

# Vattenfall Wind Power Ltd

## Thanet Extension Offshore Wind Farm

### Environmental Statement Volume 1

### Chapter 3: Environmental Impact Assessment Methodology

June 2018, Revision A

Document Reference: 6.13

Pursuant to: APFP Reg. 5(2)(a)



Vattenfall Wind Power Ltd  
Thanet Extension Offshore Wind Farm  
Environmental Statement  
Volume 1  
Chapter 3: Environmental Impact Assessment Methodology  
June 2018

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Date of Approval	June 2018
Revision	A

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### 3 ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

#### 3.1 Introduction

3.1.1 This chapter describes the assessment methodology used throughout the Environmental Impact Assessment (EIA) for Thanet Extension Offshore Wind Farm (Thanet Extension) to identify and evaluate the potential impacts associated with the development of Thanet Extension. It outlines the overall assessment approach for determining any likely significant effects of Thanet Extension on the receiving environment. Information on topic specific methodologies, including surveys, is presented within the relevant Environmental Statement (ES) chapters and supporting technical annexes.

3.1.2 The EIA assessment uses a systematic, evidence-based approach in order to evaluate and interpret the potential impacts and subsequent effects of the proposed development on sensitive physical, biological and human receptors. This document has been prepared in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations), which require that a developer provides a “description of the likely significant effects on the factors specified in regulation 5(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development”.

#### 3.2 Statutory and policy context

3.2.1 The need for an EIA is detailed within the European Union (EU) Directive 85/337/EEC (as amended) on the assessment of the effects of certain public and private projects on the environment (the EIA Directive) and has been transposed into UK law through the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (EIA Regulations). The EIA Regulations 2017 are the formal implementation of the revised EIA Directive (2014/52/EU) and, as such, the EIA methodology described within this document has incorporated all relevant updates to the EIA Regulations.

3.2.2 The EIA methodology used within this ES draws upon a number of additional policy and guidance documents, including:

- Overarching National Policy Statement (NPS) for Energy (EN-1; Department for Energy and Climate Change, 2011a);
- NPS for Renewable Energy Infrastructure (EN-3; DECC, 2011b);
- NPS for Electricity Energy Networks Infrastructure (EN-5; DECC, 2011c);
- Advice Note Nine: Rochdale Envelope (The Planning Inspectorate (PINS), 2012);
- Advice Note Twelve: Transboundary Impacts (PINS, 2015a);
- Advice Note Seventeen: Cumulative Effects Assessment (PINS 2015b);
- The design Manual for Roads and Bridges (DMRB) Volume 11: Environmental Assessment (and updates) (Highways Agency *et al.*, 2008);
- A Review of Assessment Methodologies for Offshore Wind Farms (COWRIE METH-08-08) (Maclean *et al.*, 2009);
- Offshore Wind Farms: Guidance Note for Environmental Impact Assessment in Respect of FEPA and CPA requirements (Cefas, 2004);
- Cumulative Impact Assessment Guidelines – Guiding Principles for Cumulative Impacts Assessment in Offshore Wind Farms (RenewableUK, 2013);
- Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects (Cefas, 2012);
- Guidelines for Environmental Impact Assessment (IEMA, 2004);
- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (CIEEM, 2016);
- Guidelines for Ecological Impact Assessment in Britain and Ireland: Marine and Coastal (IEEM, 2010); and
- Guidelines for Landscape and Visual Impact Assessment 3 (Landscape Institute and IEMA, 2013).

### 3.3 Consultation and scoping

- 3.3.1 A draft EIA methodology was provided within the Thanet Extension Scoping Report (VWPL, 2016). The feedback received within the Scoping Opinion (PINS, 2017a) is provided in Table 3.1, the same broad approach as detailed within the Scoping Report has been used to produce the EIA methodology described within this chapter.
- 3.3.2 On receipt of the Scoping Opinion, the scope of each of the technical topics were agreed, through the Evidence Plan process, which are presented within this ES with agreement recorded in the EIA Evidence Plan Report (Document Ref: 8.5). The agreed scope is consistent with the received Scoping Opinion. The scope was presented to PINS during an Evidence Plan meeting. Due the evolving nature of the design and layout of the onshore project infrastructure, DDC requested (through the Evidence Plan) a re-scoping exercise to be undertaken. This request was not undertaken as the original scoping study area encompasses the Red Line Boundary (RLB) and wider study area considered within this ES . The change in substation location that occurred post scoping has not therefore resulted in any material changes to the receiving environment characterisation, or effects associated with the proposed development. This was agreed and recorded within the Evidence Plan Report (Document Ref: 8.5).
- 3.3.3 VWPL has notified PINS (May 2018) prior to the application being submitted, detailing that this ES will adhere to the 2017 EIA Regulations. This was also explained to both PINS and all statutory consultees through the section 42 consultation process. A Regulation 6 notice was submitted on 4 January 2017. The decision to voluntarily apply with the 2017 EIA Regulations was undertaken in order to ensure that the final assessment is robust and accords with best practice.
- 3.3.4 The assessment methodology was presented in the Preliminary Environmental Impact Report (PEIR) published in November 2017, to allow consultation on the proposed methodology prior to submitting this ES.
- 3.3.5 Consultation responses, pertaining to the EIA methodology are presented in Table 3.1.

