Nemo Link®

Effect on Integrity of European Nature Conservation Interests

Applicant's Submission

August 2013

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APPENDICES

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1.0 INTRODUCTION

1.1 National Grid Nemo Link Limited (Nemo Link) (the Applicant) submitted an planning application to Thanet District Council (TDC) and Dover District Council (DDC) for installation of 3.1km underground high voltage cables from Pegwell Bay to the former Richborough Power Station together with an outline application for the erection of a converter station building and substation building with outdoor electrical equipment, internal roads and landscaping in March 2013.

1.2 The Applicant has also submitted an application to the Marine Management Organisation (MMO) for a licence under the Marine and Coastal Access Act 2009 for the following aspects of the proposed development:

- Laying and burial of cable from the Mean High Water Spring (MHWS) tide mark to 12 nautical miles (NM);
- Dredging and disposal required to pre-sweep sand waves;
- Rock/concrete mattress placement; and
- Horizontal directional drilling (HDD).

1.3 The Nemo Interconnector will include two subsea High Voltage Direct Current (HVDC) cables between the landfall points at Pegwell Bay to mean low water and continuing to Zeebrugge.

1.4 The cables would be installed beneath the Thanet Coast and Sandwich Bay Special Protection Area (SPA), also designated as a wetland of international importance under the Ramsar convention. TDC and DDC as competent authorities under the Regulation 61 of the Conservation of Habitats and Species Regulations 2010 (as amended), are required to assess whether the project would adversely affect the integrity of the SPA and Ramsar site.

1.5 The MMO is also a competent authority and must make a similar assessment in relation to any consent it would give.

<u>Representation from Natural England</u>

1.6 TDC, DDC and the MMO are required to take account of advice from Natural England (NE). NE has submitted an objection[1], advising that the project is likely to have a significant effect on the interest features for which the SPA and Ramsar site is designated. NE's letter (at its Annex 1 presented at Appendix 1 of this report) requests further details about the methods of cable installation in intertidal habitats, reinstatement and monitoring measures, timings and measures to protect overwintering birds and terrestrial invertebrates. Annex 1 also requests clarification about working methods in relation to a landfill outside the SPA boundary, and a cumulative and in-combination assessment.

1.7 NE also objects on grounds that insufficient information has been provided in relation to natterjack toads, a European Protected Species. NE requests further information on this matter (see Annex 2 of its letter presented at Appendix 1 of this report).

Purpose of this document

1.8 The purpose of this document is to **address the two specific areas of objection from NE by providing the detail needed by TDC, DDC and the MMO, and NE as a statutory consultee, when assessing whether the Nemo Link would affect the integrity of the SPA and Ramsar Site**. Specifically, this document addresses the following points of the NE letter:

- Annex 1, Section 1: Intertidal habitats;
- Annex 1, Section 2: SPA and Ramsar overwintering birds;
- Annex 1, Section 3: Terrestrial Invertebrates;
- Annex 1, Section 4: Landfill;
- Annex1, Section 5: Cumulative and in-combination effects; and
- Annex 2: Natterjack Toads.

1.9 This document has been produced following a review of saltmarsh restoration literature and case studies of similar projects to identify best practice techniques for cable installation and saltmarsh restoration.

[1] Appendix 1: Letter dated 10 June 2013, Natural England to Thanet District Council

1.10 Chapter 2 of this document summarises how the applicant intends to install the cables and reinstate the working area.

1.11 Chapter 3 details the legislative context and conservation objectives for the Thanet Coast and Sandwich Bay SPA and Ramsar Site and Thanet Coast SAC. Chapter 4 provides a literature review of existing information available in relation to disturbance of saltmarsh and mudflats from installation of offshore wind farm cables as well as a summary of the assessment criteria for a Likely Significant Effect (LSE). Chapter 5 provides details on the current condition of the saltmarsh and mudflats and an appraisal of the LSE of the proposed development. Chapter 6 provides details of proposed future monitoring and management.

1.12 Chapters 7 to 10 provide an assessment of the Nemo Link in relation to SPA Birds, Ramsar Invertebrates, landfill crossing and natterjack toads.

1.13 Chapter 11 has an assessment of cumulative and in-combination effects. Chapter 12 provides summary and conclusions.

2.0 PROPOSED INSTALLATION METHOD - PARAMETERS

2.1 In Annex 1 (section 1) of its letter (Appendix 1 of this report), NE requested detail of the proposed installation method of the cable across intertidal habitats (saltmarsh and mudflat), based on a reasonable worst-case scenario of what equipment and techniques would be used.

2.2 This chapter sets out such a reasonable worst-case scenario as described in the Review of Intertidal Installation Techniques Report presented at Appendix 2 of this report. The methods have been advised by marine and coastal cable installation experts (PMSS Ltd), taking advice from ETA (submarine cable specialists) and TEP (ecological advisers to the Nemo Link). In addition, guidance from NE (NE) and the Environment Agency (EA) has also been used where appropriate. A list of reference material is presented in the Bibliography at the end of this report.

2.3 The PMSS report describes how the cables will initially be laid out from the barge and pulled ashore over a distance of about 1500m to a Transition Joint Pit (TJP).

2.4 Approximately 1,300m of the cables will be installed into mudflat habitats and approximately 215m into saltmarsh. The areas of habitat affected will be determined prior to the works commencing as boundaries of habitat types are dynamic and on vegetation colonisation. However changes that may arise generally are small and are not so great as to affect the assessments of significance of effects that would arise.

