Potential Impacts

3.12.2.1 Potential impacts during construction

996. Potential health related impacts that may result from construction will be defined in the topic specific chapters of the ES, but are expected to include:

- Noise impacts;
- Dust and other air emissions (including odour);
- Hazardous waste and substances;
- Temporary loss of access to green space;
- Disruption to local road network (reduced access to services and amenities); and
- Increased local employment.

3.12.2.2 Potential impacts during operation

997. Potential health related impacts that may result from operation will also be defined in the topic specific chapters of the ES, but are expected to include:

- Noise disturbance in the proximity of the operational substation;
- EMFs generated above the buried cable route; and
- Increased local employment.

3.12.2.3 Potential impacts during decommissioning

998. It is proposed the cables would remain in-situ once electricity generation ceases and therefore no impacts are anticipated along the Onshore Cable Route. However, where cables have been installed in ducts it may be possible to extract the cables relatively easily during the decommissioning phase. No decision has been made regarding the final decommissioning policy for the substation, as it is recognised that industry best practice, rules and legislation change over time. The decommissioning methodology cannot be finalised until immediately prior to decommissioning; but would be in line with relevant policy at that time.

3.12.2.4 Potential cumulative impacts

999. Any other project with the potential to result in human health impacts that may act cumulatively with Thanet Extension will be identified during consultation or following a review of published information, these will also be included in the CIA.

1000. It is anticipated that all potential projects in the area, which may result in cumulative impacts associated with potential construction or operational human health impacts, will be agreed with the relevant authorities and considered as part of the HIR.

3.12.2.5 Summary of potential impacts

Table 3.25 Summary of impacts relating to health (scoped in (✓) and scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Noise disturbance	✓	✓	✓
Dust	✓	x	✓
Temporary loss of access to green space	✓	x	✓
Disruption to local road network	✓	x	✓
Increased local employment	✓	✓	✓
EMF (above buried onshore cables)	x	✓	x
Cumulative health impacts	✓	✓	✓

3.12.3 Mitigation

1001. Where health related impacts are identified in individual ES chapters, measures to avoid or reduce these effects will be identified and reported within the chapters of the ES and collated within the HIR.

3.12.4 Approach to assessment and data gathering

1002. There are no specific guidelines which inform the management or assessment of health impacts. The Overarching National Policy Statement for Energy (EN-1) (DECC, 2011) states that where the proposed project has an effect on human beings, the ES should assess these effects for each element of the project, identifying any adverse health impacts, and identifying measures to avoid, reduce or compensate for these impacts as appropriate.

1003. EN-1 indicates that direct impacts on health may include:

- Increased traffic;
- Air or water pollution;
- Dust;
- Odour;
- Hazardous waste and substances;
- Noise;
- Exposure to radiation; and
- Increases in pests.

1004. New energy infrastructure may also affect the composition, size and proximity of the local population, and in doing so have indirect health impacts, for example if it in some way affects access to key public services, transport or the use of open space for recreation and physical activity.

1005. In line with best practice, the assessment process will include the identification and review of the potential public health impacts of the full life-cycle (i.e. construction, operation and decommissioning) of the project's features, including their emissions. The findings will be taken from individual chapters from the ES and collated in the HIR. In addition feedback will be sought from consultees on potential health impacts, with particular reference to the Health and Safety Executive and Public Health England.

3.13 Onshore Inter-relationships

1006. The EIA will identify the full range of inter-relationships which are likely to result from the construction, operation and decommissioning of Thanet Extension. The inter-relationships relevant to the onshore environment are outlined in Table 3.26.

Table 3.26 Onshore inter-relationships

Impacted On \ Affected By	Ground Conditions and Contamination	Air Quality	Water Resources and Flood Risk	Land Use	Onshore Ecology	Onshore Ornithology	Onshore Archaeology and Cultural Heritage	Onshore Landscape and Visual Impacts	Onshore Noise and Vibration	Traffic and Transport	Health Impacts	Socio-Economics	Tourism and Recreation
Ground Conditions and Contamination													
Air Quality										x			
Water Resources and Flood Risk	x												
Land Use	x									x		x	
Onshore Ecology	x	x	x						x				
Onshore Ornithology		x	x						x				
Onshore Archaeology and Cultural Heritage								x	x				
Onshore Landscape and Visual Impacts				x			x						
Onshore Noise and Vibration										x			
Traffic and Transport													
Health Impacts		x	x						x	x		x	x
Socio-Economics													
Tourism and Recreation													

1007. The approach to onshore inter-relationships will be discussed with relevant stakeholders during the EIA.

3.14 Cumulative Impacts Summary

1008. This section collates the Scoping of onshore cumulative impacts discussed in Sections 3.2 to 3.12 (summarised in Table 3.27).

1009. During the EIA, a cumulative impact screening process will be undertaken once the onshore areas for Thanet Extension are defined to identify other projects or activities that are likely to create a cumulative impact. This will be completed in consultation with key stakeholders throughout the EIA process.

Table 3.27 Summary of onshore cumulative impacts (scoped in (✓) and scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Ground Conditions and Contamination	✓	✓	✓
Air Quality	✓	x	✓
Water Resources and Flood Risk	✓	x	✓
Land Use	✓	x	✓
Onshore Ecology	✓	✓	✓
Onshore Ornithology	✓	✓	✓
Onshore Archaeology and Cultural Heritage	✓	x	✓
Onshore Noise and Vibration	✓	x	✓
Traffic and Transport	✓	x	✓
Health impacts	✓	✓	✓

4 PART 4 WIDER SCHEME ASPECTS

4.1 Introduction

1010. This section presents the main baseline characteristics of the environment associated with wider scheme aspects, i.e. those which can be affected by Thanet Extension Offshore Wind Farm and proposed Offshore Export Cable Corridor and/or Thanet Extension Onshore Area of Interest. The potential impacts of the Thanet Extension during construction, O&M, and decommissioning are considered. Where there is no pathway for a potential impact, impacts are proposed to be scoped out and not considered further within the EIA process. Where impacts are proposed to be scoped out these are clearly identified within the relevant section of this report. Where impacts are proposed to be scoped in to the full EIA, an overview of the approach to the EIA is provided along with potential mitigation measures.

1011. The following questions are suggested for consideration while reviewing each onshore section and providing responses for inclusion in the Scoping Opinion:

Q1. Please tell us about further data sources that could be reviewed as part of the site characterisation for each topic?

Q2. Tell us about any other relevant potential impacts for each topic?

Q3. Do you agree with the potential impacts that have been scoped out for each topic? If not, please provide details.

Q4. Have the relevant potential cumulative impacts been identified? If not, please provide details

Q5. Do you agree the proposed approach to assessing each impact is appropriate? If not, please provide details.

4.2 Socio-economics

4.2.1 Baseline

1012. In 2014 Kent had a population of approximately 1.4 million (KCC, 2016), growing at a rate of 1% per annum. The economy is prosperous in Kent within the national context and unemployment was below the national average in 2014 (KCC, 2016). Thanet District has a population of 134,000, while Dover District has a population of 111,000. The highest level of employment in Thanet District is from wholesale and retail trade, the health sector and manufacturing. In Dover District the highest levels of employment are in public administration, education and health, and distribution, hotels and restaurants.

1013. Ramsgate, Broadstairs and Margate are the main towns for tourism in Thanet District. Sandwich Bay and Deal, both located in Dover District, are also important tourism destinations within the study area. In 2013 the total value of tourism in Thanet District was estimated to be £245million, which generated 4,193 full time equivalent (FTE) jobs, 15% of all employment in the district (The South West Research Company Ltd., 2013a). The total value of tourism in the same year in Dover district was estimated to be £248million, supporting 3,708 FTE jobs, which account for 16% of all employment in the district (The South West Research Company Ltd., 2013b).

1014. The main attractions in the area which are in the vicinity of the Thanet Extension works are the Viking Ship and Pegwell Bay County Park, and the Royal St Georges and Prince's golf courses. On the coast, a number of recreational activities occur including bathing, scuba diving, surfing, sailing and watersports.

4.2.2 Potential Impacts

4.2.2.1 Potential impacts during construction, O&M and decommissioning

1015. As discussed in Section 1.2 Need for the Project, the offshore wind industry presents an opportunity to utilise, and further develop the UK's maritime engineering skills as other industries decline (such as shipbuilding and North Sea oil) in order to secure supply chain and other employment opportunities in the UK.

1016. Thanet Extension will require large-scale investment and would need to be supported by a substantial supply chain; a proportion of the capital expenditure would add to local, regional and UK-wide income during the lifetime of the project. There would be direct expenditure on key elements of the wind farm, such as components of wind turbines, foundations, cables and onshore infrastructure as well as further expenditure throughout the supply chain for goods (e.g. fuel, paints, other consumables) and services (e.g. accommodation, catering, security, transport) some of which would result in indirect economic impacts (e.g. training and education, day-to-day indirect spend from project employees). In order to be eligible for CfD support from the UK Government, a detailed supply chain plan would be produced by the Applicant. The supply chain plan must demonstrate that the project would:

- Support the development of competition in supply chains;
- Support innovation in supply chains; and
- Support the development of skills in supply chains.

1017. The relevant Secretary of State will assess each of these three criteria against the following:

- The commitments or actions that the project has either already undertaken or will undertake in the future;
- The impact on the supply chain as a whole, using examples from the contracted supply chain if not a vertically integrated project; and
- The wider long term impacts across the relevant low carbon electricity generation industry.

1018. The Applicant is committed to ensuring that the approach to the delivery of Thanet Extension assists local businesses to enter and prosper in the renewable energy and green job sectors. The Applicant is also committed to seeking partnering opportunities with business and training agencies in the region to ensure Kent gains significantly from the major investment that comes from schemes such as Thanet Extension.

1019. In addition to the beneficial impacts of project expenditure there is also potential to impact upon other industries negatively as a result of displacement of workers currently employed in other industries. Our supply chain and skills strategy would consider the interests and needs of the existing local workforce and seek to prepare new workers adequately for the roles that would become available.

1020. Onshore impacts during construction would include job creation, training and employment retention, during all three phases of development. Some of the potential economic effects are listed below:

- Direct and indirect creation of jobs throughout construction operation and decommissioning phases of the project;
- Indirect impacts on services, such as infrastructure and housing; and
- Increased long term security and reliability of supply and more evenly distributed energy generation.

1021. Economic impacts would vary considerably at each stage, dependent on a range of factors, such as:

- The technologies and infrastructure to be deployed onshore and offshore;
- Construction, O&M and decommissioning methodologies;
- Procurement/contracting strategy;
- Availability and capacity of the supply chain;
- Number of workers;
- Where the workers come from; and
- The duration of employment.

1022. Offshore, there are potential impacts, primarily on commercial fisheries as well as shipping and navigation. As discussed in Section 1.5.1, design work undertaken to

locate the offshore project area for Thanet Extension has considered potential constraints associated with other industries. Thus the potential for adverse impacts upon other sea-users has been reduced already by siting the proposed Thanet Extension Wind Farm Area in its proposed location.

4.2.2.2 Potential cumulative impacts

1023. There is potential for Thanet Extension to bring socio-economic benefits, for example by providing opportunities for business, jobs and training. There is an existing infrastructure and skills base in the South-East for the Kentish Flats, London Array and TOWF wind farms, the Thanet Extension will be able to build on this.

1024. Conversely, there is also potential to cumulatively impact upon other industries negatively as a result of displacement of workers currently employed in other industries. This will be considered further in the EIA.

4.2.2.3 Summary of potential impacts

Table 4.1 Summary of impacts relating to socio-economics (scoped in (✓) and scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
All socio-economic impacts	✓	✓	✓
Cumulative socio-economic impacts	✓	✓	✓

4.2.3 Mitigation

1025. The final locations for the onshore infrastructure will be identified based on ongoing constraints analysis and feedback from the stakeholders and the public following this request for Scoping Opinion and initial drop-in exhibitions.

1026. This presents the opportunity for the Applicant to minimise potential socio-economic impacts through the design of the project.

1027. Further mitigation measures specific to existing industries e.g. shipping, commercial fisheries, onshore tourism, farming and other local businesses will be developed during the EIA in consultation with relevant stakeholders where appropriate.

4.2.4 Approach to assessment and data gathering

1028. The Overarching National Policy Statement for Energy (EN-1) (DECC, 2011) states that where a project is likely to have an impact on socio-economics at a local or national scale the assessment should consider all relevant impacts. These may include:

- The creation of jobs and training opportunities;
- The provision of additional local services and improvements to local infrastructure;
- The impact on tourism;
- The impact of a changing influx of workers during the different construction, operation and decommissioning phases of the energy infrastructure; and
- Cumulative impacts.

1029. The assessment will follow other relevant guidance documents such as the Productive Seas Evidence Group (2015) Social and Economic Assessment Requirements for Development Projects Affecting the Marine Environment.

1030. Establishing the baseline for the potential offshore and onshore impacts of Thanet Extension will draw upon national and regional economic data and nationally available sources such as the:

- Census;
- Office for National Statistics, for example;
    - Annual Population Survey;
    - Labour Force Survey;
    - Indices of Deprivation;
- Local Authority data and plans (e.g. economic strategies and development plans);
- Local Enterprise Partnerships policies and plans; and
- Available data relating to offshore wind farms e.g. from studies by Renewables UK, the Offshore Wind Industry Council, Offshore Renewable Energy Catapult.

1031. The approach to assessment and data gathering will be discussed and agreed with relevant bodies prior to commencement. Consultation will be undertaken at key stages throughout the EIA process.

4.3 Tourism and Recreation

4.3.1 Baseline

1032. As described in Section 4.2 Socio-economics, tourism is worth approximately £493million to Thanet and Dover Districts, supporting approximately 7,900 FTE jobs. The area provides a seaside to visit which is accessible from London and the South-East, built heritage, walking and other recreational opportunities.

4.3.1.1 Data Sources

1033. The baseline for this section was identified by undertaking an initial high level desk-based review using existing sources to characterise the area, including:

- Ordnance survey data;
- Google Earth;
- www.visitkent.co.uk;
- www.visitthanet.co.uk;
- www.whitecliffscountry.org.uk;
- The effects of human activity on the ruddy turnstone within the Thanet and Sandwich Bay SPA. Brief report of findings for the 2002-2003 fieldwork season (Webb., 2005).

4.3.1.2 Offshore and onshore tourism and recreation

Tourism

1034. The main tourist areas in Thanet District include the coastal towns of Ramsgate, Broadstairs and Margate. Sandwich Bay and Deal are also important tourist destinations within the study area and both are located in Dover District.

1035. Ramsgate has a noteworthy maritime past with its harbour being granted 'royal' status in 1821. Today, the Royal Harbour (Ramsgate Marina) offers modern facilities to local fisherman and local and international yachtsmen. Ramsgate attracts visitors because of its expanse of sandy beaches and restaurants, shopping centre and fine architectural features in its town centre. Broadstairs is a resort with a strong history of being the holiday home for Charles Dickens. It still attracts many visitors with its attractive bays, maritime history and characteristic streets. Margate has an important history as a tourist resort. Today it is a peaceful coastal retreat offering traditional seaside activities, great sporting opportunities and a vibrant nightlife.

1036. A number of events occur in the area throughout the year including the Powerboat Grand Prix, Ramsgate Regatta, Thanet Air Show and the Dickens Festival.

1037. Sandwich Bay offers a peaceful environment with its long stretch of sandy beaches. The Bay forms part of the nature conservation designation Thanet and Sandwich Bay.

1038. Deal is a small tourist resort. Key attractions include Deal Castle, which was built by Henry VIII, Deal Pier, and its gently sloping shingle beach.

1039. The main visitor attractions within the area potentially affected by the onshore works, include the Viking Ship, Pegwell Bay Country Park and the Royal St Georges and Prince's golf courses. The Viking Ship has recently undergone major restoration. Pegwell Bay Country Park covers 28 hectares and comprises the River Stour Estuary, Pegwell Bay and the Thanet cliffs. It offers facilities including toilets, parking and picnic areas.

Recreational activities

1040. A number of recreational activities occur along the Thanet and Dover coast including bathing, scuba diving, surfing and watersports.

1041. Bathing is a popular recreational activity along the Thanet and Dover coast in the summer months of May to September. It occurs in the many sandy bays along the coast, the closest location to the landfall being Ramsgate Western Undercliffs and Ramsgate Main Sands. Water quality at the Ramsgate Main Sands bathing beach has is rated excellent since for 2012-2015. The nearest bathing beaches to the Thanet Extension include Kingsgate Bay and Joss Bay.

1042. Surfing is a common activity all year round along the Thanet coastline, with Joss Bay proving particularly popular. Windsurfing occurs at Pegwell Bay, Margate Main Sands, Minnis Bay and West Brook. Water based crafts can be launched from a number of facilities along the Thanet and Dover coast, the closest to the landfall being:

- Ramsgate Harbour;
- Eastern Undercliff, Ramsgate - for powered watercraft e.g. Jet Ski, Jet Bikes, wet bikes; and
- Western Undercliff, Ramsgate - for Sail Craft and Fishing Boats.

1043. There are two scuba diving clubs in Thanet with approximately 80 members. Diving mainly occurs between May and September in good weather conditions but does not tend to occur within the marine cSAC due to water turbidity.

1044. Sea angling occurs within a ten mile radius around the coast throughout the year. Launch facilities are available at Ramsgate Harbour and Broadstairs Harbour, amongst others.

1045. Shore angling occurs at Broadstairs and Ramsgate Harbour (The North East Kent European Marine Sites Management Scheme, 2001).

1046. The main recreational activities at Pegwell Bay include bait digging at low tide and surfing at high tide (pers. comm., Kent Wildlife Trust local warden, 2005). Pegwell Bay also attracts visitors with a special interest in geology, because of its geologically important chalk cliffs. A number of fossil events are organised annually by the Thanet Coast Project.

1047. Bait digging is undertaken both for commercial and non-commercial reasons. Non-commercial bait digging mainly occurs between September and March, while commercial activity occurs all year round (The North East Kent European Marine Site

Management Scheme, 2001). Ragworms and lugworms are the main species of bait collected either with a fork or a hand held water suction pump.

1048. Other significant recreational activities in Pegwell Bay and Sandwich Bay include walking and dog walking along the coast.

1049. A number of people involved in coastal activities have jointly developed Codes of Conduct for the Thanet coast (see www.thanetcoast.org.uk, Thanet Coast Project, 2005). Codes of Conduct are available for the activities listed below and individuals and clubs are encouraged to support them Seashore;

- Bait Digging and Collecting;
- Dog Walking;
- Horse Riding;
- Powercraft Activities;
- School Field Trips;
- Shellfish Harvesting and Fixed Netting;
- Shore Angling; and
- Wind-Powered Activities.

Sailing

1050. Consideration of recreational sailing will be considered under the Shipping and Navigation assessment.

4.3.2 Potential Impacts

4.3.2.1 Potential impacts during construction

Offshore

1051. Offshore construction activities and associated Safety Zones may disrupt marine and coastal recreational activities. This would be temporary in nature. Marine users would be informed of Safety Zones, and these would be removed or reduced following completion of construction. The risk of collision due to the presence of structures and reduced navigable area as a result of the construction activity will be assessed in the EIA and is discussed in Section 2.9 Commercial Fisheries.

