

Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Appendix 23 to Deadline 2 Submission: Saltmarsh
Mitigation, Reinstatement and Monitoring Plan

Relevant Examination Deadline: 2

Submitted by Vattenfall Wind Power Ltd

Date: February 2019

Revision B

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Approved By:	Daniel Bates
Date of Approval:	February 2019
Revision:	A

Revision A	Original Document submitted in the Application
Revision B	Revised document submitted to the Examining Authority
N/A	
N/A	

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Thanet Extension Offshore Wind Farm

Saltmarsh Mitigation, Reinstatement and Monitoring Plan

Date: February 2019

Author: GoBe Consultants Ltd

Revision: B

Document Reference Number: 8.13

Revision and Approvals					
Rev	Date	Reason for Issue	Originated by	Checked by	Approved by
B	February 2019	Updated on receipt of consultee consultation	GoBe Consultants Ltd	GoBe Consultants Ltd	Daniel Bates
A	22/05/18	Submitted with Application	GoBe Consultants Ltd	Daniel Bates	Helen Jameson
Draft	15/05/18	Pre-client draft for review	GoBe Consultants	GoBe Consultants	GoBe Consultants

Table of Contents

FIGURES.....	3
LIST OF ABBREVIATIONS.....	4
1. OVERVIEW.....	5
1.1. CONTEXT.....	5
1.2. OBJECTIVE.....	5
2. PROJECT OVERVIEW.....	6
2.1. THANET EXTENSION OFFSHORE WIND FARM.....	6
2.2. WORST-CASE SCENARIO.....	9
2.3. WORKS PROCEDURE.....	15
<i>Site mobilisation.....</i>	<i>15</i>
<i>Work site establishment:.....</i>	<i>17</i>
<i>Trench excavation (within the saltmarsh):.....</i>	<i>17</i>
<i>Cable pull in:.....</i>	<i>17</i>
<i>Cable burial:.....</i>	<i>18</i>
<i>De-mobilisation:.....</i>	<i>18</i>
3. CONSULTATION.....	20
3.1. EVIDENCE PLAN.....	20
3.2. SECTION 42.....	21
3.3. RELEVANT AND WRITTEN REPRESENTATIONS.....	23
4. EXISTING SALTMARSH HABITAT AND PREVIOUS SURVEYS.....	24
5. MITIGATION MEASURES FOR CABLE INSTALLATION WORKS.....	26
6. PROPOSED PRE-CONSTRUCTION BASELINE SURVEY.....	28
7. POST-CONSTRUCTION MONITORING AND REINSTATEMENT.....	29
7.1. MONITORING.....	29
7.2. REINSTATEMENT.....	29
8. REFERENCES.....	31

Figures

Figure 2-1: Onshore Cable Route: Landfall Option 1.	7
Figure 2-2: Onshore Cable Route: Landfall Option 3.	8
Figure 2-3: Maximum area of disturbance within the Sandwich Bay to Hacklinge Marshes SSSI. ...	11
Figure 2-4 Indicative layout of Option 3. Extracted from Volume 3, Chapter 1: Project Description (Offshore) (PINS Ref APP- 057/ Application Ref 6.3.1).	13
Figure 2-5 Indicative cofferdam layout for open trenching cable installation. Under both Options 1 and 3 the sea defence would remain in its existing position.	14
Figure 2-6: Illustration of sheet piling used for intertidal cofferdams (Sheet Piling UK Ltd).....	16
Figure 4-1: Thanet Extension export cable landfall site in relation to designated areas.	25

Tables

Table 1: Summary of the maximum cable installation parameters within the saltmarsh habitat....	10
Table 2: Evidence Plan comments relating to saltmarsh habitat.	20
Table 3: Section 42 consultation comments relating to the saltmarsh habitat at the landfall site. .	22
Table 4: Mitigation and Management Controls.....	27

List of Abbreviations

Abbreviation	Definition
DAFOR	Dominant, Abundant, Frequent, Occasional, Rare
HDD	Horizontal Directional Drilling
HVADC	High Voltage Direct Alternating Current
MMO	Marine Management Organisation
NNR	National Nature Reserve
PEIR	Preliminary Environmental Information Report
SAC	Special Area of Conservation
SMRMP	Saltmarsh Mitigation, Reinstatement and Monitoring Plan
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
Thanet Extension	Thanet Extension Offshore Wind Farm
TDC	Thanet District Council
TJBs	Transition Joint Bays
TOWF	Thanet Offshore Wind Farm
VWPL	Vattenfall Wind Power Ltd

1. Overview

1.1. Context

- 1.1.1. This document is the Saltmarsh Mitigation, Reinstatement and Monitoring Plan (SMRMP) for the proposed Thanet Extension Offshore Windfarm (Thanet Extension). This document is being submitted in support of the Thanet Extension project and reflects the final project description as amended following the Section 42 consultation and receipt of the Relevant Representations and Written Representations of relevance to this document.
- 1.1.2. Saltmarsh habitat is valued due to its flood and coastal defence function and ecosystem and conservation importance, as well as its role in pollution control, waste disposal and the maintenance of water quality. It supports various vegetation, large numbers of both rare and abundant invertebrates and provides feeding and roosting areas for a large number of migrant, over-wintering and breeding birds. The Saltmarsh habitat present on site is of specific value given its identification as a supporting habitat of the Sandwich Bay RAMSAR¹. It is noted that the saltmarsh does not form a designated feature of the Sandwich Bay Special Area of Conservation (SAC) or the Thanet Coast and Sandwich Bay Special Protected Area (SPA).

1.2. Objective

- 1.2.1. The objective of this SMRMP is to describe the actions needed to ensure that the development will minimise the temporary effects on the saltmarsh area associated with the construction and installation of the proposed Thanet Extension export cable. The provision of this document is secured under the pre- and post-construction conditions within the deemed Marine Licence (dML). This will be achieved through the application of appropriate mitigation, the success of which will be monitored post-construction. Following the removal of the Option 2 landfall design there will no longer be permanent habitat loss of saltmarsh. This document will provide information on the following areas, and is structured accordingly:
- Brief overview of the Thanet Extension project and proposed cable installation options;
 - Overview of the worst-case scenario;
 - Details of installation procedures and requirements;
 - Brief overview of consultation responses received to date;
 - Details of the existing saltmarsh habitat and previous surveys;
 - Mitigation measures which will be in place to preserve the saltmarsh habitat;
 - Outline of the proposed pre-construction baseline survey; and
 - Details of post-construction monitoring and reinstatement requirements.

¹ A RAMSAR Site is a wetland site designated of international importance under the RAMSAR Convention.

2. Project Overview

2.1. Thanet Extension Offshore Wind Farm

- 2.1.1. Vattenfall Wind Power Ltd (VWPL) is proposing the development of Thanet Extension. If successful, the project would be located approximately 8 km offshore in the proximity of the operational Thanet Offshore Wind Farm (TOWF). Thanet Extension would have a generating capacity of up to 340 MW with the electricity being exported from the array to the landfall location via an export cable corridor. Landfall denotes the location where the offshore cables are brought ashore and connected to the onshore cables at Transition Joint Bays (TJBs). Landfall for Thanet Extension is at Pegwell Bay and passes over/ through saltmarsh and mudflats before entering the Country Park.