2.5 The PMSS report describes various techniques which might be used to install the cables in the intertidal area:

- Open trench and backfill;
- Cable lay and bury using tracked or skidded plough or chain cutting tool;
- Pre installation of ducts; and
- Horizontal directionally drilled ducts.

2.6 Each of these installation techniques has specific environmental, technical and/or consenting risks, as summarised in chapter 2 and Appendix A of the PMSS report (Appendix 2 of this report).

2.7 The cables route shown on the plans included in this report is that submitted with planning application reference F/TH/13/0144 and DOV/13/00143 and which has been the subject of an explanatory site visit with NE. The cables route in the intertidal zone

is as close to the existing Thanet Offshore Wind Farm (TOWF) installed cables as practicable consistent with advice from consultees. The Nemo Link cables need to avoid crossing the TOWF cables; need to maintain sufficient separation to allow the cables to be safely installed without interfering with the TOWF cables; and so cannot fall to land north of the petrol filling station on the A256 Sandwich Road.

2.8 NE has requested that the Applicant describes the impacts arising from the technique that would be a reasonable worst-case scenario (REASONABLE WORST-CASE SCENARIO) for the saltmarsh, rather than describing an aspirational technique that may not be deliverable. In this case, the open trench and backfill option is the REASONABLE WORST-CASE SCENARIO. Cable-laying and burial using plough or cutter may not be feasible for the particular cables needed for the Nemo Link.

Open trench and backfill

2.9 This option is the most widely used method for coastal cable installation and protection and has been successfully consented and undertaken at a number of UK locations. Open trench and backfill is normally carried out immediately after cable landing to minimise the time that cables are left exposed and also to avoid leaving excavated trenches open. Trenches are dug in sections, using backhoe excavators in close proximity to the cable bundle. The cable bundle is lifted into the trench by a second excavator. The trench is then immediately backfilled. This method would be suitable for the saltmarsh area, in that the excavation works can be closely controlled by sectioning. This would mean that trenches are not left open for extended periods thus avoiding flooding risk. The saltmarsh area is higher in the tidal frame and therefore direct excavation should be easier in the drier ground conditions, although temporary localised dewatering techniques and working at neap tides only could be considered if necessary.

2.10 Low ground pressure excavators (‘LGPE') would be used if ground compaction in the saltmarsh or low ground bearing pressures in the mudflat area are deemed to be of concern. The excavators would operate from trackways consisting of bogmats or rolled steel sheeting to avoid direct damage to the saltmarsh surface. Although weight-bearing mats will protect the saltmarsh, there may be an area of localised sediment seepage resulting from the compaction of the saltmarsh.

2.11 A REASONABLE WORST-CASE SCENARIO of 20m working width for cables installation has been assumed. This assumption has been underpinned by the following outline requirements:

- 3m wide trench (based on 1m width at bottom and 1m depth, assuming approximately 45° trench side slopes for stability);
- Approximately 3m width required for temporary storage of excavated material; and
- 6m width of protective track way (e.g. bog mats or aluminium / steel track way).

2.12 The remaining width would be incidental space between the above components. In particularly soft ground, it may be necessary to leave a space of between 2m and 3m between the edge of the track way and the edge of the trench to ensure the safety of those working on the installation by reducing risk of trench collapse.

2.13 A 20m working width is considered to be a sufficient REASONABLE WORST-CASE SCENARIO, although the Applicant notes that a 15m working width was achieved for the TOWF and could be achievable for the Nemo Link, unless local ground conditions dictate otherwise. It should also be noted that the TOWF installed two export cables, whereas the Nemo Link plans to install one bundled cable.

2.14 In certain limited places the swathe may be slightly wider, up to 25m in total, to allow for vehicle turning or additional storage of excavated material. The numbers of vehicles that may be used in the intertidal area will be the minimum needed for safe working. The method statement to be submitted and agreed with planning authorities in consultation with NE will set out the number of vehicles required for the works. If open trenching is used, the vehicles turning area will be in mudflat. Prior to the commencement of cables installation works within the intertidal zone, a plan showing the location of the turning area and width of the cables route will be provided as part of the method statement to be agreed with the planning authorities in consultation with NE. Only the areas identified on this plan and agreed in consultation with NE will be used for turning.

2.15 The Transition Joint Pit (TJP) will be an excavated pit in saltmarsh. It will be 15m long x 5m wide x up to 2.5m deep, resulting in approximately 187m³ volume excavated. It will have a reinforced concrete plinth laid in its base. The TJP is along the line of the cable swathe described in the previous paragraphs, so trackway and backfill can be accommodated within the cables swathe. As the contract for the installation works

has not yet been awarded, detailed method statements have not been produced. It may be possible to locate the TJP outside the area of saltmarsh however, the REASONABLE WORST-CASE SCENARIO would be that the TJP remains within the saltmarsh as shown on Saltmarsh Zones drawing presented at Appendix 4 (TEP Drawing Reference: G2700.123A). The location of the TJP will be set out in the method statement to be agreed with the planning authorities in consultation with NE.

2.16 The cables will be jointed on the TJP plinth and once this is undertaken, the excavation will be backfilled to original ground levels. On completion of works full recovery of the saltmarsh would be expected within a five year period. The TJP would be surrounded by a Heras fence, or similar structure, to ensure the safety of the general public during the jointing process.