Onshore

1052. There is the potential for beach access to be affected during construction works at the landfall during the laying of the cable, however this would be temporary in nature, with access restored on completion of construction.

1053. During the installation of the onshore cable, potential noise, dust and visual disturbance impacts could arise, although these would be temporary in nature. Impacts from dust and noise are considered in Section 3.3 Air Quality and Section 3.10 Onshore Noise and Vibration, and visual impacts are considered in Section 3.9 Onshore Landscape and Visual Impact Assessment.

1054. Local businesses and tourism facilities may be temporarily disrupted through access route diversions as a result of construction work.

1055. Temporary diversions to PRoWs could discourage visitors. In addition, road visitors to the area may be affected by road closures required during construction.

4.3.2.2 Potential impacts during operation

Offshore

1056. The only main source of impact is associated with Safety Zones during maintenance. Impacts on recreational vessels are considered in Section 2.9 Commercial Fisheries.

Onshore

1057. Noise emissions from the substation have the potential to negatively affect local communities including tourists and recreational users. This is being considered in Section 3.9 Onshore Noise and Vibration.

4.3.2.3 Potential impacts during decommissioning

Offshore

1058. Impacts from decommissioning are anticipated to be similar to those identified for construction activities, decreasing in extent and timescale.

Onshore

1059. Reverting land and amenity to an improved condition**:** There is the potential for a positive impact as a result of reverting land to previous or improved condition, making the area more attractive to visitors.

4.3.2.4 Potential cumulative impacts

1060. For a cumulative impact to arise during construction, for example, impacts on beach users, recreational sea users and on tourism and recreational facilities, a development would have to happen at the same time and be within a similar area. Any potential cumulative impacts will be agreed in consultation with stakeholders and local authorities and therefore will be considered further in the EIA.

4.3.2.5 Summary of potential impacts

Table 4.2 Summary of impacts relating to tourism and recreation (scoped in (✓) and scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Offshore			
Visual impacts	✓	✓	✓
Disruption to marine and coastal recreational activities	✓	✓	✓
Restricted beach access	✓	×	✓
Onshore			
Disturbance including noise, dust and visual impact	✓	✓	✓
Noise at the substation	✓	✓	✓
Visual impacts from substation	✓	✓	✓
Disruption to local recreation and tourism provisions and businesses	✓	✓	✓
Loss of amenity land	×	×	×
Temporary/permanent closure of PRoWs	✓	×	✓
Cumulative impacts	✓	✓	✓

4.3.3 Mitigation

1061. Mitigation measures will be incorporated into the ES as appropriate. Embedded mitigation would ensure that major tourism and recreation facilities such as golf courses, caravan and camp sites, fishing lakes and other local attractions are avoided, where possible, by appropriate siting of the onshore electrical infrastructure.

1062. In addition to the projects embedded mitigation, the following measures may be incorporated in consultation with relevant parties and landowners:

- Adjusting the construction programme to minimise impacts where practicable;
- Siting discussions with landowners, occupiers and local communities during the site selection process.

4.3.4 Approach to assessment and data gathering

1063. The tourism and recreation assessment will include the following:

- A desk-based study to identify tourism and recreation provisions which may be affected by the proposed project, using maps and local sources.
- Consultation with land owners, occupiers and the local community; and
- An assessment of the impacts of the proposed project on recreation and tourist facilities and identification of appropriate mitigation.

- The approach to assessment and data gathering will be discussed and agreed with relevant bodies prior to commencement. Consultation will be undertaken at key stages throughout the EIA process.

4.4 Wider Scheme Inter-relationships

1064. Socio-economics and tourist and recreation are inter-related topics and the assessments will necessarily be cross-referenced.

4.5 Cumulative Impacts Summary

1065. This section collates the Scoping of cumulative impacts discussed in Sections 4.1 to 4.3 (summarised in Table 4.3).

1066. During the EIA, a screening process will be undertaken once the onshore areas for Thanet Extension are defined to identify other projects or activities that are likely to create a cumulative impact. This will be completed in consultation with key stakeholders through the EPP.

Table 4.3 Summary of wider scheme cumulative impacts (scoped in (✓) and scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Cumulative socio-economic impacts	✓	✓	✓
Cumulative tourism and recreation impacts	✓	✓	✓

5 PART 5: CONSULTATION

5.1 Overview

1067. Under the Planning Act 2008 (as amended) consultation relating to an NSIP must be undertaken with statutory or prescribed bodies (under Section 42 of the Act), with local communities (under Section 47) and more widely through the general notification of a proposed application (under Section 48). An Applicant must have regard to any relevant response received as a result of this statutory consultation when deciding on the application it will make to PINS (Section 49).

1068. Section 37 of the Act requires all applications for a DCO to be accompanied by a Consultation Report which gives details of compliance with the statutory requirements, any relevant responses received and the account taken of those responses. A Consultation Report will be provided along with the DCO application.

1069. Under Section 47 of the Act, a Statement of Community Consultation (SoCC) must be produced to describe how the applicant proposes to consult with the local community. The Applicant will publish the SoCC in Q2 2017 in advance of submission of the PEIR. The SoCC will take into account of non-statutory consultation described in this Section of the Scoping Report which will help to identify stakeholders and the appropriate approach to consultation. In advance of publishing the SoCC, informal consultation would be on going, as described below.

1070. Under Section 48 of the Act, the applicant is required to advertise formal consultation of the PEIR and proposal to submit a DCO application in relevant newspapers, including a national newspaper and local newspaper for at least two successive weeks, once in the London Gazette, once in Lloyds List and a fishing trade journal. Formal consultation commences on the date of the last advert and continues for at least 28 days. During this period, all interested parties have the opportunity to provide feedback to the Applicant to inform the proposed application to be submitted.

5.2 Statutory and Prescribed Bodies Consultation

1071. Early informal consultation with statutory and non-statutory stakeholders in relation to Thanet Extension began in early 2016, following Vattenfall's decision to progress with EIA site characterisation work in the absence of an AfL. The aim of these discussions being to gain feedback on the initial site design and likely key issues for EIA, to inform stakeholders of expected timescales and project constraints, and (where relevant) to seek advice on the appropriateness of survey strategies.

1072. The proposed project has been introduced and discussed with the following parties;

- Natural England;
- Historic England;
- Marine Management Organisation;
- Marine Coastguard Agency;
- Trinity House;
- Port of London Authority;
- RSPB;
- JNCC (high level only, following devolvement of remit to Natural England);
- Kent County Council;
- Thanet District Council (including Ramsgate Harbour);
- Dover District Council (initial contact only);
- Thanet Fishermen's Association;
- Kent & Essex Inshore Fisheries & Conservation Authority (IFCA);
- Sandwich Port & Haven Commissioners;
- Kent Wildlife Trust (initial contact only); and
- Local Parish Council's and community representatives.

1073. Feedback from early meetings with a number of these parties informed changes made to site design prior to Scoping. Feedback will continue during the EIA process.

1074. The Evidence Plan (EP) process for Thanet Extension has commenced and will seek to agree the evidence required to be submitted to the Planning Inspectorate as part of the DCO Application. The EP process is primarily aimed at agreeing the evidence required to inform the Habitats Regulations Assessment (HRA), in accordance with PINs advice note 10. However, it is noted that much of the evidence required for the HRA is also required to inform the EIA and therefore the scope of the EP process of Thanet Extension has been expanded to include relevant EIA topics.

1075. The aim of the process is to seek consensus between all parties on the amount and range of evidence required to be collected and in addition address and agree the key issues early in the application process.

1076. The EP includes a consultation log for tracking all consultation undertaken, a separate log will be drafted for each participant in the process and will be used to inform Statements of Common Ground. In addition, a Logistics Plan has also been developed which outlines anticipated dates for meetings as part of the EP process, the Logistics Plan is aimed at helping participants plan their resources.

1077. The EP Process will be overseen by a Steering Group who will be responsible for ensuring that progress is being made and that the process is being conducted efficiently and according to the project timescales. The Steering Group is expected to consist of the following organisations:

- The Applicant
- The Planning Inspectorate
- Natural England
- The Marine Management Organisation
- Thanet District Council
- Kent County Council
- Dover County Council
- Historic England

1078. The EP process commenced in October 2016 and will continue until the application submission. Meeting and workshops have been scheduled to coincide with strategic project milestones such as receipt of scoping responses, pre and post PEIR and pre submission. This schedule ensures that sufficient data are available to enable meaningful and effective discussions to take place. It is anticipated that Interim meetings on specific topics, for example Offshore Ornithology, are likely to be required.

1079. In addition to preparations for Scoping, Vattenfall is also preparing to formally introduce Thanet Extension to key local communities with a series of Public Information Days (PIDs) planned for early 2017. An initial meeting has been held with Parish Council and local community representatives. Further information on dates and venues for PIDs will be provided in the New Year.

5.3 Community Consultation

1080. The Applicant is committed to liaising with communities local to the project and would use a range of methods to disseminate information and seek feedback.

1081. Public Information Days will be held at specific intervals during the EIA process to allow ongoing engagement with the public. Further to the PIDs, members of the public will be given the opportunity to join a mailing list to receive updates on the project. In addition, information will be circulated through media advertising, posters, social media and regular updates to the project website:

http://XX.Vattenfall.co.uk

1082. In addition to the above, a dedicate Local Liaison Officer will be on hand throughout the development of Thanet Extension to provide information to and respond to queries from local communities.

1083. Consultation will also be ongoing with Kent County Council, relevant District Councils ,Parish Councils and other community groups.

6 PART 6: SUMMARY AND CONCLUSIONS

1084. The tables in this section of the report provide an overview of the potential impacts which are proposed to be scoped in (considered further) or scoped out (not considered further) in the EIA for the Thanet Extension.

Table 6.1 Summary of potential offshore environment impacts

	Construction	Operation	Decommissioning
Marine Geology, Oceanography and Physical Processes			
Effects to hydrodynamic regime (waves and tidal currents)	×	✓	✓
Effects on sediments and sedimentary structures	✓	✓	✓
Effects on suspended sediment concentrations and transport	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	×	×	×
Marine Water and Sediment Quality			
Deterioration in water quality due to re-suspension of sediments	✓	×	✓
Release of contaminated sediments	×	×	×
Accidental release of contaminants	×	×	×
Cumulative impacts	×	×	×
Transboundary impacts	×	×	×
Offshore Air Quality			
Impacts on offshore air quality	×	×	×
Benthic and Intertidal Ecology			
Physical disturbance	✓	✓	✓
Incr**eased suspended sediments**	✓	✓	✓
Smothering	✓	✓	✓
Re-mobilisation of contaminated sediments	×	×	×
Underwater noise and vibration	×	×	×
Loss of habitat	×	✓	✓
Colonisation of foundations	×	✓	×
Sites of Marine Conservation Interest	✓	✓	✓
EMF	×	×	×
Cumulative impacts	✓	✓	✓
Transboundary impacts	×	×	×

	Construction	Operation	Decommissioning
Fish and Shellfish Ecology			
Physical Disturbance	✓	✓	✓
Suspended sediments	✓	✓	✓
Changes to water quality	×	×	×
Loss of (or changes to) habitat	×	✓	×
Noise and vibration disturbance	✓	✓	✓
Fish aggregation	×	✓	×
EMF	×	×	×
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓
Marine Mammal Ecology			
Underwater noise	✓	×	✓
Impacts upon prey species	✓	×	✓
Vessel interactions	✓	✓	✓
Physical Barrier effects	×	×	×
EMF	×	×	×
Disturbance at haul out sites	✓	✓	✓
Changes to water quality	×	×	×
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓
Offshore Ornithology			
Disturbance and displacement	✓	✓	✓
Indirect impacts through effects on habitats and prey species within the proposed Wind Farm Area	✓	✓	✓
Indirect impacts through effects on habitats and prey species within the proposed Offshore Export Cable Corridor	✓	×	×
Collision risk	×	✓	×
Barrier effect	×	✓	×
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓
Commercial Fisheries			

	Construction	Operation	Decommissioning
Impacts on landings of commercially exploited species	✓	✓	✓
Loss of or restricted access to traditional fishing grounds	✓	✓	✓
Displacement of fishing activity	✓	✓	✓
Loss of or damage to fishing gear	✓	✓	✓
Increased collision risk (to be covered by NRA)	Included in shipping and navigation assessment.	Included in shipping and navigation assessment	Included in shipping and navigation assessment
Increased steaming times	✓	✓	✓
Impacts to ancillary services	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓
Shipping and Navigation			
Vessel Routeing	✓	✓	✓
Displacement of Third Party Activities	✓	✓	✓
Increased Collision Risk	✓	✓	✓
Allision Risk	✓	✓	✓
Interference with Marine Navigational Equipment	✓	✓	✓
Interaction with Subsea Cables	✓	✓	✓
Impacts on Emergency Response Resources	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓
Offshore Archaeology and Cultural Heritage			
Direct physical disturbance	✓	×	✓
Indirect physical disturbance	✓	×	✓
Indirect disturbance of setting (offshore)	✓	✓	✓
Indirect disturbance of setting (landfall)	✓	×	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓
Offshore seascape, landscape and visual impact			
Seascape, landscape and visual effects, and cumulative effects, of the TEOWF on seascape, landscape and visual receptors within 45km radius study area in Kent	✓	✓	✓
Seascape, landscape and visual, and cumulative effects,	×	×	×

	Construction	Operation	Decommissioning
of the TEOWF on seascape, landscape and visual receptors beyond 45 km radius study area			
Seascape, landscape and visual effects, and cumulative effects, of the TEOWF on seascape, landscape and visual receptors within 45 km in Essex	×	×	×
Aviation and Radar			
Impact on aviation radar systems	×	✓	×
Impact on military training area	×	×	×
Increased collision risk	✓	✓	✓
Impact on SAR	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	×	×	×
Infrastructure and Other Users			
Potential interference with other wind farms development	×	×	×
Potential interference with O&G operations	×	×	×
Physical impacts on subsea cables and pipelines	✓	×	✓
Impacts on aggregate dredging activities	×	×	×
Impacts on disposal sites	×	×	×
Initiation of UXO	×	×	×
Impacts on MoD activities	×	×	×
Cumulative impacts	×	×	×
Transboundary impacts	×	×	×

Table 6.2 Summary of potential onshore environment impacts

	Construction	Operation	Decommissioning
Ground Condition and Contamination			
Ground Conditions and Contamination	✓	×	✓
Human health (construction workers)	✓	×	✓
Human health (residents)	✓	×	✓
Designated geological sites	✓	×	✓
Cumulative impacts	✓	×	✓
Air Quality			
Increase in traffic based air quality pollutant concentrations – human receptor locations	✓	×	✓

	Construction	Operation	Decommissioning
Increase in traffic based air quality pollutant concentrations – ecological habitats	✓	×	✓
Construction dust impacts – human receptors	✓	×	✓
Construction dust impacts – ecological habitats	✓	×	✓
Cumulative impacts	✓	×	✓
Water Resources and Flood Risk			
Impacts on water resources	✓	x	✓ (Substation only)
Impacts on WFD surface water bodies	✓	x	✓ (Substation only)
Impacts on WFD groundwater bodies	✓	x	✓ (Substation only)
Flood risk	✓	✓ (Substation only)	✓ (Substation only)
Cumulative impacts	✓	✓ (Substation only)	✓ (Substation only)
Land Use			
Agricultural productivity	✓	×	✓
Drainage	✓	✓	✓
Disruption to farming practices	✓	✓	✓
Existing utilities	✓	×	✓
Public health and safety	✓	✓	✓
Permanent loss of land	✓	✓	✓
Closure/diversion of PRoWs/cycle paths	✓	×	✓
Soil heating	✓	✓	✓
Cumulative impacts	✓	✓	✓
Onshore ecology			
Impacts to statutory and non-statutory designated sites	✓	✓	✓
Permanent and temporary loss of habitats	✓	✓	✓
Temporary habitat fragmentation and species isolation	✓	✓	✓
Impacts upon protected species or upon their resting or breeding sites	✓	✓	✓
Spread of non-native, invasive species	✓	✓	✓
Cumulative impacts	✓	✓	✓

	Construction	Operation	Decommissioning
Onshore Ornithology			
Temporary and permanent loss of habitat suitable for nesting, roosting and foraging birds	✓	✓	✓
Noise, vibration and visual disturbance to birds	✓	✓	✓
Cumulative impacts	✓	✓	✓
Onshore Archaeology and Cultural Heritage			
Direct impacts upon buried archaeological remains	✓	×	×
Indirect impacts through the alteration of the settings of built heritage assets	✓	✓	✓
Indirect impacts through the alteration of the setting of the historic landscape	✓	✓	✓
Cumulative impacts	✓	✓	✓
Onshore Landscape and visual impacts			
Landscape and visual impacts of landfall (within 1km radius study area)	✓	×	×
Landscape and visual impacts of Onshore Cable Route Options (within 1km radius study area)	✓	×	×
Landscape and visual impacts of substation (within 5km radius study area)	✓	✓	✓
Cumulative impacts of landfall	×	×	×
Cumulative impacts of Onshore Cable Route Options	×	×	×
Cumulative impacts of onshore substation (within 5km radius study area)	✓	✓	✓
Onshore Noise and Vibration			
Noise affecting human and ecological receptors (offshore sources)	✓	×	✓
Noise affecting human and ecological receptors (onshore sources)	✓	✓	✓
Vibration affecting human and ecological receptors (onshore sources)	✓	×	✓
Cumulative impacts	✓	×	✓
Traffic and Transport			
Highway safety	✓	✓ (base port only)	✓
Driver delay	✓	✓ (base port only)	✓
Pedestrian amenity	✓	×	✓

	Construction	Operation	Decommissioning
Severance	✓	×	✓
Abnormal loads	✓	×	✓
Cumulative impacts	✓	×	✓
Health			
Noise disturbance	✓	✓	✓
Dust	✓	x	✓
Temporary loss of access to green space	✓	x	✓
Disruption to local road network	✓	x	✓
Increased local employment	✓	✓	✓
EMF (above buried onshore cables)	x	✓	x
Cumulative health impacts	✓	✓	✓

Table 6.3 Summary of potential impacts on wider scheme aspects

	Construction	Operation	Decommissioning
Socioeconomics			
All socio-economic impacts	✓	✓	✓
Cumulative socio-economic impacts	✓	✓	✓
Tourism and Recreation			
Coastal and marine - visual impacts	✓	✓	✓
Coastal and marine - disruption to marine and coastal recreational activities	✓	✓	✓
Coastal and marine - restricted beach access	✓	×	✓
Onshore - disturbance including noise, dust and visual impact	✓	✓	✓
Noise at the substation and cable relay station	✓	✓	✓
Visual impacts from substation and cable relay station	✓	✓	✓
Disruption to local recreation and tourism provisions and businesses	✓	✓	✓
Loss of amenity land	×	×	×
Temporary/permanent closure of PRoWs	✓	×	✓
Reverting land and amenity to an improved condition			
Cumulative tourism and recreation impacts	✓	✓	✓