The proposed method for the installation of the export cable through the saltmarsh will depend on the final design of the onward/ onshore cable. Two designs are currently being proposed for the landfall cable installation. Option 1 involves drilling, via Horizontal Directional Drilling (HDD), from the Country Park underneath the existing sea wall and at least 100 m seaward into the intertidal zone (

- 2.1.2. Figure 2-1). Option 3 involves burial of the TJBs in the Country Park using open trenching through the saltmarsh with no extension of the sea wall (Figure 2-2). Both Options 3 require the installation of a temporary cofferdam within the saltmarsh area. As identified in paragraph 1.1.2 the extension of the seawall landfall design (Option 2) has been removed from the design envelope of the project.
- 2.1.3. The different design options are due to the difference in height of the Country Park compared to the intertidal area containing the saltmarsh (a height differential of approximately 1.5 - 2 m). This is combined with the presence of an historic landfill site on which the Country Park is located. The TJBs will be either buried within the Country Park (under both Options 1 and 3). The perimeter of the Country Park is characterised by a rock armour wall which it is understood acts as a buffer between the historic landfill and the surrounding environment; it is understood that it does not represent an Environment Agency managed sea defence but that it does form a defence of the material within the landfill. As the TJBs would be buried within the Country Park there will be no need to amend the perimeter of the Country Park. More detail on each landfall design can be found in ES, Volume 3, Chapter 1: Project Description (Onshore) (PINS Ref APP-057/ Application Ref 6.3.1).

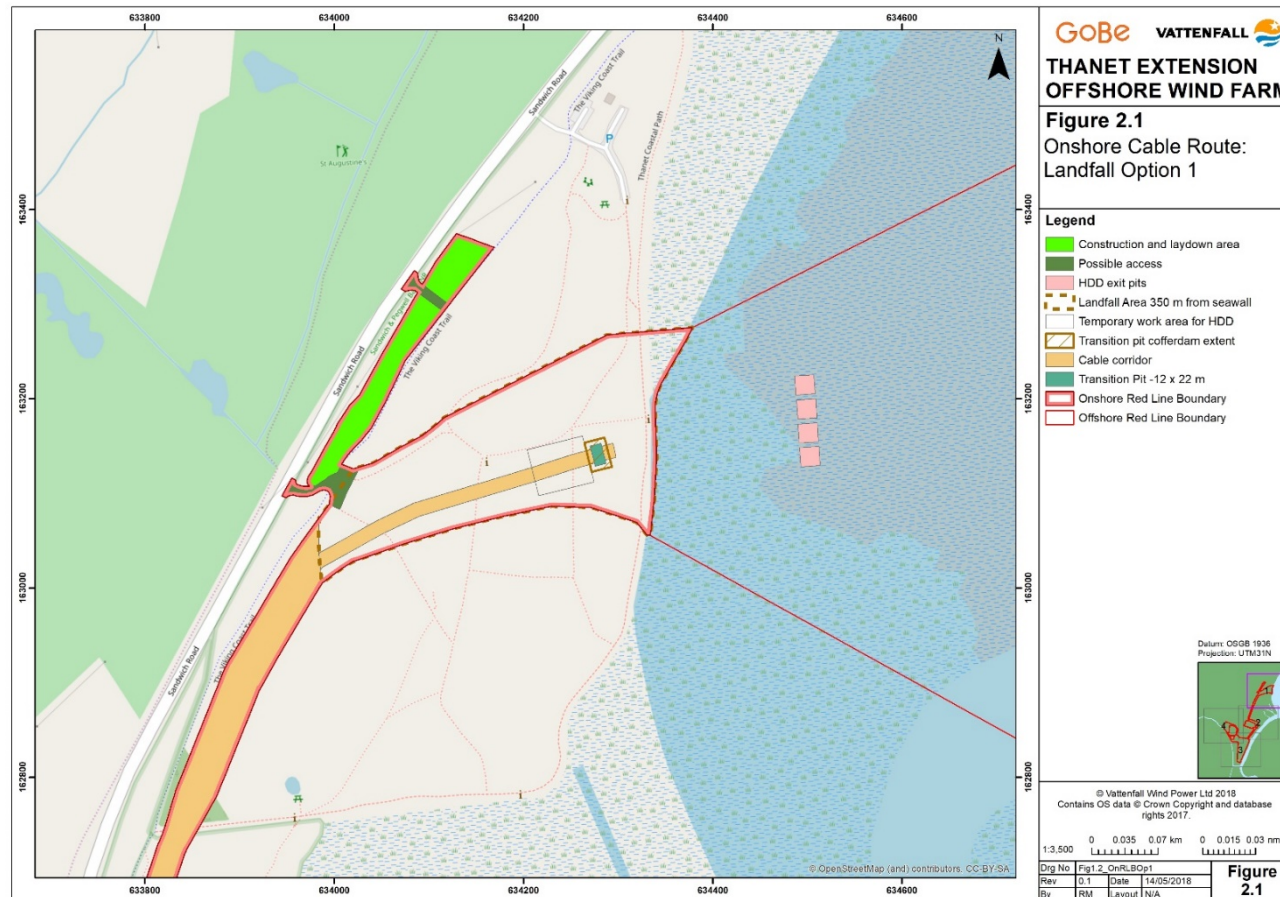


Figure 2-1: Onshore Cable Route: Landfall Option 1.



Figure 2-2: Onshore Cable Route: Landfall Option 3.

2.2. Worst-case Scenario

- 2.2.1. For the purpose of this mitigation plan the worst-case scenario for temporary disturbance to saltmarsh habitat is assessed. The worst-case scenario encompasses the open trenching operation, of up to four cables, for Option 3 (Figure 2-2) and the largest cofferdam construction area required.
- 2.2.2. HDD, if possible, will bypass the saltmarsh habitat by drilling underneath the saltmarsh and exiting out in the intertidal area (
- 2.2.3. Figure 2-1), therefore avoiding any interaction with the saltmarsh (as noted in Volume 1, Chapter 3: Project Description (Onshore) (PINS Ref APP-057/ Application Ref 6.3.1). The drilling fluid is anticipated to be bentonite, which is a natural clay water based material and any spillage will be dealt with according to the Code of Construction Practice (PINS Ref APP-133/ Application Ref 8.1).
- 2.2.4. The worst-case temporary disturbance area in the saltmarsh will be 7,372 m² of saltmarsh north of the Stour, which represents approximately 0.67% of the total saltmarsh habitat within the SSSI (using the assumptions presented in Table 1, and 2016 Environment Agency data).
- 2.2.5. The calculation of the area affected by trenching and the cofferdam working area in the saltmarsh was presented in the Benthic Intertidal and Subtidal Ecology Chapter (PINS Ref APP-046/ Application Ref 6.2.5). This area was calculated for the receptor (saltmarsh) specific assessment through reference to the maximum working width of cable installation (35m) for a maximum worst case length of saltmarsh of 100m plus a maximum working area for cofferdam installation (3,872m²). The trench area was considered as part of the wider 'intertidal' footprint (80,000 m² (2 km x 40 m), with both the intertidal trench and working areas presented in the Project Description (PINS Refs APP-042/ Application Ref 6.2.1) and the Project Description Transcription Note (Annex A to Appendix 1 of the Applicant's Deadline 1 Submission (PINS Ref REP1-023). Therefore, the total area of temporary disturbance within the saltmarsh is the sum of the maximum working area and the trenching area 7,372 m² (3,872 m² (maximum working area) + 3,500 m² (trenching)).
- 2.2.6. This worst-case scenario is based on no seaward extension of the sea defence (Figure 2-2), four export cables with a layout as shown in Figure 2-4 and the use of a cofferdam required to prevent the release of contaminants, as shown in Figure 2-5. The works will be undertaken between April to September to avoid the October to March period which is sensitive to the golden plover and turnstone features of the Thanet Coast and Sandwich Bay SPA. Therefore, the works will be undertaken in the summer months which typically have lower precipitation rates relative to winter months.