2.17 The works will be supported by a temporary lay down area of approximately 1302m² (42m x 31m), to the south west of the petrol station accessed from the A256, Sandwich Road. Although within the SSSI and Ramsar designation, much of this habitat is not saltmarsh (refer to TEP National Vegetation Classification (NVC) survey reported at Chapter 5). Only 60m^2 is saltmarsh. The REASONABLE WORST-CASE SCENARIO anticipates that this area of saltmarsh would be included in the laydown area to allow space for storage around working areas. The method statement to be agreed with the planning authorities in consultation with NE will seek to avoid this area of saltmarsh if possible. The laydown area would not be subject to excavation, and storage of materials can be carried out on a geotextile mat overlain by gravel. This would be removed after the works (6 weeks approximately).

2.18 Table 1 below summarises all the dimensions of work in the SPA and Ramsar site.

Table 1: Dimensions of Work in SPA and Ramsar Site

Item	Measure
Total intertidal cables corridor	1,515m
Cables installed into mudflat habitat	1300m
Cables installed into saltmarsh habitat	215m
Normal Reasonable worst-case working swathe	20m (3m cables trench, 3m backfill storage, 6m trackway, and incidental space between each of the above)
Cables trench width (top)	3m
Cables trench width (bottom)	1m
Cables trench depth	1m

Item	Measure
Width of temporary storage of excavated materials (within cables swathe)	3m
Width of protective trackway within cables swathe	6m
Mudflat substrate to be excavated (volume)	2600m^3
Saltmarsh substrate to be excavated (volume)	430m^3
Mudflat to be excavated (area)	3900m^2
Saltmarsh to be excavated (area)	645m^2
Transition Jointing Pit (TJP) length	15m
TJP width	5m
TJP depth	2.5m
Saltmarsh substrate excavated for TJP (volume)	187m^3
Saltmarsh to be excavated for TJP (area)	75m^2
Temporary compound dimensions	42m x 31m
Temporary compound area	1302m^2
Saltmarsh habitat within temporary compound (area)	60m^2 (remaining 1,242m^2 is modified grassland)
Intertidal area affected by localised sediment seepage (mudflats and saltmarsh)	1.82ha, made up of 1515 linear metres of cables route consisting of: • 6m trackway; • Estimated 3m between the edge of trackway and edge of the trench; and • 3m backfill storage area.
Summary: Total Area of mudflats to be excavated	3,900m^2
Summary: Total Area of saltmarsh to be excavated	720m^2 Consisting of: 645m^2 trench; 75m^2 TJP
Summary: Total Area of saltmarsh to be affected by localised seepage	2640m^2 Consisting of 2580m^2 alongside trench and 60m^2 in compound

2.19 Based on this, the total area of saltmarsh vegetation affected is estimated to be 3360m^2. Within this, an area of 720m^2 of saltmarsh would be subject to excavation and backfilling (arising from trench and TJP) and 2640m^2 saltmarsh would be subject to temporary surface damage (arising from trackway, storage of arisings prior to backfilling, and storage of materials in the laydown compound).

2.20 During design and Environmental Impact Assessment (EIA) stages, other locations for the TJP were considered. The other feasible alternative identified would be in the Pegwell Bay Country Park. This is a former landfill site and Nemo Link has been advised by the EA to avoid methods of installation involving excavation in this area because it would create risks of contamination affecting the wider environment.

2.21 Following installation of the cables, initial reinstatement would be by controlled backfill of excavated materials.

2.22 This technique was previously consented for the adjacent TOWF cables installation and a combination of land cable plough and open cut using LGPE was successfully used to install the export cables for TOWF. In an e-mail correspondence from NE following the TOWF cable installation (Ingrid Chudleigh, 25th February 2010), NE confirmed that the TOWF installation had proceeded well and to its satisfaction. Following submission of two annual monitoring reports NE is understood to have confirmed no further monitoring was necessary. This technique is therefore considered a low risk from a technical and environmental perspective.

Indicative Installation Programme

2.23 Typical sequential work durations are expected to be as follows:

- Set up site compound and winch – 7 days;
- Cable Landing – 1 day (daylight hours);
- Cable protection – 14 days (comprising approximately 4 days in saltmarsh and 10 days on mudflats);
- Cable jointing – 7 days (continuous); and
- Clear work compound. 3 days.

2.24 The programme above for cable installation in both the mudflat and saltmarsh is sequential, with an estimated 32 days being required to complete the installation. There may be some tasks which can be completed concurrently although this is not guaranteed and any changes would not reduce the working time significantly. It is anticipated that seven day working will be used to take best advantage of tides and reduce the risk of over-run. This programme therefore allows ten days' 'float' within the overall six-week window of between mid-July and the end of August (identified by NE in Annex 1). This demonstrates that the programme is feasible.

2.25 The majority of working time will be spent on the mudflats, and cable installation works in the saltmarsh zone will take approximately four days (within the 32 days). On the saltmarsh, it is anticipated that excavated material would be replaced within the trench within 48 hours of excavation, conditions and installation techniques allowing.

Mitigation Measures

Maintaining the Substrate Profile

2.26 The Applicant will endeavour to maintain the substrate profile in the excavated material, but experience has shown that this is not always feasible, particularly in the mudflats and lower saltmarsh, where substrates are much softer.