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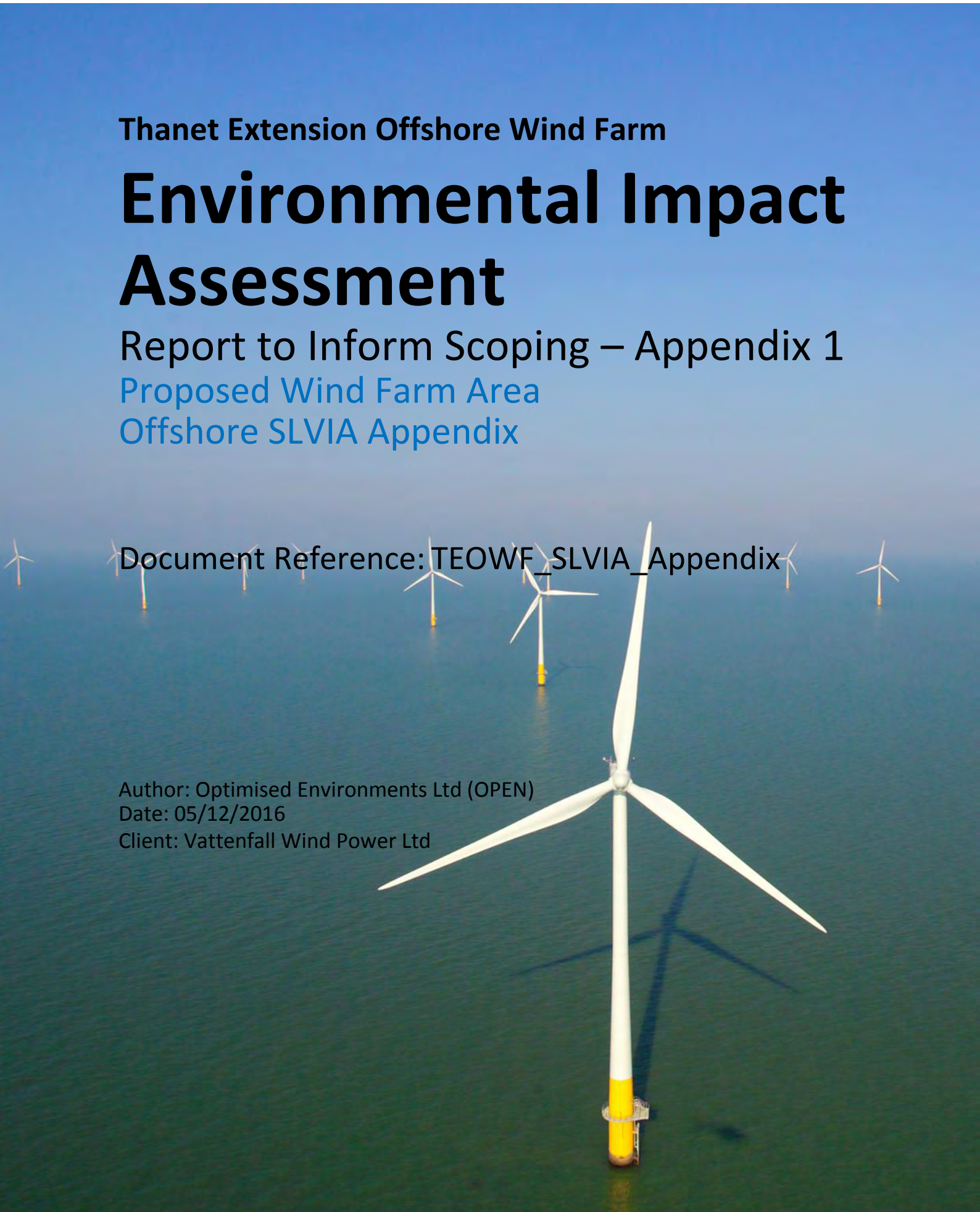

Thanet Extension Offshore Wind Farm

Environmental Impact Assessment

Report to Inform Scoping – Appendix 1

Proposed Wind Farm Area Offshore SLVIA Appendix

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Author: Optimised Environments Ltd (OPEN)
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1.1 Seascape, Landscape and Visual

1. A Seascape, Landscape and Visual Impact Assessment (SLVIA) will be undertaken as part of the EIA in order to identify the likely significant effects of Thanet Extension on seascape, landscape and visual amenity. This Appendix provides an initial overview of the baseline seascape, landscape and visual environment; the potentially significant effects of Thanet Extension to this baseline; the methods proposed to predict these impacts; and an outline of the primary mitigation proposed to avoid, reduce or offset seascape, landscape and visual effects. This appendix addresses the proposed wind farm area of Thanet Extension, consisting the area proposed for the offshore wind farm itself, comprising wind turbine generators, inter-array cables and offshore substation infrastructure (if required). Section 2.12 of the Scoping Report summarises this Appendix. Section 3.9 of the Scoping Report addresses the onshore area of interest associated with Thanet Extension.

1.1.1 Baseline

1.1.1.1 Study Area for SLVIA

2. The proposed study area for the SLVIA of Thanet Extension will cover a radius of 45 km from the proposed wind farm area of Thanet Extension, as illustrated in the Blade Tip Zone of Theoretical Visibility (ZTV) in Figure A1. The ZTV indicates areas from where Thanet Extension is theoretically visible and helps to inform the selection of the study area in which seascape, landscape and visual impacts will be considered in more detail. The 45 km study area is considered to be the outer limit of the area within which likely significant effects could potentially occur, given the height of the turbines that are being considered for Thanet Extension (up to 210 m to blade tip); the landscape context within which they would be located and in accordance with current best practice and guidance.

3. Within this 45 km study area, the SLVIA will focus primarily on the assessment of seascape, landscape and visual effects within Kent, its coastline and adjacent seascape, as shown in Figure A2. Assessment of seascape, landscape and visual effects on receptors within Essex and its coastline are proposed to be scoped out of the SLVIA due to their distance (over 43 km) and the limited visibility/discernibility of Thanet Extension at this distance offshore.

4. Potential cumulative effect interactions with other offshore wind farms have also influenced the study area for the SLVIA. Offshore wind farms with which Thanet Extension may have significant cumulative effects and which are likely to affect decision making are shown in Figure A3. The study area includes a number of

existing offshore wind farms including Thanet Offshore Wind Farm (TOWF) (operational); London Array I (operational); Gunfleet Sands I & II and demonstration (operational); Greater Gabbard (operational); Galloper (consented); Kentish Flats (operational) and Kentish Flats Extension (under construction). Of these, the existing Thanet, Kentish Flats and London Array wind farms will be most pertinent to the SLVIA for Thanet Extension.

1.1.1.2 Seascape Character

5. In England, Seascape Character principally applies to coastal and marine areas seaward of the low water mark. Seascape, like landscape is about the relationship between people and place and the part it plays in forming the setting to our everyday lives. Seascape results from the way that the different components of the environment – both natural and cultural - interact together and are understood and experienced by people. Seascape is defined by Natural England in its position statement on All Landscapes Matter (2010) as: *"An area of sea, coastline and land, as perceived by people, whose character results from the actions and interactions of land with sea, by natural and/or human factors".* A summary of what constitutes seascape is presented in 'An Approach to Seascape Character Assessment' (Natural England 2012).

6. Published Seascape Character Assessments within the SLVIA study area for Thanet Extension are shown in Figure A4. Currently, there are no published seascape character assessments covering the majority of Thanet Extension site or the North Kent Coastline and Outer Thames Estuary within the study area. Natural England have advised that a Seascape Character Assessment covering this geographic area of the Outer Thames Estuary and North Kent coastline is currently being prepared and if published during the SLVIA programme, this Seascape Character Assessment will inform the baseline seascape characterisation in the SLVIA for Thanet Extension. If it is not published, a Seascape Character Assessment will be undertaken as part of the SLVIA according to best practice (Natural England, 2012).

7. The Seascape Character Assessment for the Dover Strait (July, 2015) provides a published baseline seascape character assessment for the area between Folkestone and North Foreland (Figure A4), extending from the southern edges of Thanet Extension site south to the Strait of Dover. Thanet Extension site is located on the northern edge of the *Dover Strait Channel (North) (01A)* offshore seascape character area (SCA). This is summarised as the deep water shipping channel extending from the distinctive chalk headland of North Foreland to the White Cliffs of Dover. Thanet Extension site is also located 5.0 km from the active inshore waters of the *Broadstairs Knolls & Ramsgate Road (I2A)* inshore SCA, which runs parallel to the chalk cliffs coastline that characterises the coast between Ramsgate and North

Foreland. Thanet Extension site is also located 8.7 km from the *Broadstairs to North Foreland (C1E)* SCA, which covers the east facing chalk cliffs of the Thanet Coast, part of the longest continuous stretch of coastal chalk in the UK. The high cliffs afford long views across the North Sea and entrance to the Dover Strait, with ships, tankers and TOWF forming visible features on the horizon.

8. The SLVIA will prepare a baseline description of relevant SCAs within the study area and will focus on assessing the likely significant effects of Thanet Extension on the following seascape character areas (Figure A4) which are considered most susceptible to changes as a result of Thanet Extension:

- Offshore SCAs:
    - Dover Strait Channel (North) (01A)
- Inshore SCAs:
    - Sandwich & Pegwell Bays (I1A)
    - Broadstairs Knolls & Ramsgate Road (I2A)
    - Goodwin Sands, Gull Stream and North Sand Head (I3A)
- Coastal SCAs:
    - Broadstairs to North Foreland (C1E)
    - Ramsgate Harbour (C3C)
    - Sandwick & Pegwell Bays (C5A) Tidal Estuary and Flats
    - Deal Seafront & Deal Bank (C4B)
    - Kingsdown Chalk Cliffs (C1A)

9. The Seascape Character Assessment due to be published for the North Kent Coastline and Outer Thames Estuary will be reviewed as part of the SLVIA and the likely significant effects will be assessed on the seascape character areas defined within this report that are most susceptible to changes resulting from Thanet Extension.

1.1.1.3 Landscape Character

10. Landscape Character principally applies to terrestrial areas lying to the landward side of the high water mark. There is a hierarchy of published Landscape Character Assessments that describe the baseline landscape character of the Kent section of the study area, at the National, County and District level.

11. The English Landscape is classified at the national level by National Character Areas (NCAs). The 159 NCAs, which cover the country, were originally identified by the Countryside Agency. This mapping and the associated descriptions have been

revised and developed by Natural England into National Character Area profiles which provide a recognised, national, spatial framework.

12. At the National level, the northern part of the Kent section of the study area is characterised by the *North Kent Plain National Character Area* (NCA, 113) and the southern part of the study area by the *North Downs NCA* (119) (Figure A5). The North Kent Plain NCA is located 8.3 km from Thanet Extension site, located between the Thames Estuary and the chalk of the Kent Downs to the south. A detailed description can be found in the NCA profile (Natural England, http://publications.naturalengland.org.uk/category/587130). The North Kent Plain NCA is an open, low and gently undulating productive agricultural area, characterised by arable use, significant areas of ancient woodland and characteristic shelterbelts. The NCA meets the sea between Whitstable and Deal, where there is a diversity of coastal habitats, including chalk cliffs around Thanet; soft cliffs between Herne Bay and areas of intertidal sand and mud, salt marshes, sand dunes, shingle beaches, brackish lagoons and maritime grasslands. The area has a strong urban influence, with several built-up areas, including coastal towns such as Whitstable, Herne Bay and the towns of Margate, Broadstairs and Ramsgate around the Thanet coastline. Development pressures (and the associated infrastructure) are likely to present significant challenges as the area responds to an increasing population and the demands of economic development and a changing climate. Offshore wind farms are visible from the coastline, particularly TOWF, Kentish Flats and London Array.

13. Local Authorities across England have produced Landscape Character Assessments (LCAs) for their areas which subdivide the broader NCAs into more detailed Landscape Character Areas (LCA). For a site specific proposal, a district level landscape assessment would typically be referred to for the baseline description of landscape character. The relevant LCAs in Kent include the following:

- Dover District Landscape Character Assessment (Dover District Council, 2006).
- Swale Landscape Character and Biodiversity Appraisal (Swale District Council, 2011).
- Canterbury Landscape Character and Biodiversity Appraisal (Canterbury District Council, 2012).
- Kent Downs AONB Landscape Design Handbook: Landscape Character Area Design Guidance (1995).

14. Thanet District Council area does not currently have a published landscape character assessment (Figure A6), however this is currently under production and is due to be published in November 2016. The character of the wider parts of the study area are described at the local district level, primarily within the Dover District Landscape Character Assessment (Dover District Council, 2006) and the Canterbury Landscape

Character and Biodiversity Appraisal (Swale District Council, 2012), as shown in Figure A6. These district level LCAs will be referred to, together with the landscape baseline provided by the Thanet District LCA, when published, in defining the baseline conditions assessed during the SLVIA. If the Thanet District LCA is not available during the assessment stages of the SLVIA, then the countywide Landscape Assessment of Kent (Kent County Council, 2004) ('the Kent LCA') will inform the baseline for the Thanet area and Thanet Extension will be assessed in relation to the county level LCAs defined in this report.

15. At the County Level, the Kent LCA identifies landscape character areas (LCAs) across the county (Figure A5). The majority of the coastline around Thanet is defined by the urban areas of Margate, Broadstairs and Ramsgate. LCA boundaries start on the inland urban edge of these settlements, with the closest and most susceptible LCAs to the potential changes resulting from Thanet Extension being the *Thanet LCA* (12), covering the the Isle of Thanet (8.0 km from the site); and *The Wantsum and Lower Stour Marshes LCA* (15), covering the lower lying marshlands of the reclaimed Wantsum Channel (14.3 km from the site).

16. The Thanet LCA (12) forms a distinct landscape area defined by the former limits of the island that was cut off from the mainland by the Wantsum Channel; until it silted up around 1000 years ago. The island quality is preserved in the way that Thanet rises out of the marshes to a modest height of about 50 m. The landscape falls into two distinct types, based on the local landform - the flat plateau top (above 40 m) and the sloping backdrop to the marshes (between 20-40 m). The plateau top of the LCA provide long views, both to the 'island' and back from it over the Chislet Marshes. On the seaward side, Thanet is characterised by steep chalk cliffs and small sandy bays. Since the 1960's there has been a marked increase in the extent of urban land, notably in the coalescence of Ramsgate with both Broadstairs and Margate, which now form a large conurbation. Otherwise, the landscape of Thanet is primarily characterised by arable agricultural land, with the most distinctive aspect being its open nature and general lack of vegetation. The Thanet LCA (12) is described in the Kent LCA as having a high sensitivity, due to its strong sense of place, in part due to the island quality, accentuated by the dominant landform, long views and the historic characteristics associated with settlement and cultural use.

17. The SLVIA will prepare a baseline description of relevant LCAs within the study area and focus on assessing the likely significant effects of Thanet Extension on the following landscape character areas (Figure A5 and A6), which are considered most susceptible to changes as a result of Thanet Extension:

    - National Character Areas:

- North Kent Plain NCA (113)

- County-wide Landscape Character Areas (Kent LCA):
  - Thanet LCA (12)
  - The Wantsum and Lower Stour Marshes LCA (15)
- District Landscape Character Areas (Dover District LCA):
  - Sandwich Bay (6)
  - Lydden Valley (7)
- District Landscape Character Areas (Canterbury LCA):
  - Beltinge Coast (1)
  - Reculver Coastal Fringe (8)
- District Landscape Character Areas (Kent Downs AONB LCA):
  - South Foreland (13)

18. The Landscape Character Assessment due to be published for the Thanet District Council area will be reviewed as part of the SLVIA and the likely significant effects will be assessed on the landscape character areas defined within this report that are most susceptible to changes resulting from Thanet Extension.

19. Of most relevance to the SLVIA of Thanet Extension are the LCAs which extend along the north and east Kent coastline (Figure A5 and A6). Whilst the marine environment includes offshore wind farms as part of the existing character, Thanet Extension has the potential to bring higher turbines closer to the coastline, where their height will be seen against the locally elevated Isle of Thanet, thus potentially effecting perceptions of landscape character.

1.1.1.4 Landscape Designations

20. Thanet Extension is located outwith any areas subject to international, national or regional landscape designation intended to protect landscape quality, as shown in Figure A7.

21. A number of landscape designations occur in the wider landscape of the study area and include the nationally important Kent Downs Area of Outstanding Natural Beauty (AONB), which is located approximately 26.7 km from the site boundary of Thanet Extension (Figure A7). The special characteristics and qualities of the Kent Downs AONB are been identified in the AONB management plan as relating to the areas dramatic landform and views; bio-diversity rich habitats; farmed landscape woodland and trees; legacy of historic and cultural heritage; and its geology and natural resources.

22. Although it is unlikely that Thanet Extension would have significant effects on the character and special qualities of the Kent Downs AONB, owing to their distance from Thanet Extension and the relative scale of the likely changes resulting, the potential for indirect landscape effects on the Kent Downs AONB would be considered in the SLVIA to reflect the sensitivity of this landscape receptor. A landscape baseline of the Kent Downs AONB will be described, referring to the Kent Downs Landscape Design Handbook (containing character area design guidance) and the Kent Downs AONB Management Plan (Kent Downs AONB, 2014). The SLVIA will then assess the effects of Thanet Extension on the special characteristics and qualities of the AONB.

23. Both the South Foreland and Dover-Folkestone Heritage Coasts lie within the study area. The South Foreland Heritage Coast is 26.1 km at its closest point. It is primarily orientated towards the south east with the existing TOWF and the extension site located peripherally to it to the north and at long distance. The Dover-Folkestone Heritage Coast is 37 km at its closest point and is primarily orientated towards the south with Thanet Extension located beyond the protrusion of the coastline at St Margaret's at Cliffe to the north at long distance. Whilst the ZTV indicates theoretical visibility from the northern parts of the South Foreland Heritage Coast and from extremely limited areas within the Dover-Folkestone Heritage Coast, it is considered unlikely that Thanet Extension would result in significant effects on the landscape character of these areas.

24. There are several Registered Parks and Gardens (RPG) in the study area (Figure A7), the closest of which to Thanet Extension is Albion Place Gardens, Ramsgate (13.3 km). Further RPGs are located further south along the coast, including The Salutation (Sandwich), and Northbourne Court and Walmer Castle near Deal; and further inland at Waldershare Park and Goodnestone Park. The SLVIA will prepare a baseline description of the relevant RPGs and assess the potential impacts of Thanet Extension on the character and quality of these designated landscapes.

25. There are a number of locally designated landscapes within the study area (Figure A7). Whilst the presence of locally designated landscapes provides an indicator of landscape value they are typically of lesser concern when judging the effects of offshore wind development. Of the locally designated landscapes within the study area the Sandwich Bay/Pegwell Bay Special Landscape Area (SLA) and The Undeveloped Coast (Herne Bay to Reculver) area are likely to be the most susceptible. This reflects their coastal location and the nature of views from within them, whereby Thanet Extension will be seen in the context of the coastline with the Isle of Thanet providing a clear scale comparison.

1.1.1.5 Visual Receptors and Views

Zone of Theoretical Visibility

26. Visual effects will occur when the introduction of Thanet Extension changes or influences the visual amenity and views experienced by people in the area. The visual baseline is defined by the Zone of Theoretical Visibility (ZTV) (Figure A1 and A2). The ZTV shows the main area in which the development will be visible, highlighting the different groups of people who may experience views of Thanet Extension and the viewpoints where they may be affected. The ZTV shown in Figure A8 is based on the scoping layout, consisting of 40 turbines with a 210m blade tip turbine, representing the maximum visibility scenario.