**Table 3.1: Summary of consultation relating to the EIA Methodology**

Date and consultation phase/ type	Consultation and key issues raised	Section where comment is addressed
Scoping Opinion	“The SoS recommends that in order to assist the decision-making process, the Applicant may wish to consider the use of tables”	This has been noted and the use of summary table has been adopted within each of the technical chapters of this ES.
Scoping Opinion	“The SoS advises that where matrices are used, the terminology used is consistent across the topics. Where other approaches other than matrices are deployed, the ES chapter should explain the rationale for deviating from the overarching approach.”	The majority of the assessments within this ES adopt the matrices and terminology outlined within this chapter. However, where topics have deviated from this approach a full rationale and description of the methodology is provided. For example, within Volume 3, Chapter 10: Noise and Vibration (Document Ref: 6.3.10).
Scoping Opinion	“The Applicant is advised to agree the projects to be included within the onshore and offshore CIA with relevant consultees and in this regard the SoS welcomes that the CIA will be discussed during the preparation of the EIA and as part of the Evidence Plan Process (Paragraphs 664 and 1066).”	The methodology of the determination of the CIA tiers and projects were presented and agreed in both onshore and offshore Evidence Plan meetings, see Evidence Plan Report (Document Ref: 8.5). The use of (at least) three tiers for each of the technical assessments was agreed through the Evidence Plan process.  Following the submission of the PEIR, an updated ‘shortlist’ of onshore projects was circulated for agreement with the local authorities for inclusion within the cumulative impact assessments. The short list was agreed by each of the local authorities, see Evidence Plan Report (Document Ref: 8.5).

Date and consultation phase/ type	Consultation and key issues raised	Section where comment is addressed
Scoping Opinion	<p>“The SoS considers the CIA and the transboundary impact assessment to be separate from one another and expects both separate aspects to be clearly and separately addressed as part of the ES (with appropriate cross referencing as necessary).”</p>	<p>Each of the technical assessments consider separately the potential for:</p> <ul style="list-style-type: none"> <li>• Cumulative;</li> <li>• Inter-related; and</li> <li>• Transboundary impacts.</li> </ul> <p>Identified potential cumulative effects are assessed within each of the technical assessments. For example, see Volume 2, Chapter 6: Marine Mammal Ecology (Document Ref: 6.2.6).</p> <p>The identified inter-relationship effects are assessed in Volume 2, Chapter 14: Inter-relationships (Document Ref: 6.2.14).</p> <p>Identified potential transboundary effects are assessed within each of the technical assessments. For examples, see Volume 2, Chapter 6: Marine Mammal Ecology (Document Ref: 6.2.6) and the Report to Inform Appropriate Assessment (Document Ref: 5.2)</p> <p>A transboundary screening was undertaken by PINS on behalf of the SoS (PINS, 2017b). The transboundary screening of the proposed development has been considered taking into account the transitional provisions in Regulation 37 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 2017 EIA Regulations). The document was published 7<sup>th</sup> July 2017. The European Economic Area (EEA) states notified were The Netherlands, Belgium, France, Germany and Denmark.</p>

Date and consultation phase/ type	Consultation and key issues raised	Section where comment is addressed
S42 Natural England January 2018	<p>“Natural England wish to highlight that it is essential to assess a realistic worst-case scenario in order that impacts are not over estimated – but it is also important that realistic issues that may be encountered during construction are covered to avoid changes post consent.”</p>	<p>Each of the assessments considers the realistic worst-case scenario for each of the identified impacts based on the best available knowledge at the time of writing, in accordance with the realistic worst-case scenario provided in Advice Note Nine (PINS, 2011). The identified scenarios are presented within each individual ES chapter within the ‘Maximum design scenario assessed’ tables.</p> <p>See paragraph 3.5.2.</p>
S42 Natural England January 2018	<p>Natural England queried the use of three tiers for Cumulative Effects Assessment and whether more tiers would be more appropriate.</p>	<p>The use of three tiers, as per Advice Note Seventeen (PINS, 2015b), was agreed through the Evidence Plan process in June 2017. Following clarification, it has subsequently been discussed further and agreed through the Evidence Plan process (meeting date - 26<sup>th</sup> January 2018). Justification and additional information about the tiering approach is provided in paragraphs 3.6.10 <i>et seq.</i></p>
S42 Natural England January 2018	<p>Natural England queried whether oil and gas pipelines have been considered in cumulative impact assessments. A request for the cumulative projects to be mapped.</p>	<p>Oil and gas pipelines have been considered, see section 3.6 of this chapter, but for the majority of the study areas identified for the assessments, there is not this infrastructure present. The searches have been undertaken using the most up to date available information.</p> <p>Figures are presented in Volume 1, Annex 3-1: Cumulative Impact Assessment for offshore and onshore projects identified.</p>
S42 Natural England January 2018	<p>Natural England stated that “Although existing data is useful and can provide very good baseline evidence, the statement written here should not be used as a reason to not collect new data if necessary.”</p>	<p>Paragraph 3.4.7 of this chapter has been amended to provide further clarification that each chapter has sufficient information to characterise for the purposes of EIA. Post-consent surveys will be discussed with the relevant parties, as appropriate.</p>

Date and consultation phase/ type	Consultation and key issues raised	Section where comment is addressed
S42 Natural England January 2018	Natural England requested whether identification of further monitoring is discussed further in the EIA.	Paragraph 3.4.3 of this has been amended to provide further clarification. Identification of any further monitoring required and, where relevant, in principle monitoring plans have been drafted to accompany the development consent application.
S42 MMO January 2018	The MMO highlighted that within the PEIR "there are instances where the impacts are not defined as negative (adverse) or positive (beneficial) magnitude according to the matrix rules. In addition, there are instances where potential impact conclusions do not correlate to the matrix methodology."	All chapters have been updated to ensure that effects are defined as adverse or beneficial. All impact conclusions have been reviewed and corrected as appropriate.
S42 Agence Francaise pour la Biodiversite January 2018	Agence Francaise pour la Biodiversite Annex requested explanation as to how the magnitude of the impact and the sensitivity of the receptor are used to derive the significance of the impact.	Paragraphs 3.5.14 <i>et seq.</i> have been amended to be provide additional clarification on the application of the matrices and the determination of significance in this ES.