2.27 The development of a suitable and robust saltmarsh installation and reinstatement plan will ensure that impacts on the saltmarsh arising from the cable installation will be reduced as far as possible. At present, best practice would suggest allowing natural revegetation of the saltmarsh communities, as has successfully occurred at both the TOWF and Lincs Offshore Wind Farm (LOWF). While it may be possible to cut and replace 'turves' from the upper 20cm of trench excavation, there is a risk that the turves may disintegrate or be extremely difficult to replace. Additional plant and equipment would be needed to cut and/or re-lay the turves, which itself carries risk of greater damage to the saltmarsh from extra trafficking or delays in reinstatement. The Applicant notes that the use of turves is not NE's preferred method of recolonisation within Pegwell Bay due to the potential damage to other areas of the saltmarsh[2]. Natural revegetation is proposed as the primary method of recolonisation, in a similar manner to that agreed for the TOWF and LOWF export cable installations.

2.28 Independent of which installation and protection method is chosen, a suite of mitigation measures will be required to minimise any remaining risks. These mitigation measures will form part of the method statements and task plans and will be reviewed by and agreed with consenting authorities in consultation with NE prior to cables installation.

[2] Letter from NE to TEP dated August 9th 2013, Project Nemo draft additional information. Comments in reference to the following submitted draft document: Effect on Integrity of European Nature Conservation Interests. Applicant's submission

3.0 TEST FOR ADVERSE EFFECT ON INTEGRITY ON THE NATURA 2000 NETWORK

Legislative Context

3.1 The Conservation of Habitats and Species Regulations 2010 (as amended) (the Habitats Regulations) make provisions for implementing the EC Directive on the Conservation of Natural Habitats and Wild Fauna and Flora[3] in Great Britain (the Habitats Directive). The Habitat Regulations detail measures relating to the conservation of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).[4]

3.2 The Thanet Coast and Sandwich Bay (including Pegwell Bay) is internationally designated as a Special Area of Conservation (SAC), Special Protection Area (SPA), Ramsar Site. It forms part of the Natura 2000 network of such sites.

3.3 Pegwell Bay is also protected under UK legislation as Site of Special scientific Interest (SSSI) and National Nature Reserve.

Test for Likely Significant Effects (LSEs)

3.4 Under the Habitats Regulations competent authorities (in this case, TDC and DDC as the Local Planning Authorities and MMO as a licencing body) as advised by NE have a statutory duty under Regulation 61 of the Habitats Regulations, to assess the implications of a plan or project on a European site:

> *61.—(1) A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which—*
>
> *(a) is likely to have a significant effect on a European site or a European offshore marine site (either alone or in combination with other plans or projects), and*
>
> *(b) is not directly connected with or necessary to the management of that site, must make an appropriate assessment of the implications for that site in view of that site's conservation objectives*

3.5 LSEs are not defined in the Conservation of Habitats and Species Regulations 2010. However, there is a widely accepted working definition of the principle:

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[3] Directive92/43/EEC, amended by Directive 97/62/EC
[4] Classified under the Wild Birds Directive 79/409/EEC

'*A likely significant effect is any effect that may reasonably be predicted as a consequence of a plan or project that may affect the achievement of conservation objectives of the features for which the site was designated, but excluding trivial or inconsequential effects…*[5]'

3.6 There are a number of attributes of a plan or project which can be deemed likely to have a significant effect:

- Causing change to the ecological coherence or robustness of the site, or to the wider Natura 2000 series;
- Causing reduction in the area of a particular habitat within the site or the actual site, or in some way sterilising part of the site from its ecological functioning;
- Causing direct or indirect change to the physical quality of the environment or habitat with the site;
- Causing ongoing disturbance to species or habitats for which the site is designated or classified;
- Altering community structure (species composition);
- Causing direct or indirect damage to the size, characteristics or reproductive ability of populations on the site or using supporting habitat outside the site;
- Altering the vulnerability of population to other impacts;
- Causing a reduction in the resilience of the feature against external change; or
- Affecting restoration of a feature where this is a conservation objective.

3.7 The LSE test can be seen as an initial screening stage of an appropriate assessment. This stage is intended to ensure that all relevant plans and projects likely to undermine the conservation objective of a European site are subject to further steps of Habitats Regulations Assessment by the competent authority. For the initial assessment it should be assumed that even a small loss in an area of a European habitat should be judged to be an LSE, which then enables its full impact to be tested through a more detailed assessment.

3.8 The LSE test must consider in-combination effects and mitigation and or avoidance measures. When advising a competent authority, NE uses the following questions to

[5] Natural England's view on the impact on Saltmarsh interest features of The Wash and North Norfolk Coast Special Area of Conservation (SAC) from Lincs Offshore Wind Farm (OWF) cable installation, December 2012

aid identification of potential mechanisms which would result in an adverse effect on habitat integrity:

- Will the area of Annex I habitats or composite features be maintained?
- Will there be no direct adverse effects on the population of the Annex II species or birds for which the site was designated or classified?
- Will there be no indirect adverse effects on the populations of Annex II species for which the site was designated or birds for which the SPA was classified due to loss or degradation of the habitat (quality or quantity)?
- Will there be no changes to the composition of the habitats for which the site was designated?
- Will there be no interruption or degradation of the physical, chemical or biological process that support habitats and species for which the site was designated or classified?

3.9 NE advises that if the answer is 'No' to one or more of the above questions then it cannot be concluded that there will be no adverse effect on habitat integrity This conclusion should be informed by consideration of site or project-specific factors such as:

- Scale of impact;
- Duration of impact and recovery/reversibility;
- Long term impacts, biological-lag and sustainability;
- Dynamic systems;
- Conflicting feature requirements;
- Off-site impacts; and
- Uncertainty with cause and effect and a precautionary approach.