27. The scope of the visual assessment will be based on the ZTV for Thanet Extension, which assists with the identification of the principal visual receptors and viewpoints, as illustrated in Figure A8. The ZTV indicates that the closest areas of visibility of Thanet Extension will be from the coastal areas of the Isle of Thanet near North Foreland, where Thanet Extension will be visible approximately 8 km offshore from the coast at its closest point. There will be high visibility of Thanet Extension from the coastline around the Isle of Thanet, from the coastal conurbation of Ramsgate, Broadstairs and Margate and the small sandy bays and enclosing chalk cliffs which characterise this coastline, at distances of between 8km – 15 km.

28. The theoretical visibility of Thanet Extension extends inland from these conurbations to the plateau area of Thanet, where there will be long views from the flat plateau top to Thanet Extension across intervening urban areas, the wind turbines likely to be visible as a backdrop, at long distances of between 10 km – 20 km. There is an area with no visibility or limited visibility shown on the ZTV (Figure A8) around the Chislet and Minster Marshes, along the former Wantsum Channel, where the sloping backdrop up to the Isle of Thanet will restrict views of Thanet Extension.

29. Wider visibility of Thanet Extension will be afforded from coastal areas to the south of Pegwell Bay, at distances of approximately 17km – 30 km between Sandwich Bay and South Foreland. At South Foreland, the headland at St Margeret's at Cliffe will screen visibility from areas further south and west along the Dover coastline, as is evident in the ZTV.

30. The theoretical visibility of Thanet Extension will also extend across inland areas of Kent, becoming more fragmented by either landform, vegetation or other settlement, restricted to areas of localised higher ground at distances between 25 km – 35 km, where intervening topography allows open aspects towards the coast. Beyond 35 km, theoretical visibility is much more restricted as successive layers of landform combine to create an effective visual barrier, limiting visibility to scattered area which are less frequent across the wider area.

31. The principal visual receptors which are of likely to be most susceptible to visual effects arising from Thanet Extension are shown in Figure A8. The principal visual receptors in the study area include people within settlements, driving on roads, passengers on main rail routes, visitors to tourist facilities or historic environment assets, and people engaged in recreational activity such as on walking and cycle routes.

Settlements

32. Local residents are considered to generally have a higher sensitivity to change in their environment, with views from their own homes judged to be the most sensitive, particularly where these are orientated to an open seaward horizon. The principal settlement receptor is the coastal conurbation formed by the contiguous area of settlement between Ramsgate, Broadstairs, Margate and Birchington-on-Sea around the coastal edge of Thanet at distances of 8 – 17 km from Thanet Extension. The other principal settlement receptors are located along the east Kent coast at longer distances of 20 – 30 km at Sandwich, Deal, Kingsdown and St Margeret's at Cliffe. Other settlement receptors such as Herne Bay and Whitstable are located on the north Kent coast at 25 – 35 km.

33. The city of Canterbury is located inland at a distance of 36 km from Thanet Extension. There are numerous small villages scattered throughout the inland parts of Kent, which have theoretical visibility, but at long distances generally over 25 km. Dover and Folkestone are located on the south Kent coast but are outwith the ZTV and have no visibility of Thanet Extension.

34. The SLVIA will undertake an initial baseline assessment of all settlement receptors within the study area in order to identify those that may experience significant effects as a result of Thanet Extension. A detailed assessment will be undertaken for settlement receptors that are most susceptible to changes that may experience significant visual effects and is likely to focus on the effects of Thanet Extension on views from the settlements of Ramsgate, Broadstairs, Margate, Birchington-on-Sea, Sandwich, Deal/Kingsdown and St Margeret's at Cliffe.

Key Routes

35. The study area includes a number of strategic coastal routes which serve local communities as well as providing important commuter and freight routes to/from Europe. These routes typically provide intermittent seaward views (often oblique) where offshore wind farms are present. This medium to lower sensitivity receptor group includes motorists who are both residents and those who come to travel to or

through the area. The principal main road routes within the study area are shown in Figure A8 and include:

- A2 - between Faversham and Dover.
- A28 - between Ashford-Canterbury and Margate.
- A256 - between Ramsgate and Dover.
- A257 - between Canterbury and Sandwich.
- A299 - between the M2 and Ramsgate.

36. The B2051, B2052 and B2054 follow the coast through Margate, Broadstairs and Ramsgate respectively. There are main rail routes along the north Kent coast between Faversham-Whitstable-Herne Bay-Margate-Broadstairs-Ramsgate; along the south Kent coast between Dover-Deal-Sandwich-Minster; and inland across Kent between Ashford-Canterbury-Ramsgate.

37. The SLVIA will undertake an initial baseline assessment of all road and rail route receptors within the study area in order to identify those that may experience significant effects as a result of Thanet Extension. A detailed assessment will be undertaken for road and rail route receptors that are most susceptible to changes that may experience significant visual effects and is likely to focus on the effects of Thanet Extension on views from the A28, A256 and A299, the 'B' roads around the coast and the rail route along the south Kent coast between Deal-Sandwich-Minster-Ramsgate.

National Trails and Rights of Way

38. The study area includes a number of long distance walking routes and national trails, including stretches which form part of the England Coastal Path (refer to Figure A8). Users of coastal footpaths are considered likely to have a higher susceptibility to Thanet Extension, particularly where there are panoramic views of the coast. The key walking routes are the Thanet Coastal Path; Kent Coastline Walk; Saxon Shore Way; Wantsum Walk; Viking Coastal Trail; Stour Valley Walk; White Cliffs County Trail; Elham Valley Way; North Downs Way; and the Royal Military Canal Walk.

39. The SLVIA will undertake an initial baseline assessment of all recreational routes receptors within the study area in order to identify those that may experience significant effects as a result of Thanet Extension. A detailed assessment will be undertaken for recreational route receptors that are most susceptible to changes that may experience significant visual effects and is likely to focus on the effects of Thanet Extension on views from the Thanet Coastal Path, the Wantsum Walk and the White Cliffs County Trail.

Visitor Attractions

40. The study area offers a variety of visitor attractions and facilities, ranging from the beaches and bays around the Kent coast, offering opportunities for walking, cycling and watersports; traditional seaside resort towns and seaside attractions on the Isle of Thanet coast; Margate's Turner Contemporary art gallery; and historic environment attractions. The SLVIA will undertake a baseline assessment of all visitor attractions within the study area in order to identify those that may experience significant effects as a result of Thanet Extension. A detailed assessment will be undertaken for the visitor attractions that are most susceptible to changes that may experience significant visual effects and is likely to focus on the effects of Thanet Extension on views experienced by people visiting attractions and the beaches/bays around the Thanet coast between Margate and Ramsgate; Reculver; Richborough Castle; Sandwich Bay and Deal.

Viewpoints

41. Informal consultations with Thanet District Council, Dover District Council, Kent County Council, Natural England and Historic England have been ongoing and the agreement of viewpoint locations for use in the SLVIA has been reached following consideration of their combined feedback.

42. Representative viewpoints proposed for the visual assessment are therefore identified in Table A.1 and mapped in Figure A8, with consideration given to consultee feedback, the potential landscape and visual receptors that are described above and the ZTV for Thanet Extension. Viewpoints are located around the Isle of Thanet coastline in order to allow assessment of the effects of Thanet Extension on views experienced by residents within the communities of Birchington-on-Sea, Margate, Broadstairs and Ramsgate, together with people visiting attractions in these seaside towns and the distinct bays around the headland of Thanet (such as Epple Bay, Walpole Bay, Palm Bay, Botany Bay, Kingsgate Bay and Joss Bay). Further viewpoint are also included along the east Kent coast at Richborough Castle, Sandwich Bay, Deal and St Margeret's at Cliffe; and along the north Kent coast at Reculver. The viewpoints to be included in the SLVIA are listed in Table A.1 as follows.

Table A.1 Viewpoints included in the SLVIA

	Viewpoint	Easting	Northing	Distance from Thanet Extension
1	Reculver Country Park, Thanet Coastal Path	622757	169375	23.85
2	West Brook POS (Margate)/Thanet Coastal Path	633261	170622	13.65
3	Margate Harbour Wall (Turner Arts Gallery)	635280	171245	11.58
4	Kingsgate/North Foreland, Coastal Path	639548	170626	8.56

5	Broadstairs Promenade	639755	167632	10.51
6	Wellington Crescent, Ramsgate	638603	164867	13.27
7	Deal Pier/Promenade	637840	152694	21.04
8	Kings Avenue/Princes Drive, Sandwich Bay Estate	636323	157795	19.86
9	Richborough Castle	632348	160134	22.74
10	St. Margaret's at Cliffe (Coastguard Memorial)	637339	145209	29.43
11	Joss Bay/North Foreland	639849	170119	8.70
12	Stone Bay	639904	168540	9.77
13	"Foreness Point/Palm Bay	638475	171579	8.72
14	Walpole Bay (Margate)	635909	171376	10.97
15	Birchington-on-Sea	629752	170022	17.08

43. Viewpoint photography has been undertaken during summer 2016 for the majority of these viewpoints (with the exception of inland viewpoints to be identified by Thanet DC/Dover DC/Historic England). Initial visualisations from six viewpoints (Viewpoints 2, 4, 5, 6, 8 and 10) are presented in Figures A9-A14 showing the baseline panorama and wireframe view of the proposed wind farm area of Thanet Extension. These initial visualisations are provided in order to allow consideration of the potential visual impacts of Thanet Extension and facilitate feedback from stakeholders on the landscape and visual siting and design aspects of Thanet Extension at an early stage.

1.1.2 Potential Impacts

1.1.2.1 Potential impacts during construction

44. The seascape, landscape and visual effects that could arise as a result of Thanet Extension during construction are identified as follows:

- **Temporary effects on coastal/seascape character**, within identified seascape character areas primarily as a result of wind turbine installation during construction, either as result of physical effects within the seascape character area, or the visual/perceptual characteristics of seascape character areas.
- **Temporary effects on landscape character**, within terrestrial landscape character areas and landscape designations, primarily as a result of visibility of wind turbine installation during construction. In the context of Thanet Extension, only the visual/perceptual characteristics of onshore LCAs with seascape as a defining attribute are relevant when considering potential effects, given that

there will be no alteration to physical features as a result of offshore development.

- **Temporary visual effects on views**, primarily as a result of visibility of wind turbine installation and offshore export cable laying during construction, experienced by visual receptors (groups of people) with visibility of the proposed development, on specific views and on their visual amenity/experience of the landscape.

1.1.2.2 Potential impacts during operation

45. The seascape, landscape and visual effects that could arise as a result of Thanet Extension during operation are identified as follows:

- **Long-term effects on coastal/seascape character**, within identified seascape character areas, primarily as a result of offshore wind turbine operation, either effecting the pattern of elements that define the character or effecting the visual/perceptual characteristics of seascape character areas.
- **Long-term effects on landscape character**, within terrestrial landscape types and landscape designations, primarily as a result of visibility of the offshore wind turbines during operation. In the context of Thanet Extension, only the visual/perceptual characteristics of onshore LCAs with seascape as a defining attribute are relevant when considering potential effects, given that there will be no alteration to physical features as a result of offshore development.
- **Long-term visual effects on views**, primarily as a result of offshore wind turbine operation, experienced by visual receptors (groups of people) with visibility of the proposed development, on specific views and on their visual amenity/experience of the landscape. Visual effects on views at night-time as a result of navigational lighting and aviation lighting of offshore wind turbines.

1.1.2.3 Potential impacts during decommissioning

46. The effects of Thanet Extension during decommissioning will be similar to those identified during construction.

1.1.2.4 Potential cumulative impacts

47. The SLVIA for Thanet Extension will fully address the issue of cumulative impact, to assess the combined visual effects of Thanet Extension with other existing or reasonably foreseeable marine and coastal developments and activities, including offshore and onshore wind energy developments, within the study area. The cumulative SLVIA will include operational, consented and application stage wind farms, within the 45km radius study area (Figure A3). The study area includes a number of existing offshore wind farms including TOWF (operational); London Array

(operational); Gunfleet Sands I & II and demonstration (operational); Greater Gabbard (operational); Galloper (consented); Kentish Flats (operational) and Kentish Flats Extension (under construction).

48. The cumulative SLVIA will seek to focus detailed assessment on the cumulative effects of Thanet Extension with other offshore wind farms within a main 'influencing distance', primarily the TOWF, Kentish Flats and London Array offshore wind farms, which are located within 30 km of Thanet Extension and considered to be most pertinent to the potential cumulative effects.

49. There is foreseeable potential for the extent or magnitude of effects of the existing TOWF to be cumulatively increased by the simultaneous presence of Thanet Extension. The extent to which these cumulative effects may arise will depend primarily on the siting of Thanet Extension turbines and the height of the turbines.

50. The key impacts to be considered as part of the cumulative SLVIA are likely to be:

- Cumulative effect of Thanet Extension with the operational TOWF, as the closest offshore wind farm, to which Thanet Extension will directly relate and be viewed in combination.
- Extent to which Thanet Extension may either extend the ZTV or the scale of effects, when considered in combination with the operational TOWF and other offshore wind farms.
- Cumulative landscape and visual effects of Thanet Extension on the closest coastal areas of Thanet, particularly the conurbations of Margate-Broadstairs-Ramsgate and associated bays/headlands around the coast of Thanet, where Thanet Extension may result in turbines being closer to the coast than the operational turbines; and where differences in scale will be most noticeable from viewpoints along and close to the coast.
- Effects resulting from changes in the vertical scale experienced from all areas where turbines are presently visible, as a result of the increased height of Thanet Extension turbines creating contrasts in scale.
- Effects resulting from changes in the horizontal scale resulting from the increased lateral spread of development on the horizon in views and potential visual merging of existing offshore wind farms on the skyline.
- Extent to which the addition of Thanet Extension may increase the influence of wind farms as a characteristic element or create a character change to a 'windfarm seascape/landscape'.

1.1.2.5 Summary of potential impacts

Table A.2 Summary of impacts relating to landscape and visual impacts (scoped in (✓) and scoped out (×))

Potential impacts	Construction	Operation	Decommissioning
Seascape, landscape and visual effects, and cumulative effects, of Thanet Extension on seascape, landscape and visual receptors within 45km radius study area in Kent	✓	✓	✓
Seascape, landscape and visual, and cumulative effects, of Thanet Extension on seascape, landscape and visual receptors beyond 45 km radius study area	×	×	×
Seascape, landscape and visual effects, and cumulative effects, of Thanet Extension on seascape, landscape and visual receptors within 45 km in Essex	×	×	×

1.1.3 Mitigation

51. Options for mitigation of the identified potential effects which are predicted to arise from the development will be considered, iteratively alongside the assessment. Practical measures will be proposed and agreed to avoid, reduce or off-set these effects. The SLVIA will identify measures for avoiding or reducing the level of significance of potential effects. These measures will potentially include primary mitigation measures embedded into the design; and measures additional to these which would further reduce long term seascape and visual effects.

52. Potential embedded mitigation measures for effects on seascape and visual effects include the site selection for development, e.g. locating at distance from the coast and the realisation of design objectives for the development, achieved through alterations to layout and design.

53. The mitigation measures proposed for the development will be dependent upon the final design of the site and the potential effects as determined by the EIA studies. Mitigation options will be discussed with the relevant stakeholders for the SLVIA.

54. Mitigation measures will be prepared in line with the design statement for Thanet Extension, illustrating the primary concept setting out known constraints; and a design concept plan considering the impacts of alternative layouts.

1.1.4 Approach to assessment and data gathering

55. VWLP will be undertaking consultation with relevant consultees, including Thanet District Council, Kent County Council and Natural England, in order to define the scope of the SLVIA required for Thanet Extension.

56. The assessment would be undertaken in accordance with the methods outlined in the following best practice guidance documents.

- The Landscape Institute with the Institute of Environmental Management and Assessment (2013). Guidelines for the Assessment of Landscape and Visual Impacts. Third Edition;
- Landscape and Seascape Character Assessments published by Natural England and the Department for Environment, Food and Rural Affairs (2014);
- An Approach to Landscape Character Assessment (2014). Natural England;
- Scottish Natural Heritage (2012). Assessing the Cumulative Impact of Onshore Wind Energy Developments;
- Scottish Natural Heritage (December 2014). Visual Representation of Wind Farms: Version 2.1;
- The Landscape Institute (2011). Landscape Institute Advice Note 01/11, Photography and photomontage in landscape and visual impact assessment.

57. Data would be gathered from official, reliable and the most up-to-date sources. This would include Ordnance Survey map based data, as well as data on landscape characterisation, landscape designations and other Governmental and local authority data of relevance.

1.1.4.1 Methodology

58. This section provides a summary of the methodology that would be used to carry out the SLVIA to form a chapter in the ES. The full methodology would be agreed through further consultations with Thanet District Council, Kent County Council and Natural England. This methodology reflects the 'Guidelines for the Assessment of Landscape and Visual Impacts: Third Edition'.

59. The objective of the assessment of the proposed development is to predict the significant effects on the landscape and visual resource. In accordance with the Environmental Impact Assessment Regulations 2011, the LVIA effects are assessed to be either significant or not significant.

60. The significance of effects is assessed through a combination of two considerations – the sensitivity of the landscape or visual receptor and the magnitude of change that will result from the proposed development. In accordance with the Landscape Institute's GLVIA3, the LVIA author's methodology requires the application of professional judgement, but generally, the higher the sensitivity and the higher the magnitude of change the more likely a significant effect will be.

61. The objective of the cumulative SLVIA is to describe, visually represent and assess the ways in which the proposed development will have additional effects when

considered together with other existing, consented or application stage developments and to identify related significant cumulative effects arising from the proposed development. The guiding principle in preparing the cumulative SLVIA is to focus on the likely significant effects and in particular those which are likely to influence the outcome of the consenting process.

62. The LVIA will determine whether effects are beneficial, neutral or adverse in accordance with defined criteria.

63. The effects of the proposed development are of variable duration, and are assessed as short-term or long-term, and permanent or temporary/reversible.

REFERENCES

Canterbury District Council (2012). Canterbury Landscape Character and Biodiversity Appraisal

Dover District Council (2006). Dover District Landscape Character Assessment

Kent County Council (2004). The Landscape Assessment of Kent

Kent County Council (2015). Seascape Character Assessment for the Dover Strait

Kent Downs AONB (1995) Landscape Design Handbook: Landscape Character Area Design Guidance

Landscape Institute (2011). Landscape Institute Advice Note 01/11, Photography and photomontage in landscape and visual impact assessment

Landscape Institute with the Institute of Environmental Management and Assessment (2013). Guidelines for the Assessment of Landscape and Visual Impacts. Third Edition

Natural England (2010). Position Statement - All Landscapes Matter

Natural England (2012). An Approach to Landscape Character Assessment

Natural England (2012). National Character Area Profiles

Natural England (2014). An Approach to Landscape Character Assessment

Scottish Natural Heritage (2012). Assessing the Cumulative Impact of Onshore Wind Energy Developments

Scottish Natural Heritage (December 2014). Visual Representation of Wind Farms: Version 2.1

Scottish Natural Heritage (May 2014). Siting and Designing Wind Farms in the Landscape.