Date and consultation phase/ type	Consultation and key issues raised	Section where comment is addressed
S42 Agence Francaise pour la Biodiversite January 2018	Agence Francaise pour la Biodiversite Annex stated that "some effects are not likely to be significant in EIA terms in individual assessments, but could then have a greater significance when considered as cumulative aspects. We will recommend considering "minor" effects as potentially significant in EIA terms as well, in regard to potential cumulative, cross-border and inter-related effects. Therefore, they must be fully assessed in the Environmental Statement (ES)."	Section 3.6 of this chapter provides an overview of the cumulative impact assessment methodology undertaken for each of the ES chapters. Additional information is available in Volume 1, Annex 3-1: Cumulative Impact Assessment.  The potential for inter-related effects, wherein multiple non-significant effects could result in a significant effect, is identified within each of the topics. Volume 2, Chapter 14: Inter-relationships presents the assessment of the identified potential inter-related effects. Note: the term 'inter-relationships' is an interchangeable term with intra-relationships, as sometimes referred to by other projects.
S42 Agence Francaise pour la Biodiversite January 2018	Agence Francaise pour la Biodiversite Annex highlighted the requirement for a topic to include a "global view of the different study areas for each topic, such as birds, marine mammals, fish and shellfish."	Each of the relevant assessments have considered sensitive species in regional and population terms as appropriate. For examples, see the marine mammals, offshore ornithology and fish and shellfish ES chapters.  For each assessment, a study area is determined which is appropriate and proportional for the receptors considered. Therefore, different assessments will have different study areas and so screening areas for cumulative impacts.

Date and consultation phase/ type	Consultation and key issues raised	Section where comment is addressed
S42 Agence Francaise pour la Biodiversite January 2018	Agence Francaise pour la Biodiversite Annex highlighted that Minor effects should be fully assessed to ensure all potentially significance cumulative, cross-border and inter-related effects are assessed.	<p>For both cumulative and inter-related effects assessments have been undertaken to determine the potential for significant effects in EIA terms.</p> <p>Where the potential for a cumulative effect has been identified a cumulative effect assessment has been undertaken; regardless of whether the effect has been identified as Minor when the project is considered alone.</p> <p>Transboundary effects are considered within the Report to Inform Appropriate Assessment (Document Ref: 5.2).</p> <p>The inter-relationship assessment is provided in Volume 2, Chapter 14: Inter-relationships (Document Ref: 6.2.14).</p>
S42 January 2018	Numerous stakeholder requests were made to include the Thanet Cable Replacement (TCR) project within the cumulative assessments of relevant receptors.	The Thanet Cable Replacement project is no longer being pursued and as such a cumulative impact assessment is not required.
S42 Dover District Council January 2018	Dover District Council requested cumulative impacts and inter-related impacts are assessed for both onshore and offshore elements of the project. In addition, they requested the inclusion of re-powering the existing Thanet Offshore Wind Farm (TOWF).	<p>A full list of all projects considered in the technical assessments is provided in Volume 1, Annex 3-1: Cumulative Impact Assessment (Document Ref: 6.1.3.1).</p> <p>The re-powering of the TOWF is not currently a planned project and therefore there is no available information to undertake a meaningful assessment. Therefore, this will not be considered in the EIA, see section 3.6.</p>

Date and consultation phase/ type	Consultation and key issues raised	Section where comment is addressed
S42 Dover District Council January 2018	Dover District Council requested for each main section to have either a summary, or a separate summary document for ease of reference.	<p>The Non-Technical Summary (NTS) (Document Ref: 6.7.1) provides a summary of each of the assessments undertaken. A NTS was also published to accompany the PEIR.</p> <p>Both inter-related and cumulative effects are assessed within each technical chapter as appropriate.</p>

### 3.4 Environmental Impact Assessment Methodology

#### The Environmental Statement

- 3.4.1 The ES provides an assessment of predicted environmental impacts, using the data available at the time. The ES provides sufficient information for consultation with the public, statutory and non-statutory consultees and provides information on the predicted impacts arising from the construction, Operations and Maintenance (O&M) and decommissioning of the development and the assessment methodologies.
- 3.4.2 The potential environmental effects of Thanet Extension have been assessed for each relevant topic area (as agreed during the Scoping phase), by comparing the baseline environment with the expected conditions that will prevail if the development goes ahead. The baseline environment is determined through desk studies and surveys and has been agreed through the Scoping Report, through the Evidence Plan process, and other formal consultation processes.