Table 1: Summary of the maximum cable installation parameters within the saltmarsh habitat.

Parameter	Maximum design scenario assessed
Maximum trench length (per cable)	100 m
Maximum trench width (per cable)	1 m
Maximum trench depth (per cable)	1-3 m
Maximum area of saltmarsh impacted by trenching (4 cables)	400 m ²
Maximum width of appropriate tracking and displaced saltmarsh storage area adjacent to the trenches (4 cables) (See Figure 2-4 for layout)	25 m
Overall temporary impact footprint from trenching (4 cables plus tracks)	3,500 m ² (35 m x 100 m)
% of saltmarsh area impacted by trenching	0.32%
Maximum working area in the saltmarsh	3,872 m ²
Total area of temporary impact on saltmarsh during cable installation	7,372 m ²
Total % of saltmarsh area (as defined by **Environment Agency Saltmarsh Survey 2016) impacted during cable installation	0.67%

**Saltmarsh within Thanet Coast and Sandwich Bay SPA.

2.2.7. Figure 2-3 displays the landfall, open trench area and cofferdam area which falls within the saltmarsh habitat. The maximum design scenario has been over cautious with respect to the total area of impact for the cable installation. It should be noted that the maximum trench length extends 100 m seaward of the cofferdam and construction tracking area. This ensures coverage of the maximum width of saltmarsh within the landfall RLB (situated to the north of the open trench area in Figure 2-3). Due to the level of uncertainty for the landfall construction this maximum scenario ensures the fullest extent of temporary disturbance is accounted for.

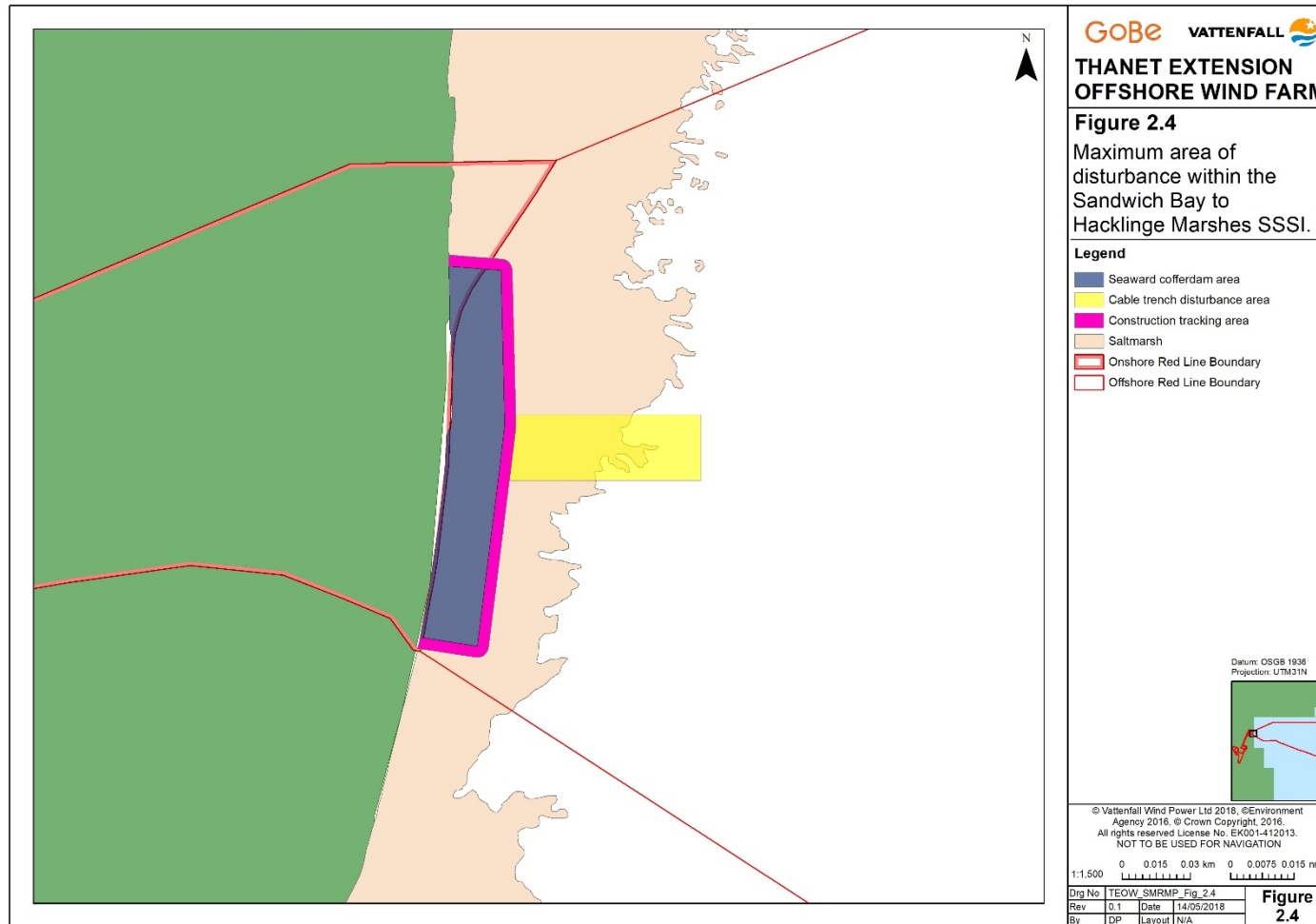


Figure 2-3: Maximum area of disturbance within the Sandwich Bay to Hacklinge Marshes SSSI.

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- 2.2.8. The numbers of transits expected are detailed in Volume 3, Chapter 1: Project Description (Onshore) (PINS Ref APP-057/ Application Ref 6.3.1) and Chapter 8: Traffic and Transport (PINS Ref APP-064/ Application Ref 6.3.8). Approximate equipment, vehicles and procedures for each phase are as follows:
- Up to six tracked backhoe excavators for cable control during pull in and excavation for cable protection;
 - Dumper truck for material/roller transport;
 - During cable landing, a single backhoe excavator is required to transit alongside the cable route for cable control and to place and remove the cable rollers;
 - During cable installation backhoe excavators are required to access alongside the cable route to excavate and backfill the cable trench. An excavator is also used to lift and control the cable during these operations; and
 - A service crane and other lifting/ loading vehicles to deliver, install and remove the cofferdam required for the works with the potential of 40 movements by large vehicles.
- 2.2.9. During saltmarsh works all vehicles will be confined to the temporary access trackways to avoid ground compaction. These tracks will be confined within the maximum footprint (35 m) as presented in Figure 2-4.