Swale District Council (2011). Swale Landscape Character and Biodiversity Appraisal

Thanet Extension Offshore Wind Farm

Environmental Impact Assessment

Scoping Report – Appendix 2

Proposed Wind Farm Area

Offshore SLVIA Appendix 2 Visualisations

Document Reference: TEOWF_SLVIA_Appendix 2

Author: Optimised Environments Ltd (OPEN)
Date: 05/12/2016
Client: Vattenfall Wind Power Ltd

360000 380000 400000 420000 440000 460000

5740000 5720000 5700000 5680000 5660000

N

Thanet Extension Offshore Wind Farm

- Proposed Turbine Location
- Proposed Wind Farm Area
- 5km Radii
- 45km Study Area

Thanet Offshore Wind Farm - Operational

- Turbine Location
- Wind Farm Area

Thanet Extension Blade Tip ZTV
No. of Blade Tips Visible

- 0
- 0 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- Kent Downs AONB [1]

[1] Contains, or is based on, information supplied by Natural England, 2016

Blade Tip:	210m	Observer height:	2m
DTM:	OS T50	Surface features:	Excluded
DTM resolution:	50m	Earth curvature:	Included

Project: Thanet Extension Offshore Wind Farm

Report: Environmental Impact Assessment Scoping Report

Title: SLVIA Study Area ZTV (45km)

Figure: A1 | Drawing No: PB5894-SCO-2-31

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	01/12/16	TH	SM	A3	1:400,000

Co-ordinate system: ETRS 1989 UTM Zone 31N **EPSG:** 25831

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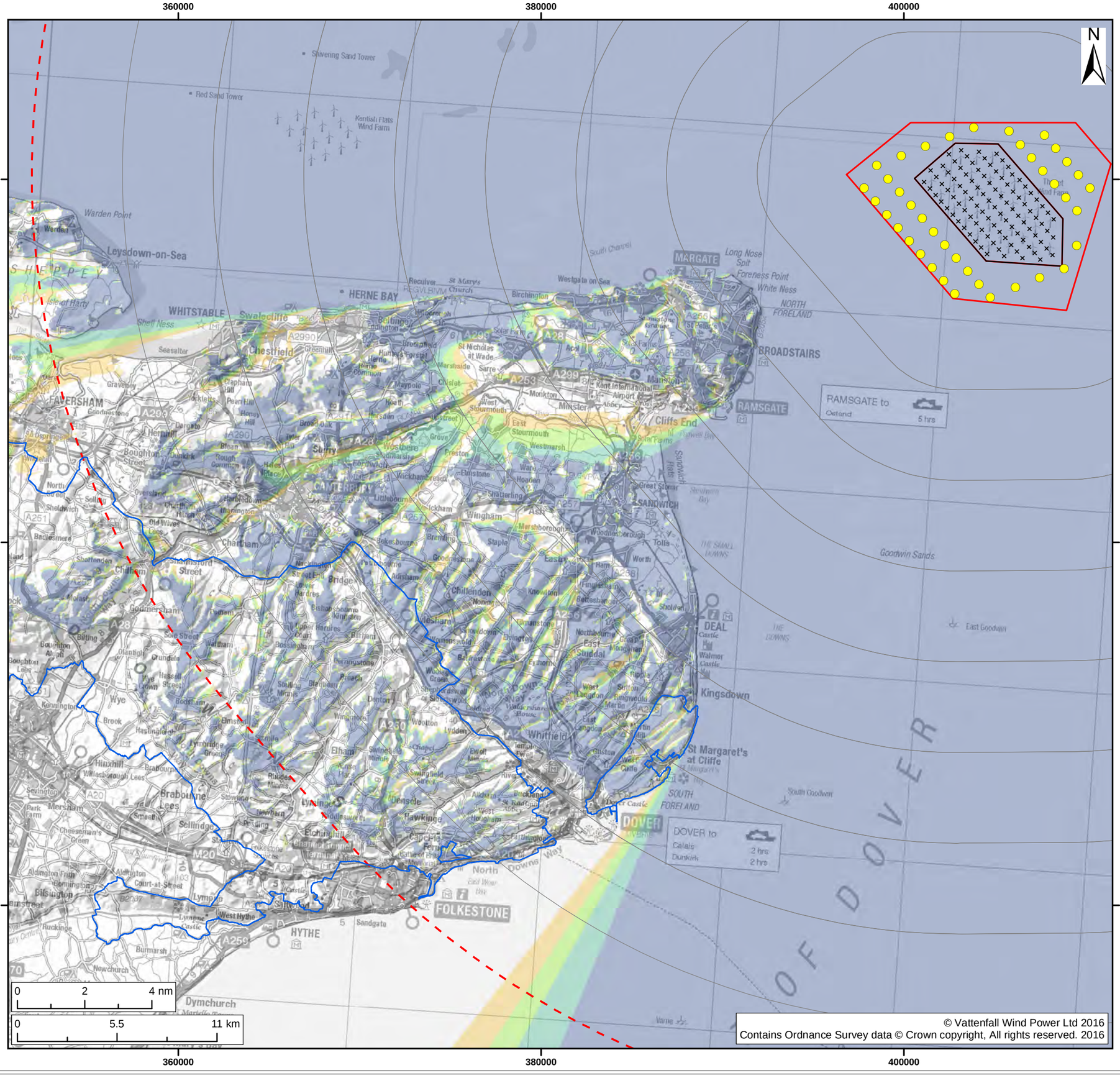
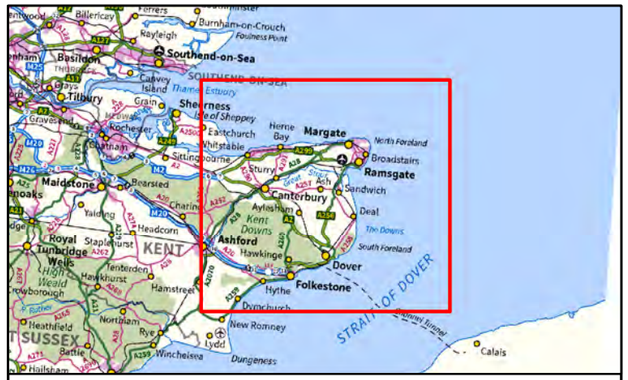
0 4 8 nm

0 10 20 km





Thanet Extension Offshore Wind Farm

- Proposed Turbine Location
- Proposed Wind Farm Area
- 5km Radii
- 45km Study Area

Thanet Offshore Wind Farm - Operational

- × Turbine Location
- Wind Farm Area

Thanet Extension Blade Tip ZTV
No. of Blade Tips Visible

- 0
- 10 - 20
- 30 - 40
- 0 - 10
- 20 - 30
- Kent Downs AONB [1]

[1] Contains, or is based on, information supplied by Natural England, 2016

Blade Tip:	210m	Observer height:	2m
DTM:	OS T50	Surface features:	Excluded
DTM resolution:	50m	Earth curvature:	Included

Project: Thanet Extension Offshore Wind Farm

Report: Environmental Impact Assessment Scoping Report

Title: SLVIA Study Area ZTV (Kent Coast)

Figure: A2 | Drawing No: PB5894-SCO-2-32

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	01/12/16	TH	SM	A3	1:210,000

Co-ordinate system: ETRS 1989 UTM Zone 31N **EPSG:** 25831

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360000 380000 400000 420000 440000 460000

5740000 5720000 5700000 5680000 5660000

N

Greater Gabbard

Greater Gabbard

Galloper

Gunfleet Sands 1

Gunfleet Sands 2

Gunfleet Sands 3

London Array

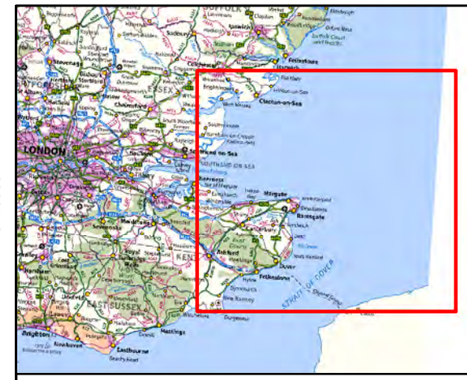
Kentish Flats
& Extension

Thanet

STRAIT OF DOVER

0 4 8 nm

0 10 20 km



Thanet Extension Offshore Wind Farm

- Proposed Turbine Location
- Proposed Wind Farm Area
- 5km Radii
- 45km Study Area

Thanet Offshore Wind Farm - Operational

- × Turbine Location
- Wind Farm Area

Cumulative Offshore Wind Farms

- • Operational
- • Under Construction

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title: Other Offshore Wind Farms (45km)

Figure: A3 | Drawing No: PB5894-SCO-2-33

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	01/12/16	TH	SM	A3	1:400,000

Co-ordinate system: ETRS 1989 UTM Zone 31N **EPSG:** 25831

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360000 380000 400000

5700000 5680000 5660000

Dover Strait Seascape Assessment, 2015

Offshore Shipping Channels

- O1A. Dover Strait Channel (North)
- O1B. Dover Strait Channel (South)

Offshore Sandbanks and Shoals

- O2A. The Varne - Le Colbart Ridge and Les Ridens

Inshore Bays

- I1A. Sandwich & Pegwell Bays

Active Inshore Waters

- I2A. Broadstairs Knolls & Ramsgate Road
- I2B. Inshore Dover Strait, The Downs & Trinity Bay
- I2C. Folkestone Pomerania
- I2D. Zone d'a pproche de Calais

Inshore Sandbanks and Shoals

- I3A. Goodwin Sands, Gull Stream & North Sand Head

Chalk Cliffs and Reefs/Coastal Waters

- C1A. Kingsdown Chalk Cliffs
- C1B. St Margaret's Bay
- C1C. White Cliffs of Dover
- C1D. Shakespeare and Abbot's Cliffs
- C1E. Broadstairs to North Foreland

Greensand Cliffs and Reefs/Coastal Water

- C2A. Greensand Cliffs and Reefs/Coastal Waters

Ports, Harbours and Seafront Development

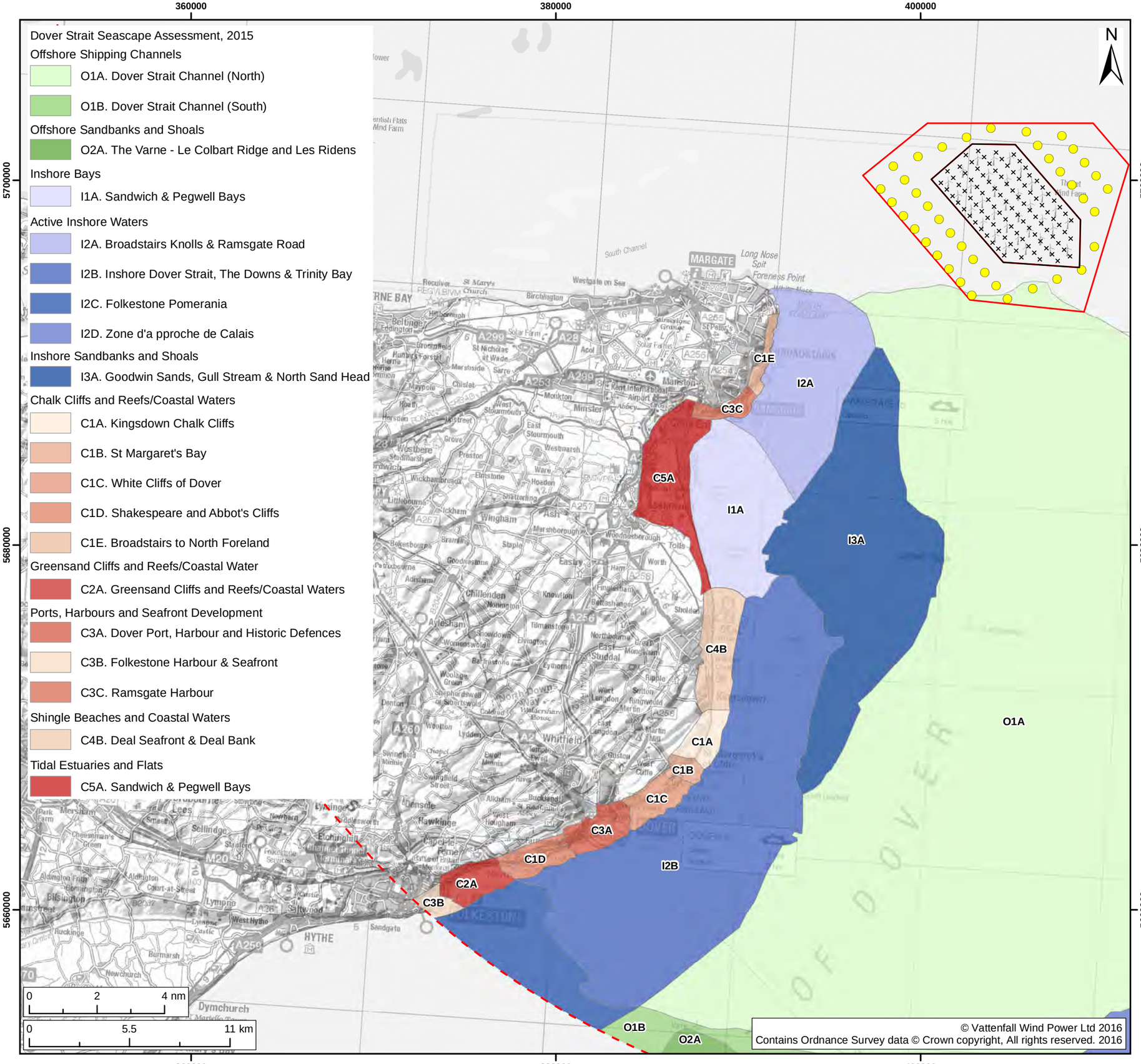
- C3A. Dover Port, Harbour and Historic Defences
- C3B. Folkestone Harbour & Seafront
- C3C. Ramsgate Harbour

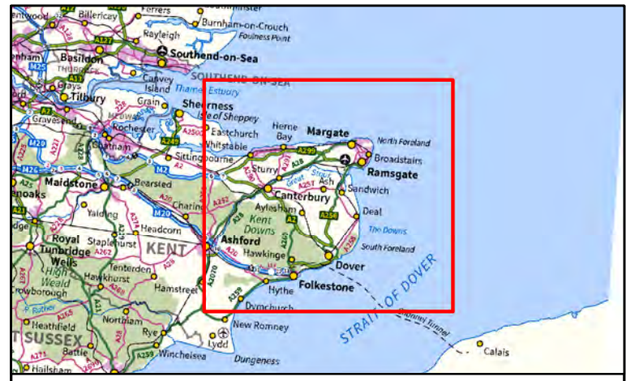
Shingle Beaches and Coastal Waters

- C4B. Deal Seafront & Deal Bank

Tidal Estuaries and Flats

- C5A. Sandwich & Pegwell Bays





Thanet Extension Offshore Wind Farm

- Proposed Turbine Location
- Proposed Wind Farm Area
- 45km Study Area

Thanet Offshore Wind Farm - Operational

- × Turbine Location
- Wind Farm Area

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title:

Seascape Character (Kent Area)

Figure: A4 | Drawing No: PB5894-SCO-2-34

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	01/12/16	TH	SM	A3	1:210,000

Co-ordinate system: ETRS 1989 UTM Zone 31N **EPSG:** 25831

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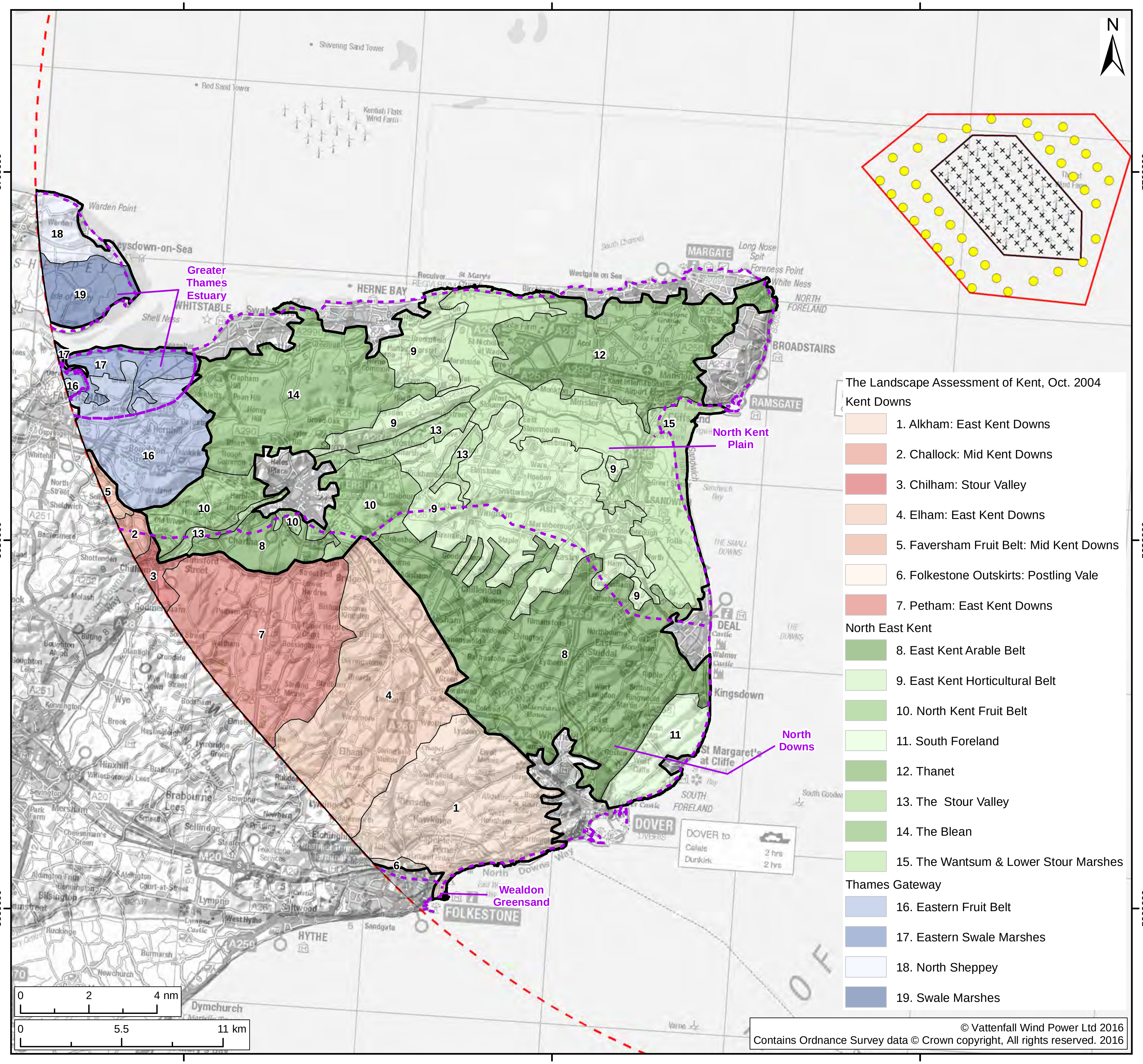
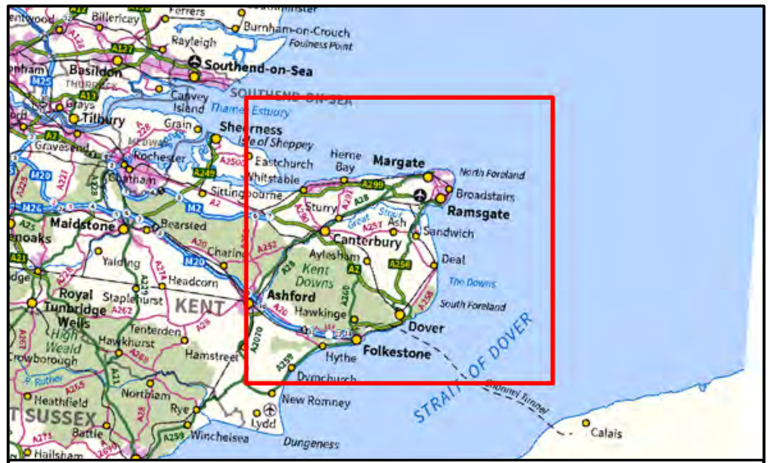