### Key principles of the Thanet Extension assessment

3.4.3 The assessment of each topic (e.g. fish and shellfish, infrastructure and other users, onshore biodiversity, etc.) forms a separate chapter within the ES. For each topic chapter, the following aspects are addressed:

- Statutory and policy context: provides a summary of the relevant legislation and national policy that have been taken into account in assessing each individual topic;
- Consultation: provides a summary of the consultation responses received to date from statutory consultees and outcomes of the Scoping process, PEIR and the ongoing Evidence Plan process;
- Scope and methodology: provides detail confirming the extent of the study area, describing baseline data sources and survey methodology and topic specific detail on the approach to the impact assessment;
- Description of the existing environment;
- Key parameters for assessment: provides a summary of the potential effects and identifies and justifies the maximum adverse scenario assessed for each effect;
- Embedded mitigation: provides detail on any mitigation measures that have been identified and adopted as part of the evolution of the project design (i.e. embedded into the project design) of relevance to the topic;
- Environmental assessment: presents an assessment of the significance of any identified effects and the magnitude of the potential impacts that may arise during the construction, O&M and decommissioning of the development, taking account of any embedded mitigation; identification of any further relevant mitigation measure to avoid, reduce and if possible remedy any adverse effects; and assessment of the confidence of any assessments of effect;
- Identification of residual impacts (taking into account embedded and further mitigation, where relevant);
- Inter-relationships: provides an assessment of the potential for and significance of any effects on the topic area from multiple impacts arising from the Thanet Extension development (e.g. direct impacts of noise from piling plus indirect impacts from potential sediment plumes changing the nature of feeding or spawning grounds on fish and shellfish together could have an effect significance greater than either impact assessed individually);
- Cumulative impacts: provides an assessment of any cumulative impacts arising from interaction with other projects, plans or activities (onshore and in UK territorial waters);
- Transboundary impacts (offshore only): provides an assessment of any impacts from Thanet Extension on the environment of other European Economic Area states; and

- Identification of any further monitoring required and, where relevant, in principle monitoring plans have been drafted to accompany the development consent application.

### Evidence based approach

3.4.4 The evidence-based approach to EIA involves not only utilising data collected specifically for the purposes of the development but also data and information from sufficiently similar investigations to inform the understanding of the baseline and/ or impact assessments for the development that is the subject of the EIA.

3.4.5 Thanet Extension will encompass the existing Thanet Offshore Wind Farm (TOWF). Extensive data from the EIA process and baseline and post-construction monitoring for the TOWF are available which provide both raw data and also modelling that can be used to help inform the assessments for Thanet Extension. Where possible, appropriate, and agreed with the relevant stakeholders Thanet Extension intend to use this existing data to: aid in the characterisation of the baseline environment, where data is sufficient and appropriate to do so; scope out impacts where there is a clear evidence base; and provide evidence for assessments where impacts are scoped in.

3.4.6 The use of this existing data is encouraged as part of the offshore wind industry's response to government drivers to reduce the cost of offshore wind energy, such as those outlined in the Offshore wind industrial strategy: business and government action (BEIS, 2013). Collaborative Offshore Wind Research into the Environment have provided best practice principles for documentation and dissemination of data (COWRIE, 2008).

3.4.7 Each topic chapter will identify where the data used for the baseline and the assessments is sourced from to inform the EIA. A gap analysis has been undertaken to identify the requirement for additional data to be collected. Each topic chapter provides the methodology for any new data collections (if required) including surveys. Adequate data collection has been undertaken for the purposes of the EIA, which has enabled the receiving environment to be robustly characterised. Further survey post-consent will only be required to inform detailed design. The Evidence Plan (Document Ref: 8.5) provides details of datasets agreed with stakeholders for the purposes of characterisation and assessment for each of the technical expert panels.

### Climate change and carbon assessment

3.4.8 Schedule 4, part 5(f) of the EIA Regulations 2017 states that applicants should assess the impact of the project on climate change (for example the nature and magnitude of greenhouse gas emissions) as well as the vulnerability of the project to climate change.

- 3.4.9 As a renewable energy project, Thanet Extension is considered to have a net beneficial effect in terms of climate change, which will positively contribute to greenhouse gas emission reduction targets. Therefore, no further assessment of greenhouse gas emissions has been undertaken for the project. UK Government targets for reduced greenhouse gas emissions and the use of renewable energy are described in Volume 1, Chapter 2: Policy and Legislation (Document Ref: 6.1.2).
- 3.4.10 In terms of assessing the resilience of the project to the effects of climate change (e.g. sea level rise), this forms an inherent part of the EIA which considers the future baseline environment in the assessment. Where this is relevant for climate change, this is described within the ES chapters (for example, Volume 3, Chapter 6: Ground Conditions, Flood Risk and Land Use (Document Ref: 6.3.6) considers the future baseline flood risk in the absence of the project, and Volume 2, Chapter 2: Marine Geology, Oceanography and Physical Processes (Document Ref: 6.2.2) considers the future baseline in terms of coastal erosion processes). The assessment of those topics that are of relevance to climate change has allowed VWPL to design in sufficient resilience based on climate change projections relevant to those receptors.
- 3.4.11 Where there is meaningful information available on the effects of climate change over the lifetime of the project, the assessment has also captured in-combination climate change impacts. Typically, the EIA has identified that the potential impacts to those receptors most sensitive to the knock-on effects of climate change (ecological receptors) are of greatest significance in the construction phase, which is limited to 2-3 years and is reversible. There is limited potential for these impacts to be compounded by climate change over this short timescale. If climate change has the potential to exacerbate an effect over a longer period of time (i.e. the O&M phase), then this has been captured through assessing impacts compared to the future baseline environment.