Designations within the Intertidal Zone

<u>Thanet Coast and Sandwich Bay Ramsar Site</u>

3.10 The Thanet Coast and Sandwich Bay Ramsar site qualifies for the designation under two criteria:

- Criterion 2 – Supports 15 Red Data Book wetland invertebrates.
- Criterion 6 – Supports population of turnstone (*Arenaria interpres*) at internationally important levels.

3.11 The wetland invertebrates listed within the Ramsar citation may be present within the saltmarsh habitats within the bay.

3.12 Habitats listed within the Ramsar site that are relevant to this assessment include:

- Sand/mud flats; and
- Saltmarsh.

Thanet Coast and Sandwich Bay SPA

3.13 The SPA consists of a long stretch of rocky shore, adjoining areas of estuary, sand dune, maritime grassland, saltmarsh and grazing marsh (JNCC, 2001). The SPA qualifies under Article 4.1 of the Birds Directive by supporting a nationally important breeding population of:

- Little tern (*Sterna albifrons*) – 0.3% of the British breeding population; and
- European golden plover (*Pluvialis apricaria*) – 0.2% of GB overwintering population.

3.14 The SPA also qualifies under Article 4.2 of the Birds Directive supporting important populations of turnstone (1.4% of GB overwintering population).

3.15 Habitats listed within the SPA designation that are relevant to this assessment include:

- Mud flats;
- Salt marshes; and
- Humid grasslands.

Conservation Objectives

3.16 The role of conservation objectives of European sites is to ensure that the aspirations of the Habitats Directive and Birds Directive are achieved. The primary aspirations are that favourable conservation status is maintained and that appropriate steps are taken in SPAs, SACs and Ramsar sites to avoid the deterioration of habitats or significant disturbance of species.

3.17 The long-term vision for Pegwell Bay is for all its special features to be maintained and enhanced whilst allowing natural dynamic coastal processes to continue. Many of the habitats and species found in Pegwell Bay are dependent on coastal processes.

Thanet Coast and Sandwich Bay SPA

3.18 NE states that the conservation objectives for the Thanet Coast and Sandwich Bay SPA are listed as follows:

> *'Avoid the deterioration of the habitats of the qualifying features, and the significant disturbance of the qualifying features, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving the aims of the Birds Directive.*
>
> *Subject to natural change, to maintain or restore:*
> - *The extent and distribution of the habitats of the qualifying features;*
> - *The structure and function of the habitats of the qualifying features;*
> - *The supporting processes on which the habitats of the qualifying features rely;*
> - *The populations of the qualifying features;*
> - *The distribution of the qualifying features within the site.*[6]'

Thanet Coast and Sandwich Bay Ramsar Site

3.19 The conservation objectives for birds and habitats of the Ramsar site are covered by those listed for the SPA (see above). In relation to saltmarsh invertebrates, the Ramsar citation does not list any management factors that could be affected by the proposed cable installation works.

3.20 The following chapter discusses the particular sensitivities of saltmarsh habitats in relation to excavation and cable-laying. Consideration of these sensitivities has informed the working practices outlined at Chapter 2.

3.21 Later chapters outline how the saltmarsh at Pegwell Bay will be monitored following cable installation in order to ensure that conservation objectives are upheld.

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6 European Site Conservation Objectives for Thanet Coast and Sandwich Bay Special Protection Area Site Code: UK9012071, Natural England, 18/08/2013

4.0 REVIEW OF SALTMARSH SENSITIVITY IN RELATION TO CABLE INSTALLATION

4.1 Saltmarshes are vegetated mudflats and are created due to the physical characteristics and coastal processes that act upon them[7]. The surface of saltmarsh is generally higher than that of the associated mudflats, which means that they are flooded less regularly and tidal currents are of a lower velocity. This allows colonisation by pioneer saltmarsh vegetation. This has the effect of raising the saltmarsh surface and slowing flow velocity further, allowing further colonisation of saltmarsh species.

4.2 Saltmarsh is identified by the government's Department for the Environment, Food and Rural Affairs (Defra)[8] as one of the main intertidal and shoreline habitats and communities likely to be encountered during cables installation. Defra acknowledges that saltmarshes and mudflats have a high ecological value, being important as feeding, roosting and nesting areas for waders and wildfowl.

4.3 As well as vulnerability to surface trafficking, other potentially significant effects on mudflats and saltmarsh are:

- Suspension of Material;
- Sediment Mobilisation (including potential release of contaminants); and
- Settlement of Material.

Suspended Sediments

4.4 Impacts resulting from cabling include the release of sediment into suspension. This can have a number of effects on the benthic species inhabiting areas adjacent the cabling activity. Significance of the impact will depend on the type of sediment, hydrodynamic conditions and the sensitivity of the species affected in addition to the types of installation method.

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[7] Environment Agency (2007) Saltmarsh Management Manual. Available from URL: http://publications.environment-agency.gov.uk/pdf/SCHO0307BMKH-e-e.pdf Accessed 04/07/2013

[8] Review of cabling techniques and environmental effects applicable to the offshore wind farm industry: Technical Report, Department for Business Enterprise and Regulatory Reform (BERR) in association with Defra, 2008

4.5 Increases in suspended sediment can affect filtering mechanisms of certain species such as specific types of worm and brittle stars through clogging of gills or damage to feeding structures. The sensitivity of the receptor is an important consideration when determining the significance of this effect.

4.6 Within fine sediments there may be issues in relation to potential contamination release. Contaminants, such as oils and heavy metals, generally attach to fine sediments and disperse but certain chemicals can persist in coarser sediments. Disturbance of sediment can release associated contaminants into the water column. If contaminants reach a certain level there can be effects on certain species or can bioaccumulate through the food chain. Effects of contaminant release on the environment tend to be localised and would only be of concern near industrialised areas. If nearby sites are identified where there is evidence of historic contamination, sediment sampling is necessary in order to determine the level of concentration within the sediment.