The Landscape Assessment of Kent, Oct. 2004

Kent Downs
- 1. Alkham: East Kent Downs
- 2. Challock: Mid Kent Downs
- 3. Chilham: Stour Valley
- 4. Elham: East Kent Downs
- 5. Faversham Fruit Belt: Mid Kent Downs
- 6. Folkestone Outskirts: Postling Vale
- 7. Petham: East Kent Downs

North East Kent
- 8. East Kent Arable Belt
- 9. East Kent Horticultural Belt
- 10. North Kent Fruit Belt
- 11. South Foreland
- 12. Thanet
- 13. The Stour Valley
- 14. The Blean
- 15. The Wantsum & Lower Stour Marshes

Thames Gateway
- 16. Eastern Fruit Belt
- 17. Eastern Swale Marshes
- 18. North Sheppey
- 19. Swale Marshes



Thanet Extension Offshore Wind Farm
- Proposed Turbine Location
- Proposed Wind Farm Area
- 45km Study Area

Thanet Offshore Wind Farm - Operational
- × Turbine Location
- Wind Farm Area
- National Character Area [1]

[1] Contains, or is based on, information supplied by Natural England, 2016

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title: Landscape Character (National & County)

Figure: A5	Drawing No: PB5894-SCO-2-35				
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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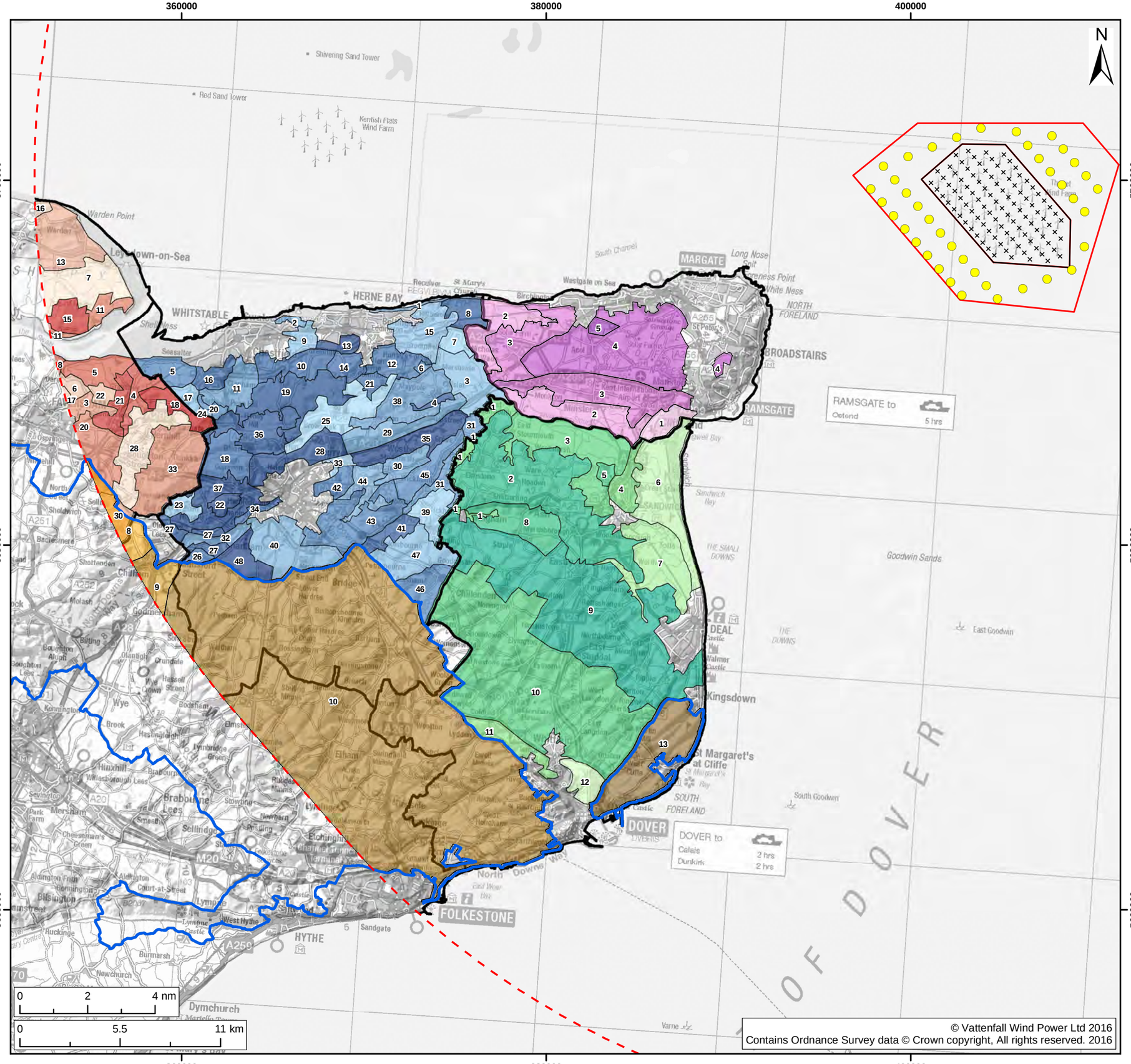

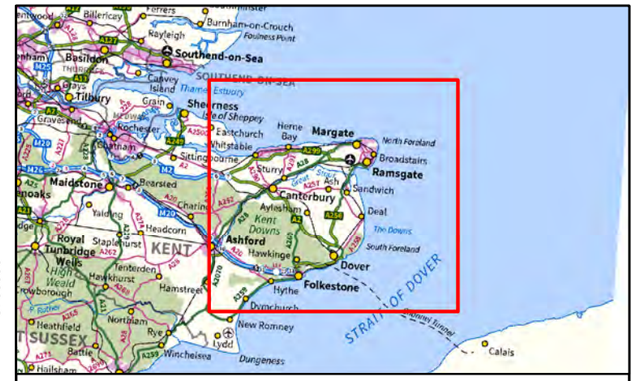

Thanet Extension Offshore Wind Farm

- Proposed Turbine Location
- Proposed Wind Farm Area
- 45km Study Area

Thanet Offshore Wind Farm - Operational

- × Turbine Location
- Wind Farm Area
- Kent Downs AONB [1]

See Figure A6b for district landscape character area legend

[1] Contains, or is based on, information supplied by Natural England, 2016

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title:

Landscape Character (District)

Figure: A6a | Drawing No: PB5894-SCO-2-36

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	01/12/16	TH	SM	A3	1:210,000

Co-ordinate system: ETRS 1989 UTM Zone 31N **EPSG:** 25831

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Thanet District Council Landscape Character Areas Update August 2012

- 1. Pegwell Bay
- 2. Former Wantsum Channel
- 3. Former Wantsum North Shore
- 4. Central Chalk Plateau
- 5. Quex Park

Landscape Assessment of the Kent Downs AONB, 1995

- 8. Mid Kent Downs
- 9. Stour Valley
- 10. East kent Downs
- 13. South Foreland

Swale Landscape Character and Biodiversity Appraisal, Supplementary Planning Document September 2011

- 3. Goodnestone Grasslands
- 4. Graveney Grazing Lands
- 5. Graveney Marshes
- 6. Ham Marshes
- 7. Leysdown and Eastchurch Marshes
- 8. Luddenham and Conyer Marshes
- 11. South Sheppey Saltmarshes and Mudflats
- 13. Central Sheppey Farmlands
- 15. Isle of Harty
- 16. Minster and Warden Farmlands
- 17. Stone Arable Farmlands
- 18. Waterham Clay Farmlands
- 20. Faversham and Ospringe Fruit Belt
- 21. Graveney Arable Farmlands
- 22. Graveney Fruit Farms
- 28. Newington Fruit Belt
- 30. Selling Fruit Belt
- 33. Blean Woods West

Canterbury Landscape Character and Biodiversity Appraisal, August 2012

Coastal Landscapes

- 1. Beltinge Coast
- 2. Swalecliffe Coast

Marshland Landscapes

- 3. Chislet Arable Belt
- 4. Nethergong Sarre Penn Inlet
- 5. Seasalter Marshes
- 6. Shelvingford Inlet
- 7. Snake Drove Pastures
- 8. Reculver Coastal Fringe

Urban Edge Landscapes

- 9. Chestfield Gap
- 10. Chestfield Wooded Farmland
- 11. Court Lees and Millstrood Farmlands
- 12. Ford and Maypole Mixed Farmlands
- 13. Greenhill and Eddington Fringe
- 14. Herne Common
- 15. Hillborough Arable Farmlands
- 16. Wraik Hill

The Blean

- 17. Yorkletts Farmlands
- 18. Blean Woods: Harbledown
- 19. Blean Woods: Thornden
- 20. Blean Woods: Yorkletts
- 21. Blean Woods: East
- 22. bigbury Hill
- 23. Denstead Woods
- 24. Clay Hill

Valley Side Landscapes

- 25. Broad Oak Valley
- 26. Shalmsford Slopes
- 27. Stour Valley Sides
- 28. Stour Valley Slopes
- 29. Stour Valley Slopes: Westbere
- 30. Stodmarsh Ridge

Valley Landscapes

- 31. Little Stour Valley
- 32. Stour Valley □ Chartham
- 33. Stour Valley – Sturry and Fordwich
- 34. Stour Valley – Wincheap and Thanington
- 35. Westbere and Stodmarsh Valley

Central Mixed Farmland Landscapes

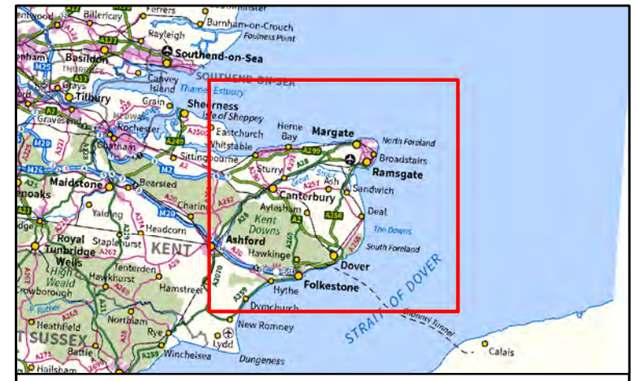
- 36. Blean Farmlands
- 37. Harbledown Fruit Belt
- 38. Hoath Farmlands
- 39. Ickham Farmlands
- 40. Nackington Farmlands
- 41. Nailbourne Parklands
- 42. Old Park
- 43. South Canterbury and Littlebourne Fruit Belt
- 44. Trenley Park Woodlands
- 45. Wickhambreaux Horticultural Belt

Downland Landscapes

- 46. Adisham Arable Downland
- 47. Bramling Downland
- 48. Chartham Downland

Dover District Landscape Character Assessment, Jan 2006

- 1. Little Stour Marshes
- 2. Preston & Ash Horticultural Belt
- 3. Ash Level
- 4. The Sandwich Corridor
- 5. Richborough Castle
- 6. Sandwich Bay
- 7. Lydden Valley
- 8. Staple Farmlands
- 9. Eastry Arable & Woodland Clumps
- 10. Eythorne Arable Mosaic with Parkland
- 11. Lydden Hills
- 12. Gusto Hills



Project: Thanet Extension Offshore Wind Farm

Report: Environmental Impact Assessment Scoping Report

Title: Landscape Character (District) Legend

Figure: A6b | Drawing No: PB5894-SCO-2-37

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	01/12/16	TH	SM	A3	n/a

Co-ordinate system: ETRS 1989 UTM Zone 31N **EPSG:** 25831

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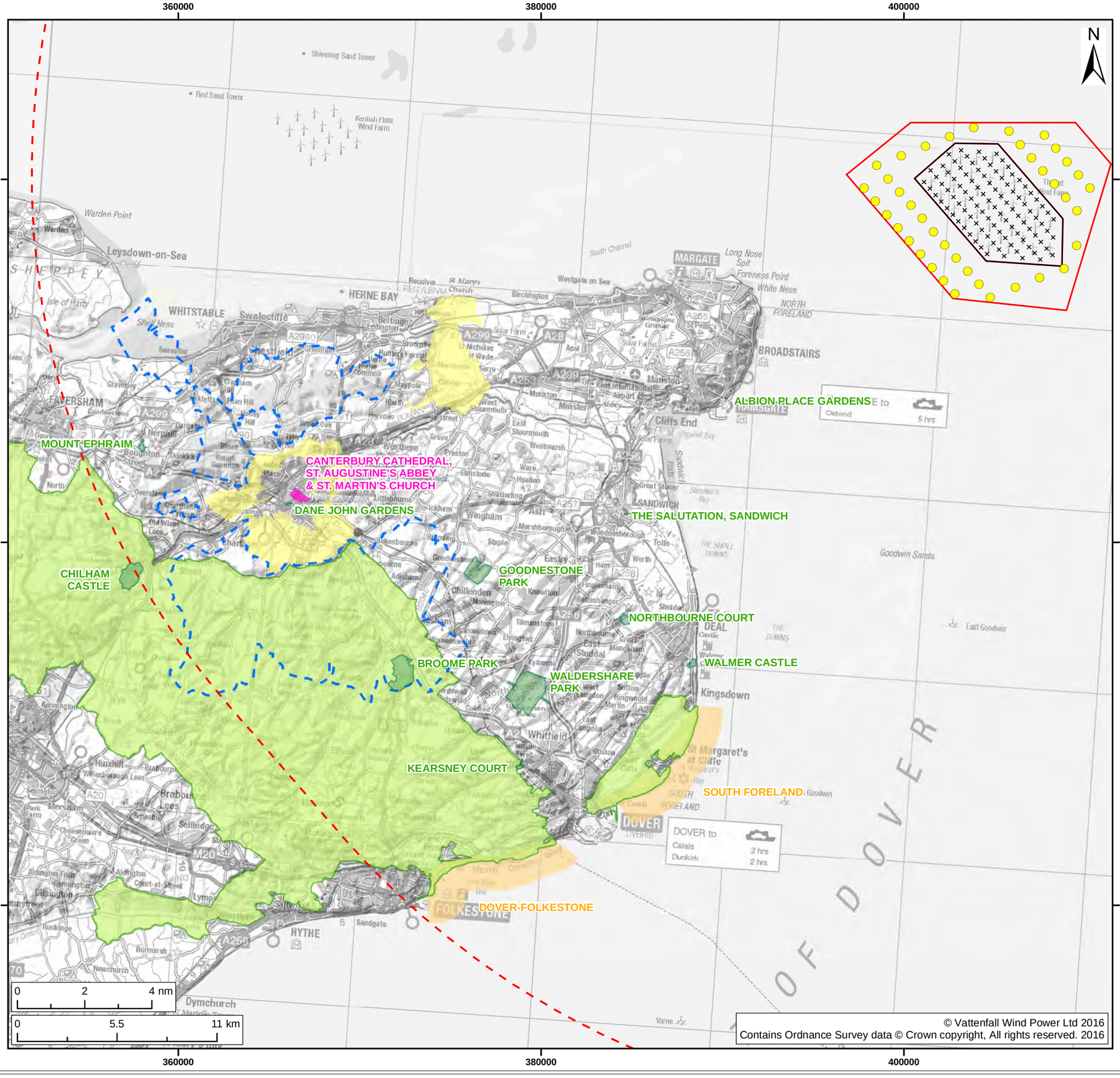

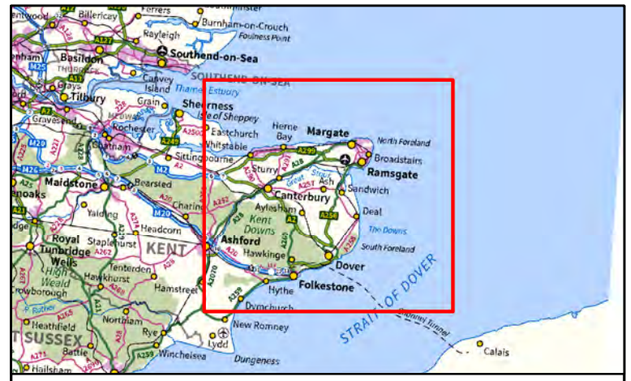

Thanet Extension Offshore Wind Farm

- Proposed Turbine Location
- Proposed Wind Farm Area
- 45km Study Area

Thanet Offshore Wind Farm - Operational

- × TOWF Operational Turbine
- Wind Farm Area
- World Heritage Site [2]
- Registered Parks and Gardens [2]
- Special Landscape Area [3]
- Area of High Landscape Value [3]
- Kent Downs AONB [1]
- Heritage Coast

[1] Contains, or is based on, information supplied by Natural England, 2016
[2] © Historic England 2016.
[3] Canterbury Local Plan, 2006

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title: Landscape Designations (Kent)

Figure: A7 | Drawing No: PB5894-SCO-2-38

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	01/12/16	TH	SM	A3	1:210,000