### 3.5 Key parameters for assessment

- 3.5.1 The Thanet Extension EIA, in line with the PINS Advice Note Nine: Rochdale Envelope, is based on identifying the 'worst-case' scenario, referred to throughout the EIA as the 'maximum design scenario', for the impact assessment for each topic area. This approach ensures that the scenario that would have the greatest impact (i.e. largest footprint, longest exposure, or tallest dimensions, depending on the topic) is assessed; it can then be assumed that any other (lesser) scenarios will have an impact that is no greater than that assessed.
- 3.5.2 The design information is based on the best available information and the parameters outlined in the project description chapters are realistic yet conservative estimations of future design parameters. Therefore, each chapter will assess the 'realistic worst-case' scenario for each of the identified potential impacts.

- 3.5.3 This approach is particularly advantageous for developments, including offshore wind, where it is not possible to identify the exact components to be used within the final development as it provides for flexibility in design and construction within maximum extents and ranges assessed within the EIA. Therefore, the consent permits the use of any components so long they are within the maximums assessed, rather than limiting the development to existing technology at the time of assessment, which may not be economically viable at the point of construction. This is of particular relevance to offshore wind development, where the technology is constantly improving, with larger and more powerful turbines being developed.
- 3.5.4 The maximum adverse scenario for each topic and the assessment of potential impacts will be derived from the options for each parameter outlined in the Onshore and Offshore Project Description chapters (Chapter 1 of Volumes 2 and 3 (Document Refs: 6.2.1 and 6.3.1) respectively). For example, the foundation type representing the maximum adverse scenario for Benthic and Intertidal Ecology would be the foundation type with the largest physical footprint (loss of habitat), whereas for Marine Mammals, monopile foundations installed using pile driving would represent the worst-case scenario (noise impacts). As described in paragraph 3.4.7 above, the use of existing data and site-specific survey has enabled an adequate characterisation of the receiving environment to enable a robust assessment to be undertaken against a realistic worst-case 'Rochdale Envelope' approach to project design. Post-consent, further survey work including Site Investigation will be required to inform the final detailed design pre-construction.

#### Embedded mitigation

- 3.5.5 The EIA is an iterative process and is used to inform the development of the final project design. Where the preliminary assessments identify unacceptable likely significant effects, changes to the design can be made and/ or mitigation measures can be built-in to the proposed development to reduce these effects. The assessment is then repeated for the revised 'maximum adverse scenario' until:
- The effect has been reduced to a level that is not significant in EIA terms; or
  - No further changes may reasonably be made to the development parameters in order to reduce the magnitude of the impact, thereby permitting the presentation of an effect that is still significant in EIA terms.
- 3.5.6 The EIA Regulations 2017, Schedule 4, require that '*a description of the measures envisaged to avoid, prevent, reduce or if possible, offset any identified significant adverse effects on the environment*' should be included within the ES.

3.5.7 Where changes are required to be made to the design of the project during the iterative following the EIA process, these measures will be clearly identified within this ES. The clear inclusion of these measures within the ES demonstrates the commitment of Thanet Extension to these measures. Where required these measures will be secured by the Development Consent Order (DCO) and/ or the deemed Marine Licences. By employing this method, the significance of effect presented for each identified impact may be presumed to be representative of the maximum residual effect that the development will have, should it be approved and constructed absent any specific mitigation.

3.5.8 Additionally, all mitigation measures will be clearly identified within the Mitigation Schedule (Document Ref 8.3) for Thanet Extension, which will provide a summary of all the enhancement and mitigation commitments agreed pre-application.

#### Additional mitigation measures

3.5.9 In some instances, additional mitigation measures will be outlined in the topic chapters. The extra mitigation measures may be deemed necessary where:

- An effect is significant in EIA terms, even with embedded mitigation, but additional mitigation measures are available to reduce the level of effect; or
- Mitigation has been proposed but has not yet been agreed with regulators, stakeholders, etc. or it is unproven.

3.5.10 Where relevant, these additional mitigation measures are outlined in the topic chapters, after the assessment of significance section.

#### Assessment of effects

3.5.11 Confusion can arise whilst undertaking and reading of the ES due to a lack of clarification around the words 'impact' and 'effect'. Throughout the Thanet Extension EIA process, the term 'impact' is used to define a change that is caused by an action. For example, pile driving of foundations during construction (the action) results in increased levels of subsea noise (the impact). Impacts can be direct, indirect, secondary, cumulative, inter-related or transboundary. They can also be beneficial, adverse or negligible. The term 'effect' is used throughout this assessment to express the outcome of an impact, i.e. the increased levels of noise (impact) from the piling of foundations (action) has the potential to disturb marine mammals or fish (the effect).

3.5.12 Effects are presented within this document as 'significance of effect', which takes into account the magnitude of an impact in combination with the importance and/ or the sensitivity of the receptor or resource, in line with defined significance criteria.

3.5.13 The impacts assessment process considers the following:

- The magnitude of the impact (as outlined in paragraphs 3.5.14 *et seq.*);
- The sensitivity of the receptor to the impact;
- The probability that the impact will result in a given effect;
- The significance of the resulting likely environmental effect; and
- The level of certainty inherent within the assessment.

#### *The magnitude of impact*

3.5.14 The magnitude of the impact depends on a range of factors, all of which feed into the magnitude assigned to each impact. These factors are:

- Spatial extent – the geographical area over which the impact occurs;
- Duration – the time over which the impact occurs;
- Frequency – how often the impact occurs over the lifetime of the development; and
- Severity – the degree of change relative to the baseline.