4.7 The Environmental Statement (paragraph 6.50 onwards) lists potential sources of contamination. There is no evidence of contamination under the main body of the saltmarsh, but there is some historical evidence of pollution events associated with facilities along the A256. This may affect the creation of the TJP and further site investigations and method statements would be implemented to ensure contaminants were isolated and not allowed to enter the intertidal ecosystem.

Sediment Mobilisation

4.8 Cable installation within the intertidal zone is very likely to be undertaken during periods of low tide, and backfilling of the trench will typically occur within 48 hours of excavation. Hence the potential for re-suspension of material is reduced. Some of the disturbed material will, however enter into suspension during the flood tide but the extent of this will depend on the sediment type and cohesiveness. Re-suspension of sediment is not likely to be of concern where cabling occurs within cohesive or coarse sediments, but can be significant when cabling is undertaken in non-cohesive fine sediments.

Settlement of Material

4.9 Settlement of suspended material has the potential for smothering to occur. Given that the installation of cables occurs during low tide, only fine sediments are likely to

have been disturbed which may become suspended in the water column during the flood tide.

Rates of Recovery

4.10 Deeper depth of trenching could result in longer recovery times as cabling activity replaces the sediment in a different structure. The majority of invertebrate communities are within the top 10 to 20cm of the sediment. BERR *et al*. (*ibid*) suggests recovery may be influenced strongly when disturbance intensity changes between depths, but may not differ too much once disturbance occurs below this depth.

4.11 BERR suggests that in order to promote recovery within the saltmarsh and mudflats, the same material displaced as a result of cable burial activities should be back filled. This reduces the potential for remobilisation of sediments and enables recovery of benthic organisms to occur within a much quicker timescale.

4.12 NE states in its literature review that '*Recovery times appear to increase with spatial scale of disturbance although the relationship between scale and recovery is unclear due to variation in parameters… [of previous studies]…being measured and the point at which recovery is considered to be complete'*. [9] Most of the studies captured in the literature review cited recovery times of a few years where the scale of disturbance was particularly large.

Saltmarsh Restoration

4.13 Saltmarsh develops when the elevation of mudflat is sufficiently high above tides to allow vegetation to develop. The species reflect the level of sediment deposited by tidal action. As vegetation develops, it helps trap more sediment and the marsh level rises. This process creates different zones of communities that have less tolerance of immersion towards the landward end of the saltmarsh.

4.14 Provided suitable physical conditions are present, one of the most important factors influencing the colonisation of habitats is the presence of saltmarsh species (Environment Agency 2007). *Spartina* and *Salicornia* are two important pioneer

[9] Is 'minimising the footprint' an effective intervention to maximise the recovery of intertidal sediments from disturbance? Phase 1: Literature review, first published 01/03/13, Natural England

species, however other saltmarsh species must also be available to colonise the different zones of the saltmarsh.

4.15 If the conditions within an estuary are suitable for saltmarsh to form, the saltmarsh will be self-sustaining (Environment Agency 2007). Not all saltmarsh is covered by every tide.

4.16 Vegetation planting can be used in a variety of situations as an exclusive saltmarsh restoration technique or, more commonly, in combination with other restoration or habitat creation methods. Through deliberate planting, particularly using Spartina species, erosive tidal flows can be dissipated by the plant stems, with the resultant effects of a decrease in current velocity, increased sediment deposition and an increase in the level of the mudflats and marshes.

4.17 The Saltmarsh Management Manual [10](Environment Agency et al.) corroborates that saltmarsh vegetation can be established successfully provided that physical and biological conditions are satisfactory. The Manual recommends that natural colonisation should be considered as the preferred option for saltmarsh vegetation establishment rather than artificial transplantation.

4.18 BERR et al. (2008) states where habitats along a cables route are sensitive, such as vegetated saltmarsh, it may be necessary to remove vegetation prior to installation and replant or enhance following installation. Stabilisation techniques may also be necessary in certain conditions.

4.19 Periods of inclement weather should be avoided for cables installation. Favourable conditions for cables installation in saltmarsh is warm weather with a breeze as this allows the ground to dry out quickly reducing increased damage which can occur in wet conditions

Case Studies

4.20 There have been several case studies of cables installation through saltmarsh habitat across the country. NE has advised review of activities carried out for the LOWF cable installation, Gibraltar Point and TOWF.

[10] The Saltmarsh Manual, Defra, Environment Agency Flood and Coastal Erosion Risk Management R & D Programme, 2007

Lincs Offshore Wind Farm (LOWF)

4.21 In 2008 LOWF was granted consent for cable installation using horizontal directional drilling (HDD) under the saltmarsh at The Wash. Use of HDD was approved as it was believed it would avoid any adverse effects on the saltmarsh interest features of the Wash and North Norfolk Coast SAC. However, due to unconsolidated sediment layers the HDD failed in 2010. The failure of HDD led to disturbance of the saltmarsh as vehicles were required to recover equipment and materials.

4.22 Alternative solutions were considered and a bespoke open cut trencher 'Nessie' was identified. NE advised the Marine Management Organisation (MMO) that open cut trenching techniques across the saltmarsh could have a likely significant effect. The developer provided information that Nessie had a low track pressure, vegetation would only have to be removed from a narrow trench strip approximately 35cm wide and there would be no further compaction or smothering of sediment once the trench had been backfilled.