Co-ordinate system: ETRS 1989 UTM Zone 31N **EPSG:** 25831

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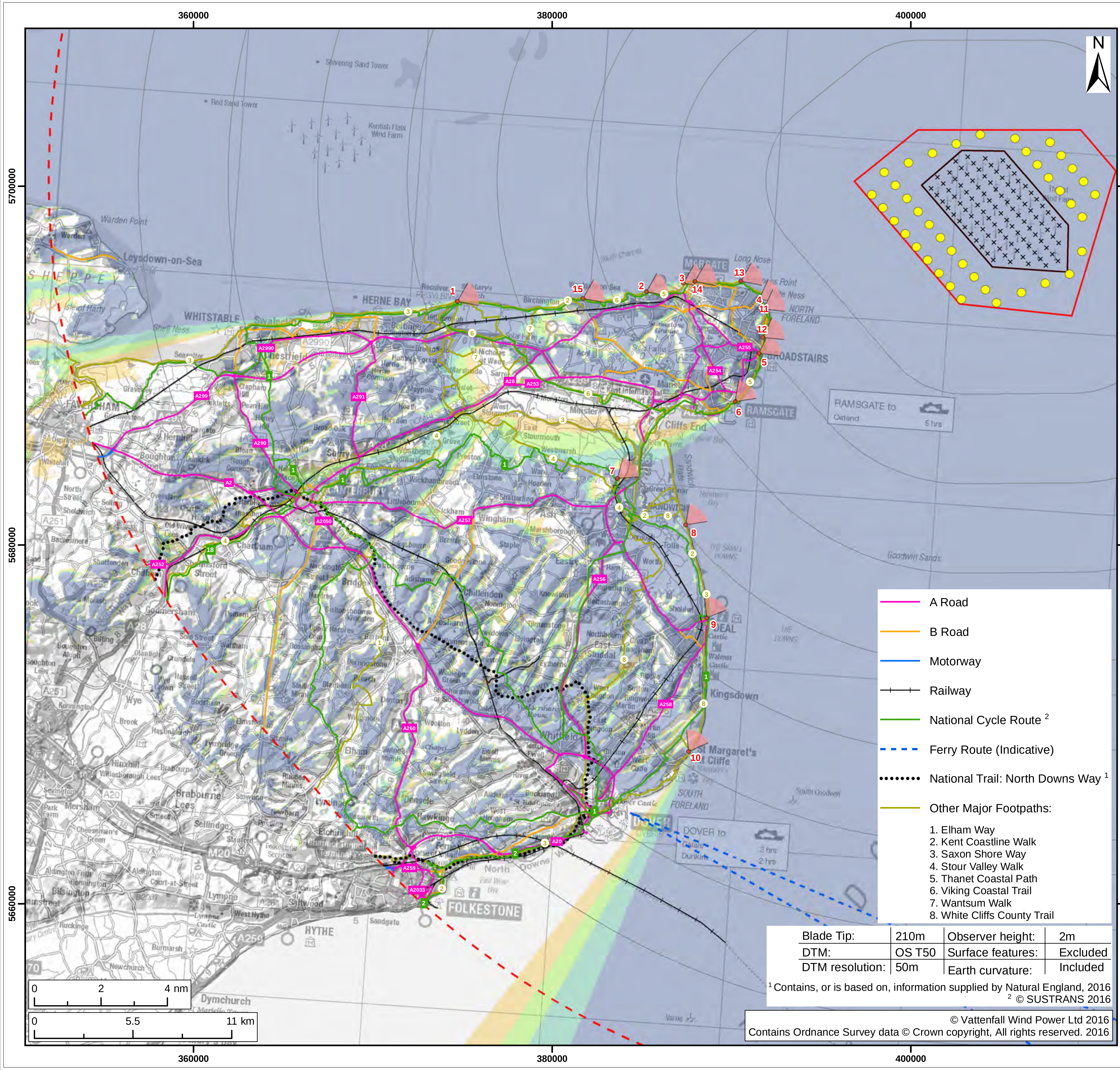

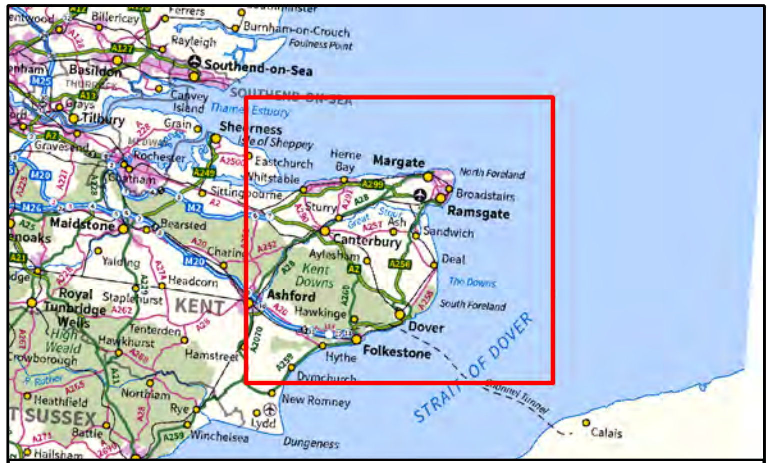

A Road	
B Road	
Motorway	
Railway	
National Cycle Route [2]	
Ferry Route (Indicative)	
National Trail: North Downs Way [1]	
Other Major Footpaths:	

1. Elham Way
2. Kent Coastline Walk
3. Saxon Shore Way
4. Stour Valley Walk
5. Thanet Coastal Path
6. Viking Coastal Trail
7. Wantsum Walk
8. White Cliffs County Trail

Blade Tip:	210m	Observer height:	2m
DTM:	OS T50	Surface features:	Excluded
DTM resolution:	50m	Earth curvature:	Included

[1] Contains, or is based on, information supplied by Natural England, 2016
[2] © SUSTRANS 2016

Thanet Extension Offshore Wind Farm

- Proposed Turbine Location
- Proposed Wind Farm Area
- 5km Radii
- 45km Study Area

Thanet Offshore Wind Farm - Operational

- Turbine Location
- Wind Farm Area

Thanet Extension Blade Tip ZTV
No. of Blade Tips Visible

- 0
- 0 - 10
- 10 - 20
- 20 - 30
- 30 - 40

Viewpoint Location

1 - Reculver Country Park, Thanet Coastal Path
2 - West Brook POS/Thanet Coastal Path
3 - Margate Harbour Wall (Turner Arts Gallery)
4 - Kingsgate/North Foreland, Coastal Path
5 - Broadstairs Promenade
6 - Wellington Crescent, Ramsgate
7 - Richborough Castle
8 - Kings Avenue/Princes Drive, Sandwich Bay Estate
9 - Deal Pier/Promenade
10 - St. Margaret's at Cliffe (Coastguard Memorial)
11 - Joss Bay/North Foreland
12 - Stone Bay
13 - Foreness Point/Palm Bay
14 - Walpole Bay (Margate)
15 - Birchington-on-Sea

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title:

Blade Tip ZTV, Visual Receptors & Viewpoints (Kent)

Figure: A8 | Drawing No: PB5894-SCO-2-39

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	05/12/16	TH	SM	A3	1:210,000

Co-ordinate system: ETRS 1989 UTM Zone 31N **EPSG:** 25831

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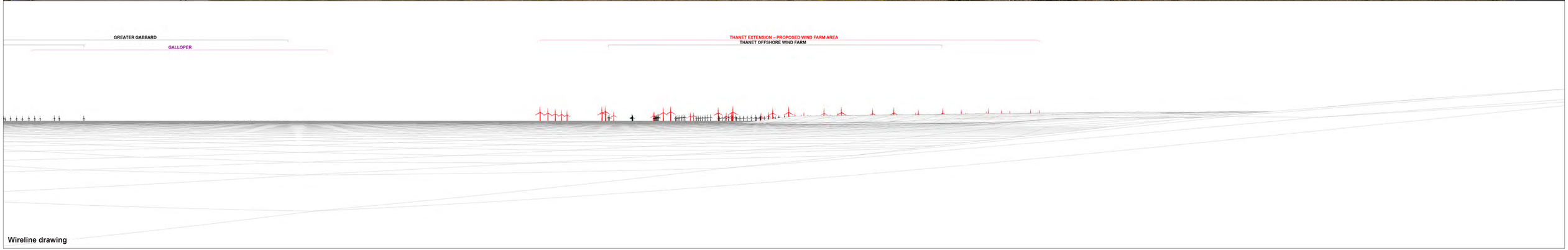
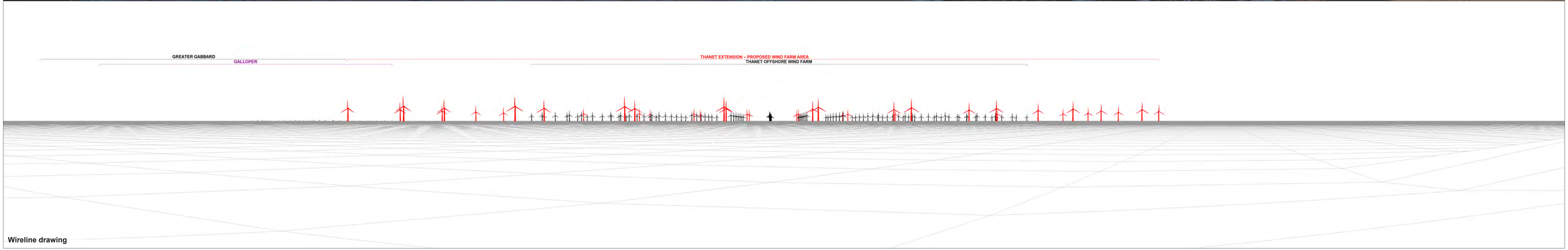


OS reference:	633269 E 170620 N	**Horizontal field of view:**	90° (cylindrical projection)	**Camera:**	Canon EOS 5D Mark II
Eye level:	8.46 m AOD	**Principal distance**	522 mm	**Lens:**	50mm (Canon EF 50mm f/1.4)
Direction of view:	73.04°			**Camera height:**	1.5 m AGL
Nearest turbine:	13.656 km			**Date and time:**	15/08/16, 15:49

Figure: A9
Viewpoint 2: West Brook POS/Thanet Coastal Path

OS reference:	633269 E 170620 N	**Horizontal field of view:**	53.5° (planar projection)	**Camera:**	Canon EOS 5D Mark II
Eye level:	8.46 m AOD	**Principal distance**	812.5 mm	**Lens:**	50mm (Canon EF 50mm f/1.4)
Direction of view:	73.04°	**Paper size:**	841 x 297 mm (half A1)	**Camera height:**	1.5 m AGL
		Correct printed image size:	820 x 260 mm	**Date and time:**	15/08/16, 15:49

Figure: A9
Viewpoint 2: West Brook POS/Thanet Coastal Path

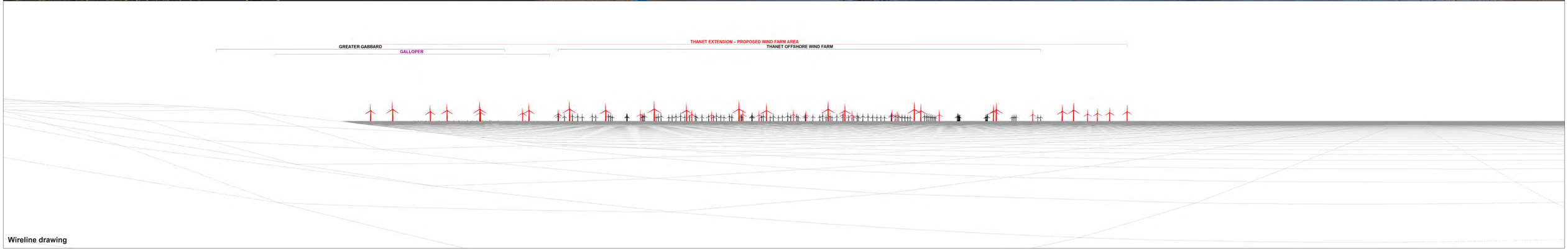


OS reference:	639546 E 170626 N	**Horizontal field of view:**	90° (cylindrical projection)	**Camera:**	Canon EOS 5D Mark II
Eye level:	10.82 m AOD	**Principal distance**	522 mm	**Lens:**	50mm (Canon EF 50mm f/1.4)
Direction of view:	65.10°			**Camera height:**	1.5 m AGL
Nearest turbine:	8.568 km			**Date and time:**	15/08/16, 17:45

Figure: A10
Viewpoint 4: Kingsgate/North Foreland, Coastal Path

OS reference:	639546 E 170626 N	**Horizontal field of view:**	53.5° (planar projection)	**Camera:**	Canon EOS 5D Mark II
Eye level:	10.82 m AOD	**Principal distance**	812.5 mm	**Lens:**	50mm (Canon EF 50mm f/1.4)
Direction of view:	65.10°	**Paper size:**	841 x 297 mm (half A1)	**Camera height:**	1.5 m AGL
		Correct printed image size:	820 x 260 mm	**Date and time:**	15/08/16, 17:45

Figure: A10
Viewpoint 4: Kingsgate/North Foreland, Coastal Path

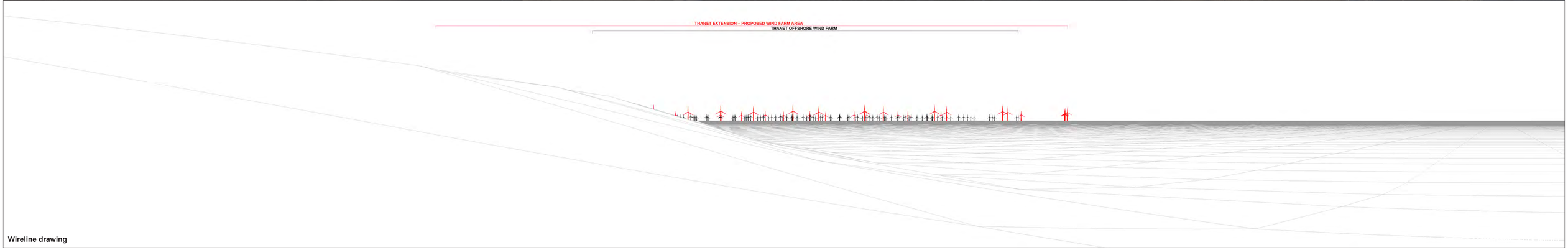


OS reference:	639763 E 167620 N	**Horizontal field of view:**	90° (cylindrical projection)	**Camera:**	Canon EOS 5D Mark II
Eye level:	11.84 m AOD	**Principal distance**	522 mm	**Lens:**	50mm (Canon EF 50mm f/1.4)
Direction of view:	53.94°			**Camera height:**	1.5 m AGL
Nearest turbine:	10.492 km			**Date and time:**	15/08/16, 18:18

Figure: A11
Viewpoint 5: Broadstairs Promenade

OS reference:	639763 E 167620 N	**Horizontal field of view:**	53.5° (planar projection)	**Camera:**	Canon EOS 5D Mark II
Eye level:	11.84 m AOD	**Principal distance**	812.5 mm	**Lens:**	50mm (Canon EF 50mm f/1.4)
Direction of view:	53.94°	**Paper size:**	841 x 297 mm (half A1)	**Camera height:**	1.5 m AGL
		Correct printed image size:	820 x 260 mm	**Date and time:**	15/08/16, 18:18

Figure: A11
Viewpoint 5: Broadstairs Promenade

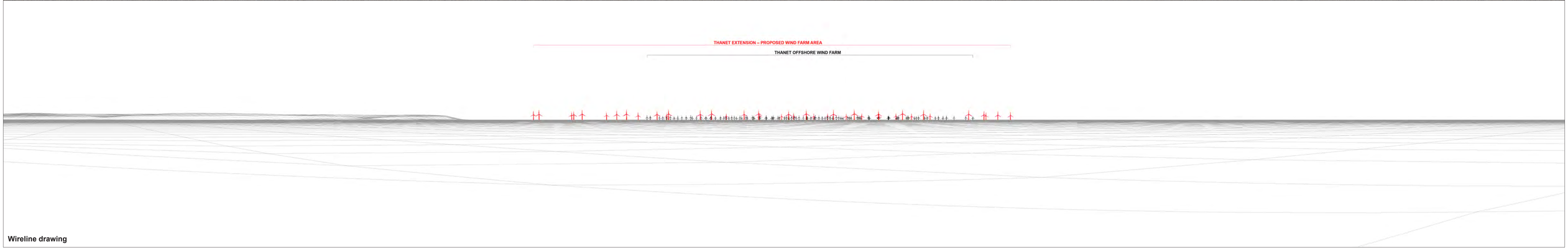


OS reference:	638612 E 164878 N	**Horizontal field of view:**	90° (cylindrical projection)	**Camera:**	Canon EOS 5D Mark II
Eye level:	15.40 m AOD	**Principal distance**	522 mm	**Lens:**	50mm (Canon EF 50mm f/1.4)
Direction of view:	48.80°			**Camera height:**	1.5 m AGL
Nearest turbine:	13.210 km			**Date and time:**	15/08/16, 18:46

Figure: A12
Viewpoint 6: Wellington Crescent, Ramsgate

OS reference:	638612 E 164878 N	**Horizontal field of view:**	53.5° (planar projection)	**Camera:**	Canon EOS 5D Mark II
Eye level:	15.40 m AOD	**Principal distance**	812.5 mm	**Lens:**	50mm (Canon EF 50mm f/1.4)
Direction of view:	48.80°	**Paper size:**	841 x 297 mm (half A1)	**Camera height:**	1.5 m AGL
		Correct printed image size:	820 x 260 mm	**Date and time:**	15/08/16, 18:46

Figure: A12
Viewpoint 6: Wellington Crescent, Ramsgate

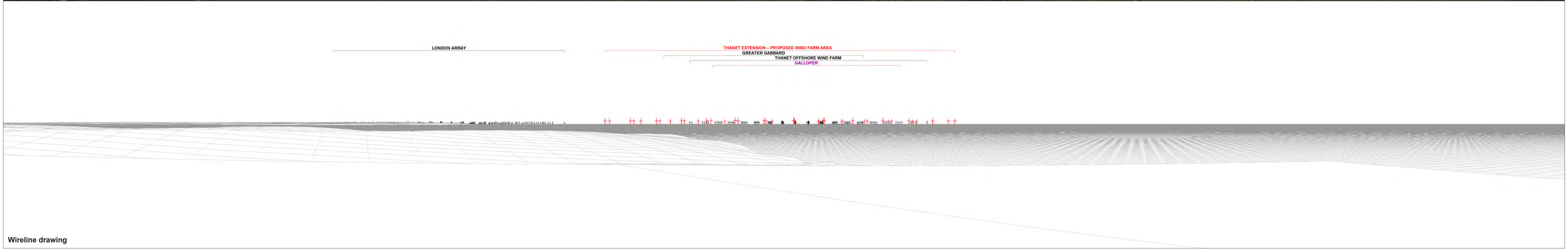


OS reference:	636323 E 157795 N	**Horizontal field of view:**	90° (cylindrical projection)	**Camera:**	Canon EOS 6D
Eye level:	5.73 m AOD	**Principal distance**	522 mm	**Lens:**	50mm (Canon EF 50mm f/1.4)
Direction of view:	39.58°			**Camera height:**	1.5 m AGL
Nearest turbine:	19.814 km			**Date and time:**	12/09/16, 15:04

Figure: A13
Viewpoint 8: Kings Avenue/Princes Drive, Sandwich Bay Estate

OS reference:	636323 E 157795 N	**Horizontal field of view:**	53.5° (planar projection)	**Camera:**	Canon EOS 6D
Eye level:	5.73 m AOD	**Principal distance**	812.5 mm	**Lens:**	50mm (Canon EF 50mm f/1.4)
Direction of view:	39.58°	**Paper size:**	841 x 297 mm (half A1)	**Camera height:**	1.5 m AGL
		Correct printed image size:	820 x 260 mm	**Date and time:**	12/09/16, 15:04