3.5.15 Based on the above criteria, the magnitude of impact is assessed as being within one of four impact severity groups, and can be either beneficial or adverse:

- Negligible;
- Low;
- Medium; or
- High.

3.5.16 Each topic area presents a 'Magnitude of impact' table within the assessment chapter. This table presents how the magnitude of the identified impacts is defined based on the criteria above.

### *The sensitivity of the receptor*

3.5.17 The sensitivity of a receptor is dependent on its capacity to accommodate change and its ability to recover if it is affected. The sensitivity of a receptor can therefore be determined using the following factors:

- Adaptability – the degree to which a receptor can avoid or adapt to an impact;
- Tolerance – the ability of a receptor to accommodate temporary or permanent change without a significant adverse effect;
- Recoverability – the temporal scale over and extent to which a receptor will recover following an impact;
- Value – a measure of the importance of a receptor in terms of ecological, social/ community, and/ or economic value.

3.5.18 The sensitivity of a receptor is defined within each topic on the following scale:

- Negligible;
- Low;
- Medium; or
- High.

3.5.19 Each topic area presents a ‘Sensitivity/ importance of the environment’ table within the assessment chapter. This table presents how sensitivity is defined for the topic’s receptors based on the criteria above.

### *Probability of impact*

3.5.20 For some assessments, such as Shipping and Navigation (Document Ref: 6.2.10), the probability of an impact occurring is taken into consideration when determining the significance of the effect (see below).

### *Determination of effect significance*

3.5.21 The significance of an effect, either adverse or beneficial, is determined using a combination of the magnitude of the impact and the sensitivity of the receptor. A matrix approach is to be used throughout all topic areas to ensure a consistent approach. The matrix is presented below in Table 3.2. Note: some technical disciplines have adopted a revised matrix to ensure that they are fully compliant and that the methodology applied is not over-prescriptive.

3.5.22 The terms assigned to categorise the significance of effects, where they are predicted to occur, can be described as follows:

- Negligible: beneficial or adverse – where the development would cause no discernible improvement in or deterioration of the existing environment;
- Minor: beneficial or adverse – where the development would cause a barely perceptible improvement in or deterioration of the existing environment;
- Moderate: beneficial or adverse – where the development would cause a noticeable improvement or deterioration of the existing environment; or
- Major: beneficial or adverse – where the development would cause a considerable improvement or deterioration of the existing environment.

3.5.23 In general, the categories of **Moderate** and **Major** would be considered significant in EIA terms, however the exact definition of these terms will be defined further within each topic chapter.

3.5.24 For example, if the magnitude of the impact is assessed as High (negative) and the sensitivity of the receptor is assessed as Negligible, then the significance would be **Minor** adverse (see Table 3.2), and therefore would not be considered significant in EIA terms.

3.5.25 Alternatively, if the magnitude of the impact is assessed as High (beneficial) and the sensitivity of the receptor is assessed as Low, then the significance would be determined as **Moderate** beneficial, and therefore would be considered significant in EIA terms.

**Table 3.2: Significance of potential effects**

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

*Level of certainty*

3.5.26 The determination of the significance of effect incorporates and describes any uncertainty inherent within the assessment. This may arise from the data used within the assessment, the identification of activities and impacts, the confidence in determining impact magnitude and receptor sensitivity and ultimately in assigning significance levels of predicted resulting effects.

*Further mitigation and future monitoring*

3.5.27 Paragraphs 3.5.5 *et seq.* describe the process of embedding mitigation measures within the design of the project and how the assessment incorporates these measures. Where the assessment determines that impacts determined as significant remain, further mitigation may be required and this will be detailed within the specific topic chapter.

3.5.28 The requirements for future monitoring will be agreed with the relevant stakeholders and secured within the DCO.

**3.6 Cumulative effects assessment**

3.6.1 A Cumulative Effects Assessment (CEA) is required under the EIA Regulations 2017 (Schedule 4, Paragraph 5(e)). Cumulative effects are defined as those effects on a receptor that may arise when the development is considered together with other existing and/ or approved projects.

3.6.2 The need to consider cumulative effects is also outlined in NPS EN-1 (DECC, 2011a), which states:

*‘When considering cumulative effects, the ES should provide information on how the effects of the applicant’s proposal would combine and interact with the effects of other development (including projects for which consent has been sought or granted, as well as those already in existence)’.*

3.6.3 The approach to the CEA is based on PINS Advice Note 17 (PINS, 2015). Full details of the approach to the assessment is provided in Volume 1, Annex 3-1 (Document Ref: 6.1.3.1); a list of projects for inclusion within the CEA is also provided within this Annex. The potential cumulative effects are assessed within each relevant topic chapter.

**Approach to cumulative effects assessment**

3.6.4 The PINS guidance (Advice Note 17, PINS 2015b) identifies that other major developments in the area should be taken into consideration in the CEA, including those which are:

- Under construction;
- Permitted application(s), but not yet implemented;
- Submitted application(s), but not yet determined;
- Projects on the National Infrastructure Planning Portal’s Programme of Projects;
- Identified in the relevant development plan (and emerging development plans – with appropriate weight given as they move closer to adoption) recognising that much information on any relevant proposals will be limited; and
- Identified in other plans and programmes (as appropriate) which set the framework for future development consents/ approvals, where such development is reasonably likely to come forward.