4.23 There is a network of creeks across the saltmarsh including Big Tom Creek. To enable Nessie to cross the saltmarsh, flume pipes were used in the creeks. Works were temporarily stopped when one of the flume pipes inshore of Big Tom was dislodged. Monitoring of the marsh and the creeks was carried out on a daily basis. A large area of standing water appeared during construction, and remedial action by hand-digging was taken to reconnect the area to a minor creek.

4.24 The first two of the LOWF cables was installed by open-cut trenching in 2011 with impacts greater than predicted. Greater impacts occurred because Nessie had difficulty crossing the saltmarsh due to soft terrain and creeks and was stuck for a few days. A winch was then used to keep Nessie upright when crossing difficult terrain. Vehicles had tracked over the saltmarsh several times to free Nessie when stuck causing a wider corridor of disturbance. The winch caused depressions of 0.5m to 1m in the saltmarsh over a stretch of 200m.

4.25 Using lessons learned, additional mitigation measures and contingency plans were put in place to reduce the impact. The final cables were installed in 2012 with a much reduced impact. Mitigation included only allowing installation vehicles and machinery to cross the saltmarsh on neap tide cycles to reduce the effect on vegetation when the marsh is sodden.

4.26 NE advised LOWF that is it essential to maintain the natural or near-natural drainage patterns of creeks during and post cables installation. Potential impacts arise from both deployment and retrieval of flume pipes or other bridging materials and the subsequent restoration of creeks, especially in the mid and upper saltmarsh. NE advised that alternative approaches such as digging out the creek by hand to restore the course of the creeks should be considered.

The Wash, Gibraltar Point

4.27 In a response to LOWF, NE highlighted the importance of ensuring saltmarsh is restored using Gibraltar Point as anecdotal evidence of damage following intertidal activity as a military exercise area.

4.28 Military vehicle tracks are still visible after 25 years as sufficient sediment does not settle into the track depressions to bring their surface levels back to that of the saltmarsh surrounding them. It is unclear at these locations whether different species are now present or whether growth is stunted.

Thanet Offshore Wind Farm Saltmarsh Monitoring and Recovery

4.29 A combination of spider plough and low pressure ground excavators were used for TOWF cables installation at Pegwell Bay. Total works took approximately 4 weeks, although works on the intertidal area (actual working days, not consecutive days) were completed in 10 days. The cables route for TOWF was chosen as it followed a 1m wide bait diggers' path but the actual working area was 15m. Works were undertaken between January and March 2010.

4.30 TOWF monitoring has found that since August 2010 the saltmarsh in Pegwell Bay has continued to establish in the cable corridor as supported by annual surveys. The quadrat survey assessment 2011 indicates that the vegetation within each zone in the cable corridor is more typical of that in the preceding zone in the control area.

4.31 Monitoring surveys were undertaken monthly over the six months immediately following the completion of the cable installation. The affected area showed evidence of saltmarsh vegetation of similar species diversity as the surrounding saltmarsh habitats, with vegetation coverage improving throughout the six months monitoring period. The 2010 monitoring report concludes that at the end of the six months monitoring period the cable route corridor through the saltmarsh had been

successfully colonised by saltmarsh species and in time the species will develop to give a similar coverage and composition as the surrounding saltmarsh habitats.

4.32 Overall the 2011 survey indicates that the cable corridor is almost fully vegetated with saltmarsh species although not at a stage to be comparable with surrounding saltmarsh. The findings of the survey indicate that natural saltmarsh succession is taking place on the site and eventually the cable corridor will have similar characteristics to the surrounding area.[11]

4.33 NE and the EA have not raised any concerns regarding the installation methods and rate of recovery of saltmarsh affected by TOWF.

[11] Thanet Offshore Wind Farm: Saltmarsh Recovery Monitoring Survey 2011, Royal Haskoning

5.0 SALTMARSH CONDITIONS AT PEGWELL BAY AND APPRAISAL OF LIKELY SIGNIFICANT EFFECTS

5.1 TEP carried out an NVC Survey in accordance with JNCC guidelines in 2011(TEP reference 2700.034). This survey informed the Environmental Statement. Following meetings with organisations including NE, Kent Wildlife Trust (KWT) and the EA an updated survey was carried out to classify the saltmarsh which may be affected by the proposed Nemo Link cables installation as shown on Planning Drawing 1 Site Location – Overview (Drawing Ref: D2700.17B). The survey also identified areas of habitat which may support invertebrates which may also be affected by the proposed cables installation. This drawing is presented at Appendix 3.

5.2 A walkover survey was undertaken by Chris Booler CEnv MCIEEM on the 25th June 2013, in agreement with KWT. Habitats and features of interest were recorded by taking GPS readings and photographs. The survey verified and where appropriate updated the NVC survey undertaken by TEP in 2011 to produce accurate mapping of habitat types and features of interest.

Saltmarsh Classification

5.3 The results of TEP's NVC saltmarsh survey have been referenced against definitions of salt marsh habitat types in JNCC report 334. TEP Drawing 2700.123A, presented at Appendix 4, shows the habitat types present in the proposed Nemo Link cables installation area (the red line planning application boundary).

5.4 The saltmarsh in the area surveyed can be separated into four habitat types as defined in JNCC report 334 (Boorman 2003). An additional transitional habitat zone is also present between the saltmarsh and modified grasslands alongside Sandwich Road, northwest of the saltmarsh.