Figure: A13
Viewpoint 8: Kings Avenue/Princes Drive, Sandwich Bay Estate

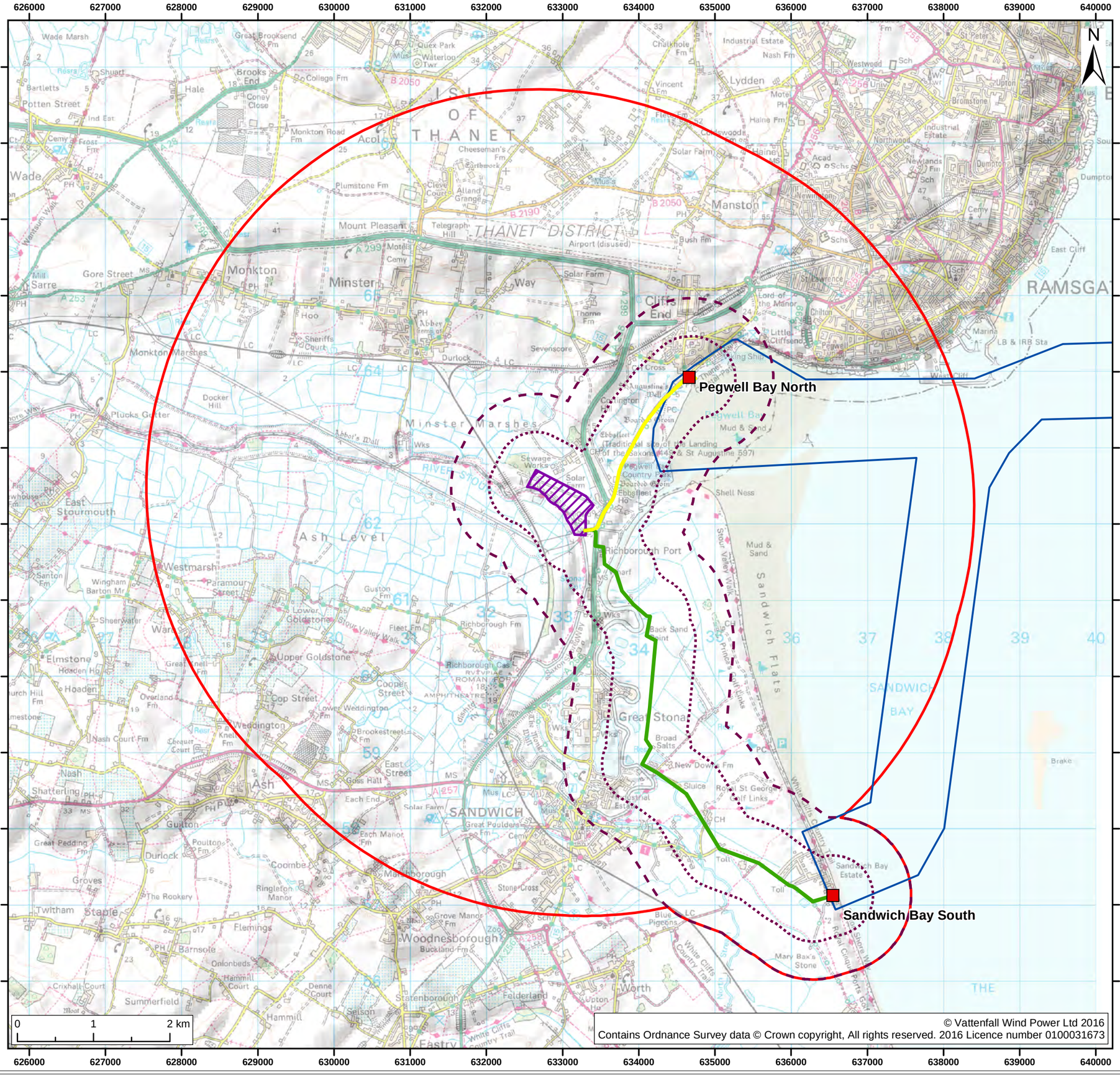


OS reference:	637339 E 145209 N	**Horizontal field of view:**	90° (cylindrical projection)	**Camera:**	Canon EOS 6D
Eye level:	85.32 m AOD	**Principal distance**	522 mm	**Lens:**	50mm (Canon EF 50mm f/1.4)
Direction of view:	24.61°			**Camera height:**	1.5 m AGL
Nearest turbine:	29.442 km			**Date and time:**	12/09/16, 16:27

Figure: A14
Viewpoint 10: St. Margaret's at Cliffe (Coastguard Memorial)

OS reference:	637339 E 145209 N	**Horizontal field of view:**	53.5° (planar projection)	**Camera:**	Canon EOS 6D
Eye level:	85.32 m AOD	**Principal distance**	812.5 mm	**Lens:**	50mm (Canon EF 50mm f/1.4)
Direction of view:	24.61°	**Paper size:**	841 x 297 mm (half A1)	**Camera height:**	1.5 m AGL
		Correct printed image size:	820 x 260 mm	**Date and time:**	12/09/16, 16:27

Figure: A14
Viewpoint 10: St. Margaret's at Cliffe (Coastguard Memorial)



Cable Landfall Options

Onshore Cable Route Option 1 with 25m Wide Corridor

Onshore Cable Route Option 2 with 25m Wide Corridor

Substation Area of Interest

500m Buffer Around 25m Corridor

1000m Buffer Around 25m Corridor

Proposed Offshore Export Cable Corridor

Onshore LVIA Scoping Area

Project: Thanet Extension Offshore Wind Farm	Report: Environmental Impact Assessment Scoping Report

Title: LVIA Onshore Study Area

Figure: A15 | Drawing No: PB5894-SCO-2-40

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	01/12/16	TH	SM	A3	1:50,000

Co-ordinate system: British National Grid **EPSG:** 27700

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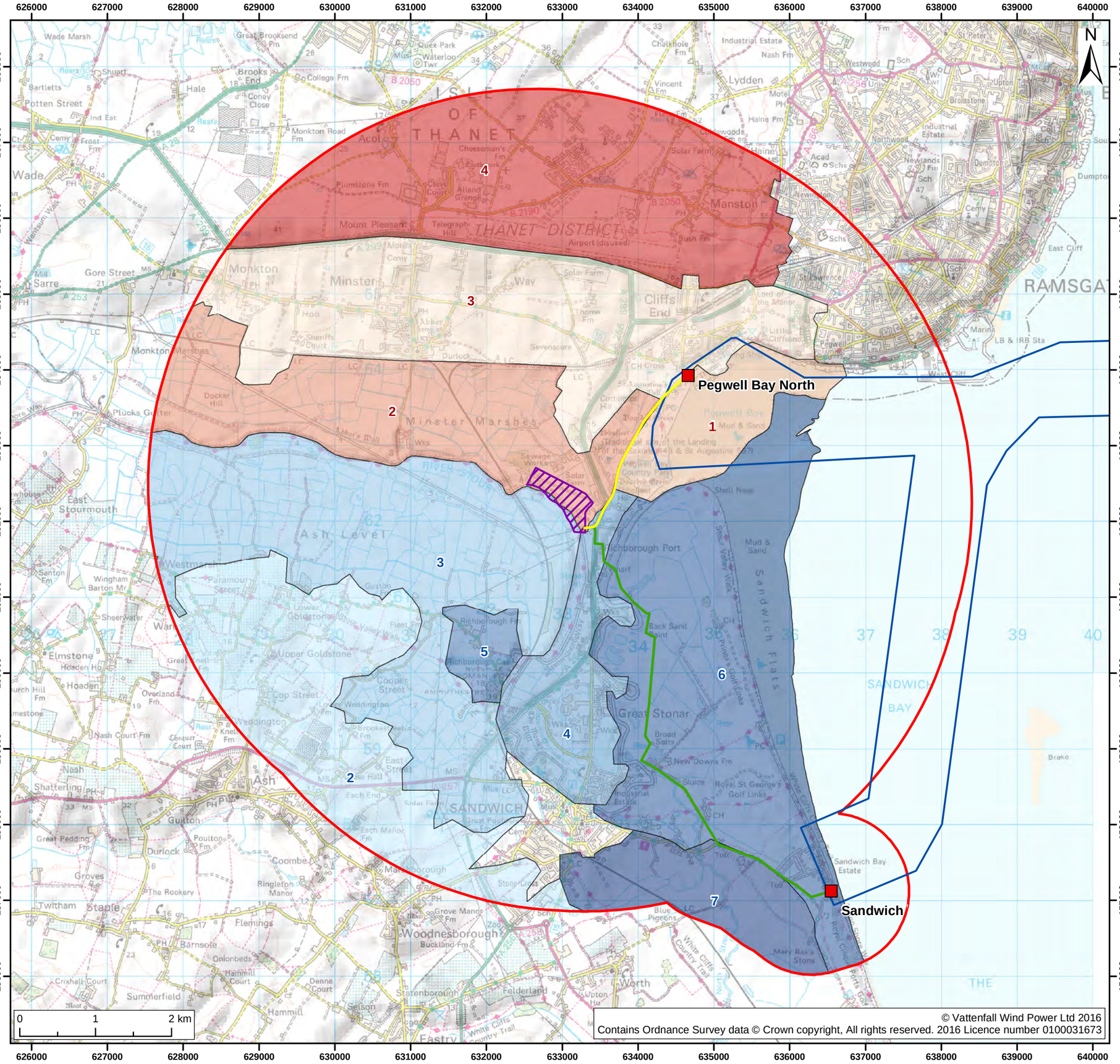

Legend:

- Cable Landfall Options
- Onshore Cable Route Option 1
- Onshore Cable Route Option 2
- Substation Area of Interest
- Proposed Offshore Export Cable Corridor
- Onshore LVIA Scoping Area

Dover Landscape Character [1]

- 2 - Preston & Ash Horticultural Belt
- 3 - Ash Level
- 4 - The Sandwich Corridor
- 5 - Richborough Castle
- 6 - Sandwich Bay
- 7 - Lydden Valley

Thanet Landscape Character [2]

- 1 - Pegwell Bay
- 2 - Former Wantsum Channel
- 3 - Former Wantsum North Shore
- 4 - Central Chalk Plateau

[1] Dover District Landscape Character Assessment, Jan 2006
[2] Thanet District Council Landscape Character Areas Update August 2012

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title: Landscape Character (Onshore Study Area)

Figure: A16 | Drawing No: PB5894-SCO-2-41

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	01/12/16	TH	SM	A3	1:50,000

Co-ordinate system: British National Grid **EPSG:** 27700

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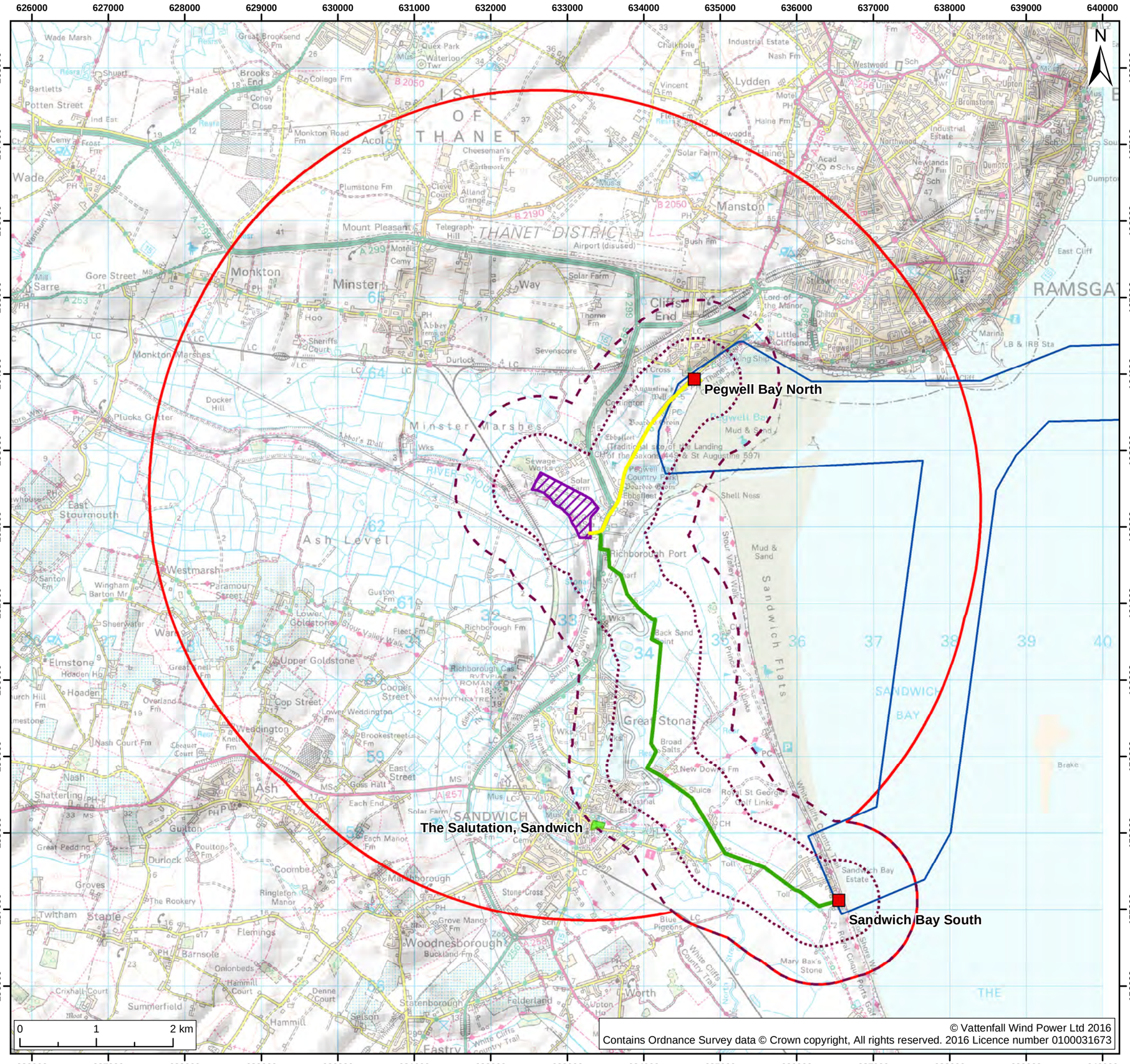

- Cable Landfall Options
- Onshore Cable Route Option 1 with 25m Wide Corridor
- Onshore Cable Route Option 2 with 25m Wide Corridor
- Substation Area of Interest
- 500m Buffer Around 25m Corridor
- 1000m Buffer Around 25m Corridor
- Proposed Offshore Export Cable Corridor
- Onshore LVIA Scoping Area
- Registered Parks and Gardens [1]

[1] © Historic England 2016

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title:

Landscape Designations (Onshore Study Area)

Figure: A17 | Drawing No: PB5894-SCO-2-42

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	05/12/16	TH	SM	A3	1:50,000

Co-ordinate system: British National Grid **EPSG:** 27700

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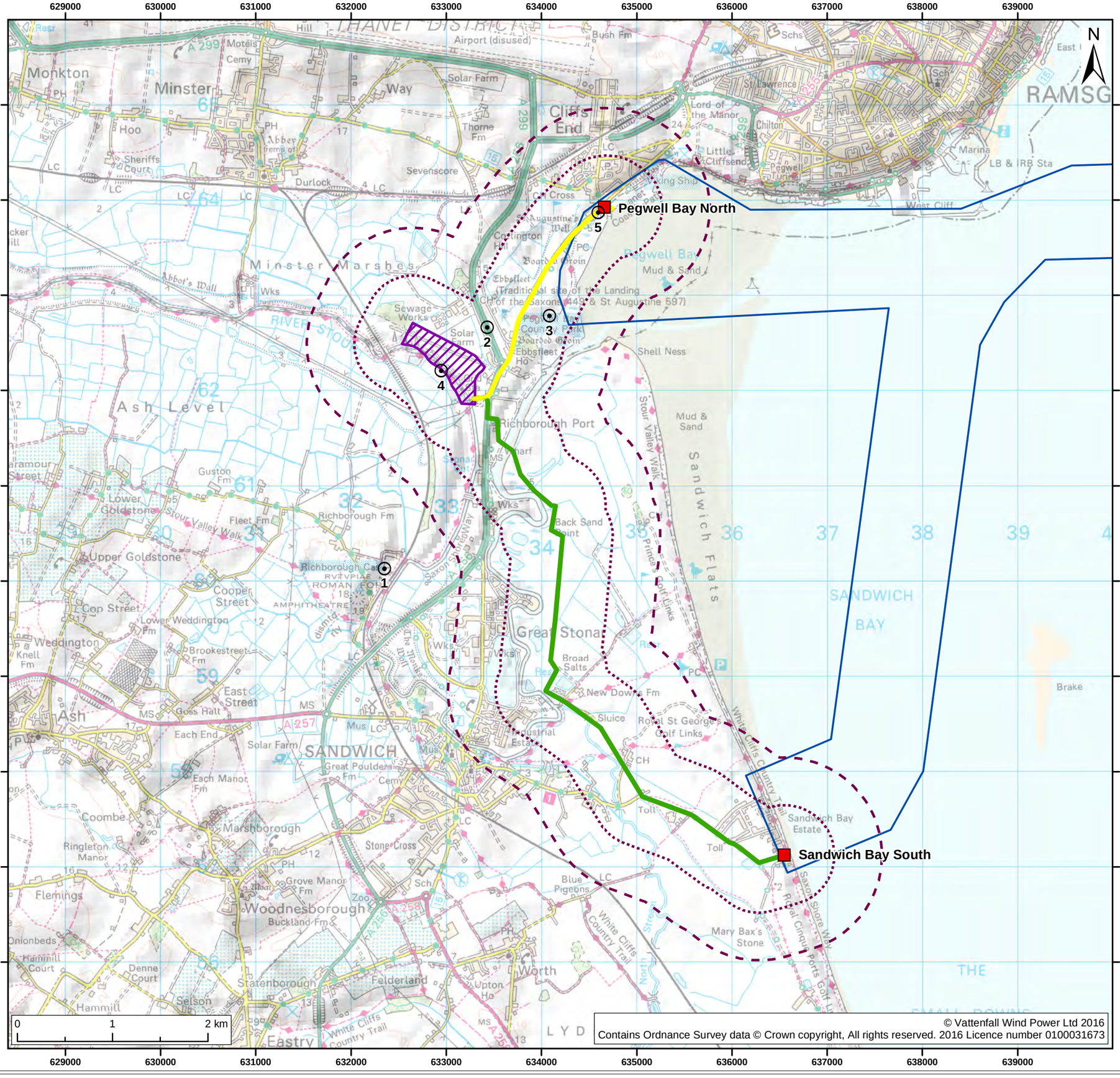

Legend:

- Cable Landfall Options
- Onshore Cable Route Option 1 with 25m Wide Corridor
- Onshore Cable Route Option 2 with 25m Wide Corridor
- Substation Area of Interest
- 500m Buffer Around 25m Corridor
- 1000m Buffer Around 25m Corridor
- Proposed Offshore Export Cable Corridor
- Viewpoint Location
  1. Richborough Castle
  2. A256 Richborough Way
  3. Pegwell Bay Country Park (Thanet Coastal Path)
  4. Saxon Shore Way (River Stour)
  5. Cliffs End, Sandwich Road

Project:	Report:
Thanet Extension Offshore Wind Farm	Environmental Impact Assessment Scoping Report

Title: Viewpoint Locations

Figure: A18 | Drawing No: PB5894-SCO-2-43

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	05/12/16	TH	SM	A3	1:40,000

Co-ordinate system: British National Grid **EPSG:** 27700

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