3.6.5 Projects that were built and operational at the time that survey data were collected have been classified as part of the baseline conditions. For those projects that were only partially constructed or have only recently been completed, the full extent of the impacts arising from the development(s) may not be known and have therefore been included within the CEA.

- 3.6.6 The CEA consists of a screening exercise of projects, plans and activities, and the assessment. The screening process is carried out by defining agreed ranges at which it is agreed that different projects, plans and activities may have a cumulative effect and then identifying any plans, projects and activities within that area. For Thanet Extension, the ranges presented in Table 3.3 were applied. The ranges applied have been derived based on best practice and expert judgement.
- 3.6.7 All relevant potential cumulative effects are considered, regardless of assessed significance when the project is assessed in isolation.

**Table 3.3: CEA Offshore search area extents**

Project, Plan and Activity Type	CEA search area extents
Aggregate and disposal	Up to 50 km from the Thanet Extension array area and Offshore Export Cable Corridor (OECC)
Offshore energy	Up to 500 km from the Thanet Extension array area and OECC
Commercial fisheries	Up to 200 km from the Thanet Extension array area and OECC
Oil and gas	Up to 200 km from the Thanet Extension array area and OECC
Cables and pipelines	Up to 50 km from the Thanet Extension array area and OECC
Shipping	Up to 200 km from the Thanet Extension array area and OECC
Military, aviation and radar	Up to 200 km from the Thanet Extension array area and OECC
Coastal	Up to 200 km from the Thanet Extension array area and OECC

**Table 3.4: CEA Onshore search area extents**

Project component	CEA search area extent
Onshore	Up to 5 km from the Thanet Extension Red Line Boundary (RLB) (including from landfall, substation and within the RLB)

- 3.6.8 Following the identification of all projects within these search extents, a ‘long-list’ of the projects was created, providing information on the project, plan or activity including: project name, information source, data confidence assessment, scale/ capacity, status of the development, known planned construction programme, and distance to the Thanet Extension array area and/ or export cable corridor.

- 3.6.9 Using the above information, a further screening exercise is undertaken, screening plans, projects or activities in or out of the final assessment based on: the data confidence; whether there is a conceptual overlap; whether there is a spatial overlap; and whether there is a temporal overlap. Following this second screening process, a ‘short-list’ is created, with the included plans, projects and activities taken forward for the assessment.

*Tiering*

- 3.6.10 In assessing the potential cumulative impact(s) for Thanet Extension, it is important to bear in mind that for some projects, predominantly those ‘proposed’ or identified in development plans etc. may or may not actually be taken forward. There is thus a need to build in some consideration of certainty (or uncertainty) with respect to the potential impacts which might arise from such proposals. For example, relevant projects/ plans that are already under construction are likely to contribute to cumulative impact with Thanet Extension (providing effect or spatial pathways exist), whereas projects/ plans not yet approved or not yet submitted are less certain to contribute to such an impact, as some may not achieve approval or may not ultimately be built due to other factors.
- 3.6.11 For this reason, all relevant projects/ plans considered cumulatively alongside Thanet Extension have been allocated into ‘Tiers’, reflecting their current stage within the planning and development process. This allows the cumulative impact assessment to present several future development scenarios, each with a differing potential for being ultimately built out. Appropriate weight may therefore be given to each scenario (Tier) in the decision-making process when considering the potential cumulative impact associated with Thanet Extension (e.g. it may be considered that greater weight can be placed on the Tier 1 assessment relative to Tier 2).
- 3.6.12 The projects and plans selected as relevant to the assessment of impacts of each topic are based upon an initial screening exercise undertaken on a long list. Each project, plan or activity has been considered and scoped in or out on the basis of effect-receptor pathway, data confidence and the temporal and spatial scales involved.
- 3.6.13 The following tier structure ensures that there is a clear understanding of the level of confidence in the cumulative assessments provided in the Thanet Extension ES:
  - Tier 1
    - Thanet Extension considered alongside other projects/ plans currently under construction and/ or those consented but not yet implemented, and/ or those submitted but not yet determined where data confidence for the projects falling within this category is High; and/ or

- Built and operational projects will be included within the cumulative assessment where they have not been included within the environmental characterisation survey, i.e. they were not operational when baseline surveys were undertaken, and/ or any residual impact may not have yet fed through to and been captured in estimates of 'baseline' conditions or there is an ongoing effect.
  - Tier 2
    - All projects included in Tier 1 plus other projects/ plans consented but not yet implemented and/ or submitted applications not yet determined where data confidence for the projects falling into this category is Medium.
    - This includes, for example, Norfolk Vanguard for which PEIR has been submitted and data availability is Medium.
  - Tier 3
    - The above plus projects on relevant plans and programmes (the PINS Programme of Projects and MMO 'Marine Case Management System' being the source most relevant for this assessment). Specifically, all projects where the developer has advised PINS in writing that they intend to submit an application in the future were considered. This includes when data availability is limited and/ or data confidence is Low.
- 3.6.14 The specific projects scoped into this cumulative impact assessment, and the tiers into which they have been allocated are presented in tabular form in each of the assessments. The operational projects included within the tables are included due to their completion/ commission and as such not included within the baseline characterisation.
- 3.6.15 The use of three tiers, as per Advice Note Seventeen , was agreed through the Evidence Plan process in January 2018. The use of three tiers has also been adopted by a number of recent Offshore Wind Farm (OWF) ESs such as Walney Extension OWF and Hornsea Project 3.
- 3.6.16 To ensure that the tiering of projects was still using the best available information on the proposed projects and plans, the tiering assessment was reassessed following PEIR. This reassessment was circulated to the onshore Evidence Plan panels has been agreed.
- 3.6.17 The CEA includes all projects, plans or activities in Tiers 1 and 2. Tier 3 projects are included where sufficient information exists or otherwise a very high-level assessment is undertaken.
- 3.6.18 The CEA assessment methodology broadly follows that of the EIA detailed above, in order to maintain consistency throughout the chapter and allow relevant comparisons to be made.