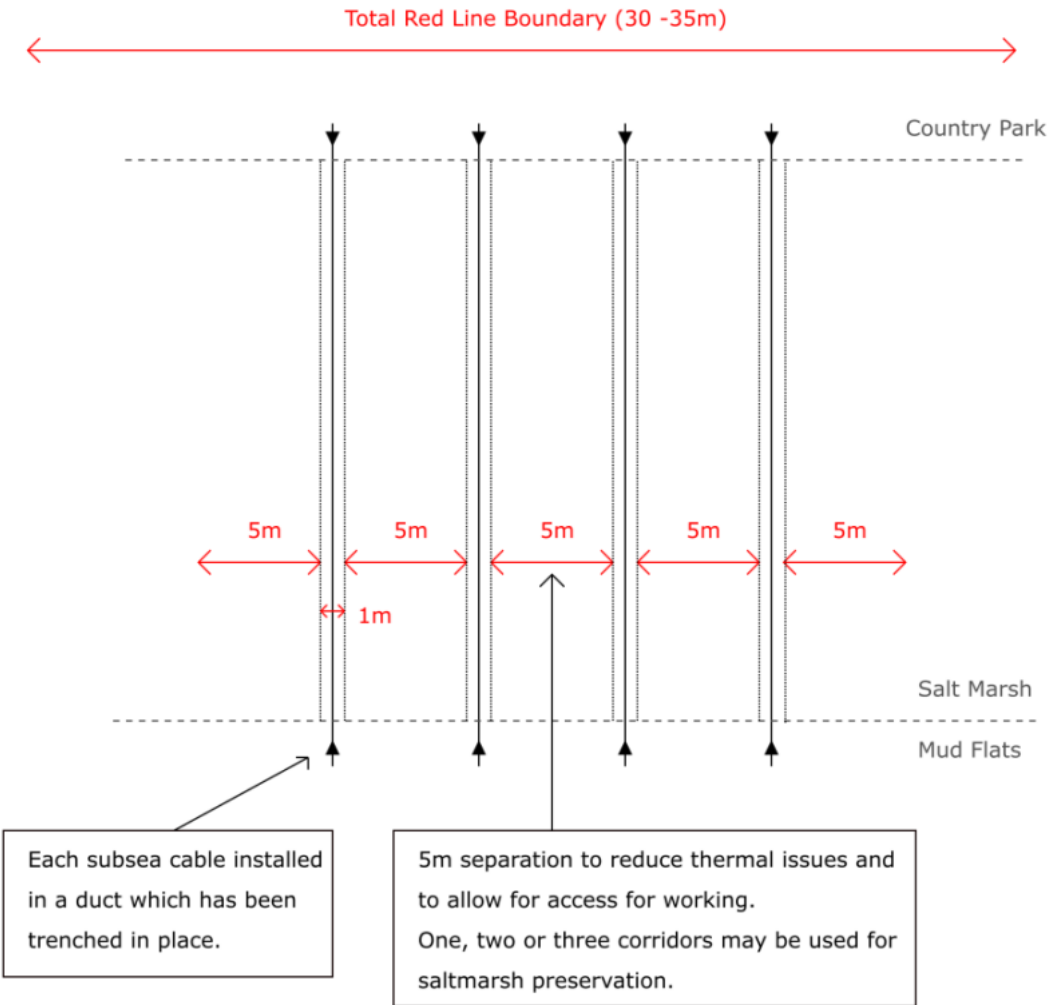


Figure 2-4 Indicative layout of Option 3. Extracted from Volume 3, Chapter 1: Project Description (Offshore) (PINS Ref APP- 057/ Application Ref 6.3.1).

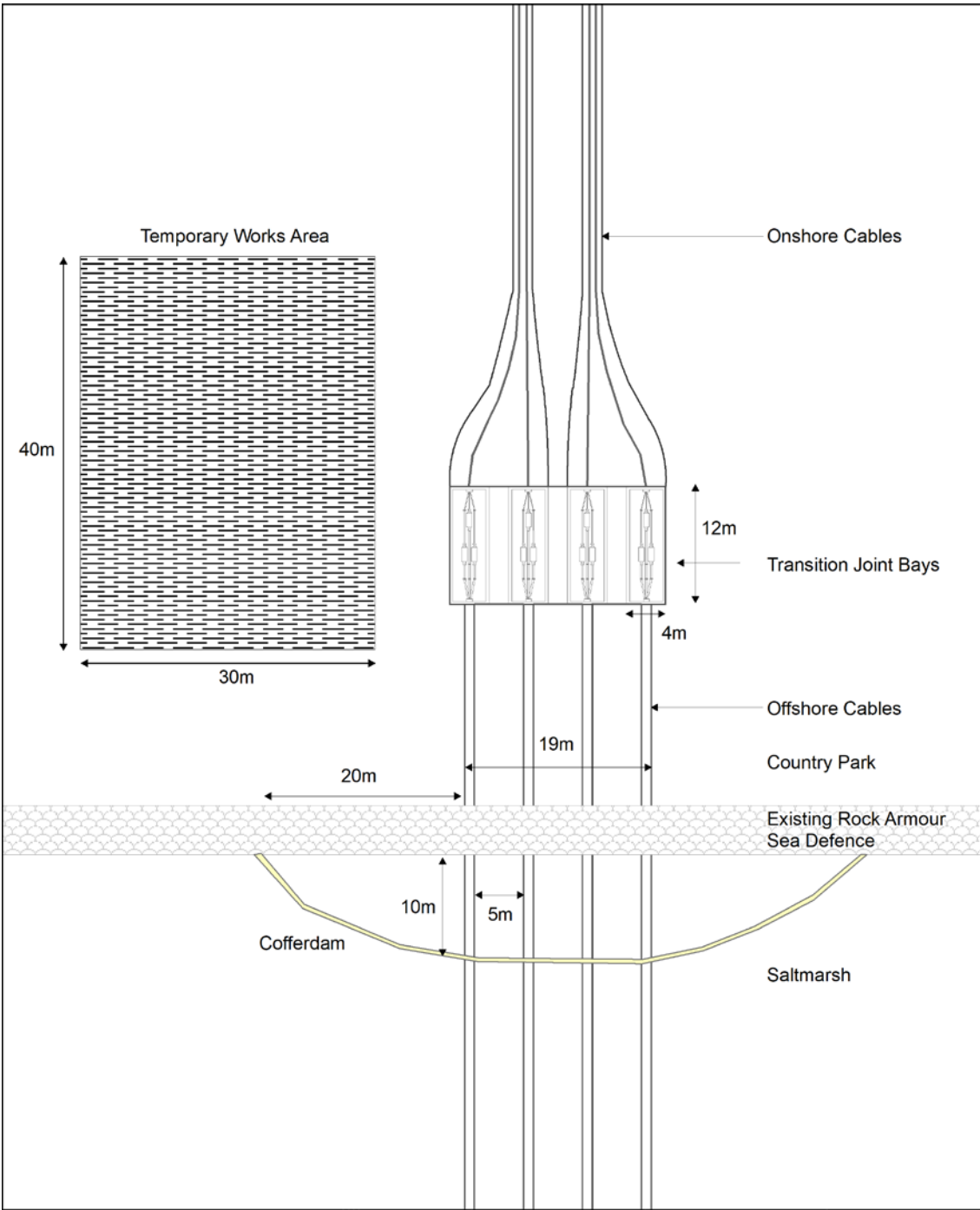


Figure 2-5 Indicative cofferdam layout for open trenching cable installation. Under both Options 1 and 3 the sea defence would remain in its existing position.