3.6.19 The following chapters have deviated are made from this (three) tiered approach, this is detailed and justified within:

- Volume 2, Chapter 4: Offshore Ornithology (Document Ref: 6.2.4);
- Volume 2, Chapter 7: Marine Mammals (Document Ref: 6.2.7);
- Volume 3, Chapter 7: Historic Environment (Document Ref: 6.3.7); and
- Volume 3, Chapter 8: Traffic and Access (Document Ref: 6.3.8).

### 3.7 Inter-related effects

3.7.1 The inter-related effects assessment considers the likely significant effects of multiple impacts from the proposed development on one receptor. For example, noise and air quality together could have a greater effect on fauna than each impact considered separately.

3.7.2 Inter-related effects are assessed through consideration of all effects on a receptor by the Project. An assessment of the potential for all effects on that receptor to interact, whether that be spatially or temporally, results in the identification of inter-related effects on a receptor (e.g. all effects on human amenity – noise and air quality, access, and traffic – these might be short-term, temporary or transient effects or incorporate longer term effects).

3.7.3 The inter-related effects assessment methodology and screening process is outlined in Volume 2, Chapter 14: Inter-relationships (Document Ref: 6.2.14). The assessment incorporates the findings of the individual assessment chapters to describe the potential additional effects that may be of greater significance than the isolated individual effects acting on the receptor. If there are additional effects from separately considered impacts acting together, these are considered qualitatively using professional judgement. The approach can be summarised via the following key steps:

- Identification of relevant receptors from the assessment of significance of effect sections within each topic chapter;
- Identification of the impact source pathways that can affect the receptor and identification of the ES chapter where those pathways are described and assessed;
- Identification of potential effects on these receptor groups through a review of assessment sections; and
- Production of the inter-related effects assessment, utilising tables listing all potential effects on selected receptors during the construction, O&M and decommissioning phases.

### 3.8 Transboundary impacts

- 3.8.1 Transboundary impacts are those that may have an impact on the environment in other European Economic Area (EEA) states. The need to consider these transboundary impacts is enshrined within the United Nations Economic Commission for Europe (UNECE) Convention on EIA in a Transboundary Context, adopted in 1991 in the Finnish city of Espoo (the 'Espoo Convention').
- 3.8.2 The Espoo Convention has been incorporated into the EIA Directive and has been transposed into UK law through the EIA Regulations. The Secretary of State (SoS) is required to consider the potential for transboundary impacts and where it is deemed that there is the potential for transboundary impacts or an EEA state submits a request, then the prescribed consultation and notification process must be followed.
- 3.8.3 PINS Advice Note 12: Transboundary Impacts (PINS, 2015), recommends that the developer undertakes independent consultation with other EEA states that may be affected. This is suggested to speed up the consultation process and reduces the risk to the development of a lack of time to consider transboundary impacts at the Examination stage (which would lead to possible consent refusal). It is suggested that all relevant environmental bodies within the identified EEA states and any relevant interest groups be consulted as appropriate.
- 3.8.4 Where consultation is required and undertaken by the developer, they are recommended to collate the names and contact details for the relevant EEA states and share this information with PINS and the SoS. All consultation will be recorded within the Consultation Report submitted alongside the final consent application.
- 3.8.5 Potential transboundary impacts include, for example, increased subsea noise levels from piling which could affect marine mammal populations in other EEA state waters or displacement of fishing vessels from the area around the development into other EEA state waters.
- 3.8.6 Transboundary impacts are assessed in each chapter. The transboundary impacts assessment has two stages, screening and assessment. This assessment methodology will follow that of the EIA methodology. Where any deviations are required on a topic by topic basis, these will be detailed within the relevant EIA topic chapter.
- 3.8.7 The screening process has identified that the following receptors may experience transboundary impacts from Thanet Extension:
- Volume 2, Chapter 6: Fish and Shellfish Ecology (Document Ref: 6.2.6);
  - Volume 2, Chapter 7: Marine Mammals (Document Ref: 6.2.7);
  - Volume 2, Chapter 4: Offshore Ornithology (Document Ref: 6.2.4);
  - Volume 2, Chapter 9: Commercial Fisheries (Document 6.2.9);

- Volume 2, Chapter 10: Shipping and Navigation (Document Ref: 6.2.10);
  - Volume 2, Chapter 13: Offshore Archaeology (Document Ref: 6.2.13); and
  - Volume 3, Chapter 3: Socio-economics (Document Ref: 6.3.3).
- 3.8.8 A Transboundary Screening Opinion was produced by PINS (PINS, 2017b) on the basis of the initial Scoping Report submitted by Vattenfall Wind Power Ltd. This document was published and disseminated to the relevant EEA states by PINS. In addition, the PEIR was sent to transboundary consultees and additional project information has been made available online by VWPL. The consultation responses received to date have informed the identification and screening of likely significant transboundary effects addressed in this ES. The Regulation 6 Notice has also provided consideration of transboundary impacts.



### 3.9 References

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