2.3. Works Procedure

Site mobilisation

- 2.3.1. For cable installation via open trenching, access is required to the saltmarsh to install the cable ducts for the subsea cables to be pulled through. This process will cause disturbance to the saltmarsh due to the excavation of a maximum of four trenches into which the ducts will be installed. These trenches will be deep enough to enable the cables to be buried to at least 1 m within the saltmarsh. Disturbance will also be caused by vehicle access for reinstatement. Suitable running boards or mats will be laid on the saltmarsh to minimise the damage from vehicles. Diagrams of the proposed landfall site plans which require open trenching can be seen in Figure 2-5. Note that this diagram shows the basic outcome of Option 3 for landfall as stated in the Onshore Project Description (PINS Ref APP-057/ Application Ref 6.3.1). For Option 3 the sea wall will remain in its current position.
- 2.3.2. Option 3 requires the installation of a cofferdam on the seaward side of the existing sea defence. This is to enable the sea wall to be dismantled to allow trenching activities to access the country park. The cofferdam is primarily being installed to mitigate against any leachate from the historic landfill which may be exposed to the intertidal environment when the sea defence is opened. A proposed layout of the cofferdam can be seen in Figure 2-6. The cofferdam will be constructed of metal sheets piled into the saltmarsh area and will enclose all sea wall construction activities. It will enable cable trenching to reach the sea defence without having an opening directly between the landfill and intertidal environment. The maximum working area (including the cofferdam) within the saltmarsh will be 3,872 m².



Figure 2-6: Illustration of sheet piling used for intertidal cofferdams (Sheet Piling UK Ltd).

2.3.3. Site enabling works:

- Ensure that pre-installation saltmarsh surveys have been undertaken and passed on for consideration and review by Natural England, the Marine Management Organisation (MMO) and Thanet District Council, as necessary;
- Ensure that the areas to be used for works avoid any deep or mature creek features where possible;
- Ensure that the site is clear of breeding birds by having an Ecological Clerk of Works (ECoW) inspect habitats to determine the presence of any nesting activity (typically March – July). If active nests are identified for key species, the commencement of works in the vicinity of the nest site will be delayed until the nest is no longer in use or appropriate mitigation is put in place under the advice of the ECoW;
- Hand rake beach litter (e.g. drift wood which is an important habitat for terrestrial invertebrate species) which is within the upper area of saltmarsh to move it outside of the working corridor to minimise impacts on terrestrial invertebrates; and
- Undertake a photographic survey to illustrate the current (i.e. pre-commencement) condition of the working area.

Work site establishment:

- Erect fencing along the line of the working zone of the saltmarsh, visibly segregating the saltmarsh areas that are to remain untouched by the works (an ecologist should advise as to locations and placement of protective fencing);
- Install cofferdam around the sea defence where cables will transition from the saltmarsh to the Country Park;
- Mark out the corridors for storage and preservation of saltmarsh/ topsoil/ turf, cable pulling, track ways for plant and machinery and trench excavation, taking into account the working widths; and
- Lay and secure (this is particularly important low in the tidal frame where matting could be washed away if not appropriately secured) appropriate matting (such as bog mats, geotextiles, aluminium trackways or appropriate alternative to be agreed at the time) along access trackways to prevent plant and equipment sinking into saltmarsh and to prevent damage to the saltmarsh resulting from the weight and movement of the vehicles. The Applicant recognises that lessons learnt from other projects should be applied in terms of appropriate matting type and this would be agreed pre-construction.

Trench excavation (within the saltmarsh):

- Cable trench within the area of recognised saltmarsh will be excavated alongside the cable ducting using conventional mechanical excavators adapted for working on soft soils (low ground pressure excavators). Further down the shore suitable alternatives (such as a spider plough) will be agreed in advance of construction;
- Excavated material will be placed to one side for re-use;
- The excavation of the trench should be carried out in such a way as to maintain the sediment profile (e.g. surface sediments should be replaced at the surface and not mixed with those excavated from the bottom of the cable trench);
- Once the trench is opened and stabilised the cable ducting can be laid within. Trenching should start from the seaward end of the works, backfilling sections as soon as possible, to minimise the potential for pollution pathways via ground/surface water;
- The cable routing will be shortest (yet practicable) route possible through the saltmarsh;
- A temporary cofferdam will be required to stabilise the trench and keep surface water from entering the trench during excavation. Ground water will be pumped out and processed as stated in the Contaminated Land and Groundwater Plan; and
- Alongside the use of a cofferdam, Bentonite plugs may be used to prevent transport of any polluted water from the former landfill area through the saltmarsh.

Cable pull in:

- In preparation for the subsea cables being hauled ashore, the works area will be marked off with a tape or a buoy line to protect the site and the public;
- Position cable rollers and winches in the designated areas;
- On the rising tide, a shallow water cable laying vessel will move into position as close to the saltmarsh as the tidal conditions allow;

- The cables will be laid from the vessel to the shore as a bundle, this may involve small support vessels such as RIBs, divers and floats in the intertidal area along with pull-in lines from winches and cable rollers leading up to the saltmarsh area;
- A hauling rope will be installed between the pulling device, located with the Country Park, and a cable end on the vessel running through the ducting within the saltmarsh to the TJB;
- The cable will be pulled in from the vessel moored at the edge of the intertidal area through the ducting within the saltmarsh to the TJB;
- Depending on the state of the tide, the intervening distance between the vessel and the saltmarsh may be predominantly water (noting that MHW is 'below' the sea wall), entirely dry (with the installation vessel resting on the seabed) or more probably a combination of both scenarios. The cable bundle will be supported at the sea surface by floats attached as the cables leave the vessel, and supported on rollers placed on the seabed where it is above the water line;
- The cable bundle will be hauled towards the ducting within the saltmarsh area before passing through to the TJB with floats being removed as necessary. When sufficient length of each cable has been passed to the shore to allow for its correct alignment for jointing to the land cable, it will be secured in the TJB;
- Once the cable bundle has been secured at the TJB and tested to confirm that no damage has occurred during the installation process, the intertidal bundle will be manoeuvred into its correct alignment. For cable sections still afloat, the manoeuvring will be accomplished using workboats, before the remaining floats are removed and the cables allowed to sink to the seabed; and,
- Any cables on dry land leading up to the ducting will be manoeuvred using excavators, or similar, prior to burial.

2.3.4. Access points will be identified prior to starting construction.

Cable burial:

- Cable within the intertidal area is to be placed in a trench and buried using spoil initially taken from the trench, taking care to maintain the profile of the sediment.

De-mobilisation:

- On completion of trench backfilling in the saltmarsh area on the seaward side of the TJB, a post-and-rail or post-and-wire fence will be erected around the area subject to works, similar to that erected around the TOWF cables during installation. Appropriate signage will be fixed to the fence warning that the land may be unstable.
- De-mobilise the site, inclusive of the seaward cofferdam², taking care to leave it clear of any debris from the works;

² Subject to the final design, to be agreed post-consent, the landward cofferdam may be left buried in situ within the Pegwell Bay Country Park to act as a permanent mitigation structure between the contents of the landfill and the marine environment. This would result in a more permanent barrier than is currently in place.

- Photographic survey will be undertaken to demonstrate the condition of the site directly following installation works; and
- Methods to ensure reinstatement of the saltmarsh habitat will be followed as described in Section 7.2.

3. Consultation

3.1. Evidence Plan

3.1.1. Consultation received during meetings held under the Thanet Extension Evidence Plan has been recorded in minutes agreed with the relevant stakeholders and recorded within the Thanet Extension Evidence Plan (PINS Ref APP-137/ Application Ref 8.5). Table 2 below provides a brief summary of those consultation responses received during Evidence Plan meetings of relevance to this Saltmarsh Mitigation, Reinstatement and Monitoring Plan or saltmarsh habitats more broadly.

Table 2: Evidence Plan comments relating to saltmarsh habitat.

Reference	Date	Stakeholder	Comment
BE013	26-05-17	Environment Agency	Proposed that the Water Framework Directive assessment should be a standalone document and include priority habitats (including saltmarsh). Sediment disturbance and potential impacts on Bathing Waters may need to be assessed.
BE015	26-05-17	Natural England Kent Wild Life Trust Environment Agency	Agreed that the saltmarsh to the south of the existing cables is more stable but has lower biodiversity to than to the north of the cables. Therefore, if the cable were to go through the south this would be less damaging and therefore a preferred approach when compared to the more diverse habitat to the north.
BE026	04-10-17	Natural England RSPB Environment Agency	Two different TJB options being taken forwards into PEI. Both will result in a permanent loss of saltmarsh. It was noted that is it not a designated feature of the European sites.
HFR028	23-08-17	Environment Agency Thanet District Council (TDC)	All the engineering options for bringing the cabling ashore will require the construction of new rock armour defences to create an area in front of the landfill for the cables to be buried in order to rise onto the top of the country park; this will avoid the need for any excavation within the former landfill. This will require some land take from the saltmarsh, which is a SSSI. A concern for the EA would be the loss of the saltmarsh habitat. VWPL stated that engineering solution would look to reduce the land take within the saltmarsh as much as possible. The preference of the Environment Agency would be to keep the existing sea defences in place. TDC agreed to this position.

3.2. Section 42

- 3.2.1. Consultation received during the statutory Section 42 consultation period, held between 27th November 2017 and 12th January 2018, meetings held under the Thanet Extension Evidence Plan has been recorded in minutes agreed with the relevant stakeholders, and recorded within the Thanet Extension Evidence Plan (PINS Ref APP-137/ Application Ref 8.5).
- 3.2.2. Table 3 below provides a brief summary of those consultation responses received during Evidence Plan meetings of relevance to this saltmarsh mitigation, reinstatement and monitoring plan or saltmarsh habitats more broadly.

Table 3: Section 42 consultation comments relating to the saltmarsh habitat at the landfill site.

Reference	Date	Stakeholder	Comment
Volume 2, Chapter 8 (PINS Ref APP-049/ Application Ref 6.2.8), Table 8.4	January 2018	Natural England	Cofferdam: Further information needs to be provided on the expected size and specification and the installation method of a cofferdam, particularly as it will be occurring within the saltmarsh habitat.
Volume 2, Chapter 8 (PINS Ref APP-049/ Application Ref 6.2.8), Table 8.4	January 2018	Natural England	The saltmarsh is considered an important supporting habitat for the Thanet Coast and Sandwich Bay SPA species. As a result, the large amounts of disturbance and proposed permanent loss of saltmarsh within the bay is of concern, particularly on the effects of SPA birds.
Volume 2, Chapter 5, (PINS Ref APP-046/ Application Ref 6.2.5), Table 5.5	January 2018	Natural England	The permanent loss or relocation of up to 4,811 m ² of Saltmarsh in an area designated as an SPA and SSSI.
Volume 2, Chapter 5, (Document Ref: 6.2.5), Table 5.5	January 2018	Natural England	A Phase 1 intertidal habitat survey is mentioned in paragraph 5.4.5 and states the scope was agreed in the evidence plan meetings. The only surveys we can see are in Volume 4, Annex 5-1 (PINS Ref APP-081/ Application Ref 6.4.5.1) and it doesn't seem to go into detail about saltmarsh quality?
Volume 2, Chapter 5, (PINS Ref APP-046/ Application Ref 6.2.5), Table 5.5	January 2018	Natural England	Despite the quality of the saltmarsh north of the river Stour being of a "lower quality" it still represents an important habitat to a range of species and should not be disregarded.
Volume 2, Chapter 5, (PINS Ref APP-046/ Application Ref 6.2.5), Table 5.5	January 2018	Natural England	Direct disturbance to the intertidal area from cable installation operations, including in the saltmarsh - It would be good to provide an overall area figure here. Using a spider plough like the one utilised during TOWF would also be a good method to consider. Shouldn't the tracking of vehicles be also considered and added here?
Volume 2, Chapter 5, (PINS Ref APP-046/ Application Ref 6.2.5), Table 5.5	January 2018	Dover District Council	Assumptions on the impact on the saltmarsh during construction can surely be more defined due to previous experience.

3.3. Relevant and Written Representations

- 3.3.1. This section brief summary of the Relevant Representations and Written Representations received on this SMRMP. The Applicant's full responses are provided in Appendix 1 to the Deadline 1 Submission (PINS Ref REP1-017) and Appendix 1 to the Deadline 2 Submission. Each of the issues raised in the representations have been considered and updates to this SMRMP have been made accordingly.
- 3.3.2. Representations on this SMRMP were received from:
- Environment Agency (PINS Ref REP-043);
 - Natural England (PINS Ref REP-053 and REP1-113);
 - Kent County Council (PINS Ref REP-038 and REP1-096);
 - Kent and Essex Inshore Fisheries and Conservation Authority (PINS Ref REP1-099); and
 - Kent Wildlife Trust (PINS Ref REP1-101).
- 3.3.3. The key alterations made to this plan following consultation are:
- The removal of Option 2 landfall;
 - The inclusion of topographical surveys as part of the monitoring (as requested by Natural England);
 - The use of an appropriate trackway will be confirmed pre-construction noting that Natural England's and Kent Wildlife Trust's preference is the use of an aluminium track;
 - Aerial photography (e.g. from drones) will be undertaken as part of both the pre-construction and post-construction surveys; and
 - The Applicant acknowledges that lessons should be learnt from similar construction activities within saltmarsh were possible and practicable.

4. Existing Saltmarsh Habitat and Previous Surveys

4.1.1. The proposed landfall site consists of an area of saltmarsh within Pegwell Bay. The proposed landfall site overlaps with the Thanet Coast and Sandwich SPA and Sandwich Bay to Hacklinge Marshes SSSI and is located close to several other designated conservation sites (Figure 4-1):

- Sandwich Bay Special Area of Conservation (SAC);
- Thanet Coast (SAC);
- Thanet Coast and Sandwich Bay RAMSAR designation; and
- Sandwich and Pegwell Bay National Nature Reserve (NNR).

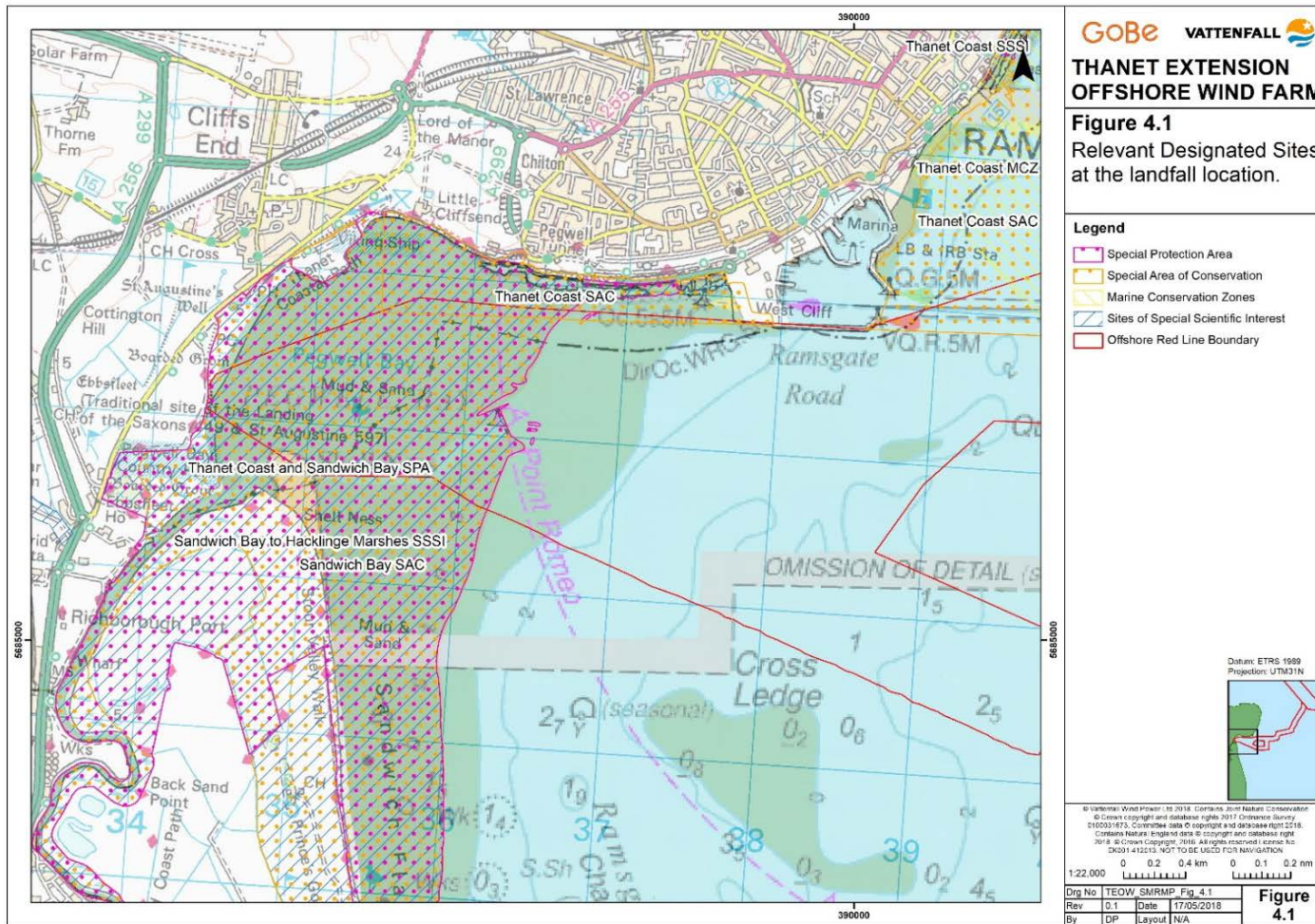


Figure 4-1: Thanet Extension export cable landfall site in relation to designated areas.

- 4.1.2. Saltmarsh is common throughout Pegwell Bay and is present throughout the proposed cable installation site. The quality of the saltmarsh increases to the south of the Stour, with patchier, less diverse assemblages being found to the north of the Stour. Pegwell Bay saltmarsh is not a recognised feature of the Sandwich Bay SAC. However, it is included as a supporting habitat for roosting and feeding activity for the designated bird species golden plover and turnstone within the Thanet Coast and Sandwich Bay RAMSAR and is also a feature of the Sandwich Bay to Hacklinge Marshes SSSI.
- 4.1.3. Previous baseline surveys of the saltmarsh were undertaken during the TOWF Environmental Statement. Saltmarsh recovery surveys following the TOWF cable installation indicated that the saltmarsh returned to its pre-construction status within two years (Haskoning UK Ltd., 2012). It has also been confirmed through discussion in the Evidence Plan (12th July 2017) that the saltmarsh in the proposed landfall site is well established and characterised by *Spartina* and less diverse than the areas to the north, which are characterised by *Salicornia*, or areas to the south of the River Stour.

5. Mitigation Measures for Cable Installation Works

- 5.1.1. The measures listed in Table 4 will reduce the potential effects of the cable installation works within the saltmarsh to a minimum; for clarity, with the mitigation in place, the RIAA (Appendix 21 of the Applicant's Deadline 2 Submission) concluded no adverse effect on the Thanet Coast and Sandwich Bay SPA or Sandwich Bay Ramsar as a result of the works. As noted previously this document addresses construction phase temporary effects.

Table 4: Mitigation and Management Controls

Topic	Mitigation and Management Controls	Document References
<p>Pollution prevention</p>	<p>Appropriate bunding will be used around any fuel, lubricant or chemical storage areas, and spill kits should be available in case of an emergency.</p> <p>Vehicles and equipment will have integral drip trays, or the use of plant nappies should be employed.</p> <p>All plant and equipment working in the vicinity of the shore line shall be clean on delivery. If not, all tracks, wheels etc. will be thoroughly cleaned before entering the working area.</p> <p>Equipment/ vehicles will be switched off when not in use. If potentially contaminated material is found on site which has not been previously identified, work will cease until the material has been characterised and appropriate measures have been identified to dispose of it.</p>	<p>Code of construction practice for onshore; PEMP for offshore works</p>
<p>Ecology</p>	<p>Work will not take place outside of April – September to avoid impacts on wintering birds.</p> <p>Prior to construction starting within the saltmarsh habitat a baseline survey will be undertaken by ecologists to provide an up to date data set that will form the basis of post-construction monitoring.</p> <p>A suitably qualified ECoW will be employed for the duration of the construction period. The ECoW will oversee the implementation of the Landscape Ecological Management Plan and check that the works comply with applicable wildlife legislation and the relevant commitments. Prior to construction commencing a breeding bird survey (focussing on Schedule 1 species) will be conducted by the ECoW. The findings will inform if construction can commence and if any additional mitigation is required.</p> <p>Pre- and post-work photo surveys (using GPS) will be undertaken along the cable route and access routes.</p> <p>The working width associated with the cables installation, within the proposed Order Limits, will be kept to a minimum to reduce disturbance to adjacent land.</p> <p>If breeding birds are found on site at any time work will stop and advise will be sought from the ECoW before work can recommence.</p> <p>Once the cable has been buried, the soil will be backfilled using all reasonably practicable efforts to maintain the substrate profile.</p> <p>Monitoring surveys of the affected saltmarsh will be undertaken for five years as described in Section 6.</p>	<p>Code of construction practice for onshore; SMRMP; Volume 3, Chapter 5: Biodiversity (Document Ref: 6.3.5)</p>

Rev: B.0

Topic	Mitigation and Management Controls	Document References
Transport and access	<p>The working area along the cable route, including the saltmarsh area, will be fenced to ensure public safety and that the area affected by the works is limited.</p> <p>Access routes will be marked and temporary ground protection, such as matting, will be used as necessary to prevent equipment sinkage and damage to the saltmarsh and intertidal area resulting from weight and movement of vehicles.</p> <p>Access to the cable route crossing the saltmarsh will be limited to that required for the specific saltmarsh cable operations only</p>	SMRMP
Training	<p>Site briefings, toolbox talks and task-specific risk assessments will be undertaken to ensure that all personnel are aware of the potential risks to the environment and the relevant mitigation or management measures.</p>	SMRMP

6. Proposed Pre-Construction Baseline Survey

- 6.1.1. A baseline survey on the condition of the saltmarsh must be conducted prior to construction to determine the post-construction regeneration of the saltmarsh and any changes in species abundance and diversity that may occur due to the disturbance. A baseline survey is also required to identify if any reinstatement work is needed. The outline of the baseline survey is proposed below.
- 6.1.2. The survey should take place at the optimum time, likely to be June/ July, to enable easier speciation of flowering plants. The survey will consist of three evenly distributed 200 m transects running along the shoreline perpendicular to the proposed export cable route. These transects should be placed so that the proposed export cable route is situated as close to half way as possible. This enables the survey to represent the saltmarsh conditions equally around the cables post-construction. A 1 m² quadrat will be placed every 20m along each transect and its GPS position recorded.
- 6.1.3. The survey will record an estimated percentage cover of each plant species using a 20 cm² grid scale within the quadrat. The DAFOR scale will be used to semi-quantitatively sample the saltmarsh and provide an estimate of the relative abundance of each species. For each of the three transects a series of photographs will be taken at the same location as the quadrats.
- 6.1.4. Aerial photography (e.g. from drones) of the saltmarsh will be undertaken as part of the pre-construction surveys.
- 6.1.5. The survey timings and methodologies will be agreed by MMO, in consultation with Natural England prior to the surveys being undertaken to ensure they are appropriate for comparison and analysis.

Rev: B.0

7. Post-construction Monitoring and Reinstatement

7.1. Monitoring

- 7.1.1. Surveys will follow the same procedure as stated in the baseline survey. This procedure has been designed to allow appropriate comparison and analysis between the different surveys. An initial post-completion monitoring survey will be undertaken following reinstatement of soil to ground level. Surveys will be undertaken on a monthly basis for 1 year following installation and once yearly up to 5 years' post-installation, or until recovery is agreed with Natural England in line with the SMRMP (and based on the interpretation of the monitoring data).
- 7.1.2. These surveys will include topographic surveys to monitor any changes, such as the creation of depressions, to ensure that areas of additional pooling of water or creation of salt pans, as a result of the cable installation does not occur. If effort to maintain the substrate profile is required in the saltmarsh, a practicable methodology would be agreed with Natural England at the time, such as ensuring material is suitably stored to prevent loss from the system.
- 7.1.3. In addition, aerial photography (e.g. from drones) of the saltmarsh will be undertaken as part of the post-construction surveys.
- 7.1.4. Monitoring reports will be produced at the end of each year. These will report on the progress of saltmarsh recolonisation in terms of overall coverage and species composition by comparison of the monitoring surveys relative to the baseline/ pre-construction surveys.

7.2. Reinstatement

- 7.2.1. If necessary, recommendations will also be made with regard to implementation of other saltmarsh recolonisation techniques, the triggers for this are defined in paragraph 7.2.4. Two options could be considered for reinstatement of the saltmarsh following cable installation. Whilst the monitoring is required in order to determine which measure is brought forward, both options give certainty that the saltmarsh will recover to its baseline condition.
 - 1. Replanting via the replacement of the removed turf by seeding or artificial transplantation.
 - 2. Natural recolonisation where tides naturally disperse seeds and propagules throughout the marsh, allowing pioneer species to take advantage of newly exposed patches within the saltmarsh.
- 7.2.2. The reinstatement option 2 (natural recolonisation) is the preferred option following reviews of manuals, guidance and its use in similar projects in this location, including the installation for the existing Thanet OWF cable, and noting that this approach was requested prior to the installation of the Nemo interconnector.

- 7.2.3. The advice of Natural England will be sought on the success of the saltmarsh recovery on receipt of each monitoring report and it will be asked to advise as necessary if it considers that natural recolonisation is unsuccessful. It is anticipated that after year 1, 25% of bare ground coverage would be achieved with a similar annual rate of colonisation thereafter.
- 7.2.4. To give certainty as to the triggers for the measures to be brought forward after three growing seasons, cover of vegetation less than 66%, subject to any potential natural variation, would be a trigger for considering the need for introduction of seeding material to supplement the natural recolonisation of the saltmarsh. It is anticipated that after 5 growing seasons the success would be measured by vegetation cover being at least at 95% of pre-excavation levels, again subject to any natural variation which will be discussed with the Environment Agency and Natural England, with evidence of on-going colonisation; or strong evidence emerging from monitoring that vegetation cover is recovering to the 95% levels. In addition, and as noted in paragraph 7.1.2 of this document, the topography will be monitored throughout the monitoring period. Notwithstanding the anticipated colonisation, the need to extend the monitoring period will be discussed with appropriate statutory bodies.
- 7.2.5. Material for seeding the saltmarsh will be selected from sources agreed with Natural England. A method statement will be submitted for approval by Natural England and Kent Wildlife Trust; and any licence necessary will be sought.
- 7.2.6. Guidance for survey methodology, monitoring and re-instatement procedures, following the TOWF cable installation, was gained from the site specific monitoring undertaken by TOWF (Haskoning UK Ltd., 2012). This monitoring was undertaken using methodologies agreed with the relevant SNCB, and recorded recovery of saltmarsh within Pegwell Bay for similar activities (cable installation) as those proposed for Thanet Extension.

8. References

Haskoning UK Ltd (2012), 'Thanet Offshore Wind Farm Saltmarsh Recovery Monitoring Survey 2012'

Sheet Piling (UK) Ltd, "Case Study: Temporary Sheet Pile Pipe Pull Trench Cofferdam, Easington", [Online]. Available: https://www.sheetpilinguk.com/case_study/temporary-sheet-pile-pipe-pull-trench-cofferdam-easington/. [Accessed: 05/03/2018].