5.5 The different habitat types within the red line planning application boundary have been linked to the NVC habitat zones as identified during the 2011 survey.

5.6 The saltmarsh zones in the red line boundary are as follows:

- Zone 1 – Upper saltmarsh and transitional zone;
- Zone 2 – Middle saltmarsh;
- Zone 3 – Middle saltmarsh;
- Zone 4 – Upper saltmarsh;

- Zone 6 – Lower saltmarsh; and
- Zone 7 - Pioneer saltmarsh.

5.7 NVC Zone 5 is present in the wider Pegwell Bay area but is not present within the Nemo Link red line boundary. NVC Zone 5 can be classified as middle saltmarsh using the JNCC definitions.

5.8 The topography of the bay has resulted in a strip of upper saltmarsh (Zone 4) running through the saltmarsh with lower saltmarsh (Zone 6) on the seaward side and middle saltmarsh (Zone 2 and 3) on the shoreward side. This belt of upper saltmarsh is on higher ground than the saltmarsh surrounding, and is dominated by sea couch (*Elytrigia sp*) with few other saltmarsh species present.

5.9 The presence of middle saltmarsh on the landward side of Zone 4 can be attributed to the presence of a saltmarsh lagoon to the west of Zone 4. To the south of the Nemo Link red line boundary is a small dip in the topography of Zone 4. The lower ground is characterised by a greater diversity of saltmarsh species as identified during the NVC survey in 2011. Sea water accesses the lagoon and surrounding saltmarsh through this channel which has resulted in the development of lower and middle saltmarsh habitats landward of Zone 4. It is important that this channel is maintained to allow the continued feeding of the lagoon and to maintain the saltmarsh areas. Within the red line boundary, only middle saltmarsh habitats are present landward of Zone 4.

5.10 Pioneer saltmarsh at the interface between the saltmarsh and mudflats appears to be stable and during survey it was possible to compare the outline of the saltmarsh with aerial photographs taken prior to installation of the TOWF cable noting that there has been little change.

5.11 At the upper end of the proposed cables installation working area (still within the SPA and Ramsar site), the saltmarsh grades into grassland and disturbed vegetation communities. This area will be used for the temporary laydown compound.

5.12 Creeks from the seaward edge of the saltmarsh are clearly visible (TEP Drawing 2700.123 Appendix 3). The creeks become shallower as they progress into the saltmarsh and become vegetated channels.

5.13 A creek which is clearly visible on the aerial photograph is also used as a footpath by people accessing the mudflats. Boot prints and dog footprints were visible at the time of survey.

5.14 To supplement the 2011 survey and address the concerns raised by NE (See Appendix 1), a saltmarsh walkover survey was carried out by TEP in June 2013 (see Appendix 3). The survey took particular account of the presence or absence of the following saltmarsh species:

- *Aster tripolium;*
- *Atriplex portulacoides;*
- *Spergularia media;*
- *Puccinella maritime; and*
- *Salicornia sp.*

5.15 Saltmarsh habitats Zones 3, 6 and 7 have potential to support species of invertebrates, identified due to the presence of flowering plants, include where sea aster *Aster tripolium* is present (TEP Drawing 2700.123 Appendix 3). Zones 3 and 6 also have areas of tidal debris within the saltmarsh with further potential to support invertebrate species.

Appraisal of Likely Significant Effects

5.16 An appraisal of the Likely Significant Effects of the project on saltmarsh and mudflats in against the criteria use by NE, set out in paragraph 3.8 is presented in the following paragraphs.

Area of habitat that will be reduced

5.17 Table 1 (in Chapter 2 above) provides dimensional information for the Project.

5.18 The length of the cables route through the intertidal area, between mean low water spring and high mean water spring, is approximately 1,515m, and the trench will be cut up to a maximum width of 3m. 1,300m runs in mudflat and 215m runs in saltmarsh.

5.19 The TJP will be 15 x 5m and as a REASONABLE WORST-CASE SCENARIO will be excavated in saltmarsh. It may be possible to relocate the TJP north west of the proposed location to be situated in an area of modified grassland. Relocation of the TJP will be determined by contractor's method statements prior to the

commencement of works in consultation with NE. The contractors' laydown compound may also be laid out on 60m² of saltmarsh in the REASONABLE WORST-CASE SCENARIO although the detailed method statement will seek to avoid use of this specific area. The laydown area occupies approximately 42m x 31m the majority of which is modified grassland and will be fenced to contain equipment and materials during the excavation of the TJP and cables installation.

5.20 In summary, the intertidal area (saltmarsh and mudflats) excavated will be 0.46ha (4,620m²). Within this, about 720m^2 of saltmarsh would be excavated. In practice the figures in Table 1 are very much worst-case for mudflats because it is expected that the cables installation barge can be brought closer to shore and a plough used for part of the installation across the mudflats.

5.21 The area affected by compaction and localised sediment seepage arising from placing of weight-bearing mats and backfill is approximately 1.82ha in all intertidal habitats. Within the above, the area of saltmarsh affected is 2,640m^2.

5.22 Importantly it is noted that trenching in the saltmarsh will not require any crossing or excavation of creeks, something that was problematic in the LOWF referred to earlier.

Scale of impact

5.23 Cables will be laid at a depth of 1m using conventional trenching. The TJP will 15m long by 5m wide and will be excavated to a depth of 2.5m. A single trench will be excavated alongside the cables using conventional mechanical excavators adapted for working on soft soils. The excavated material will be placed to one side for re-use. Rollers will be used in the base of the trench to pull the cables along it. A cofferdam may be required to keep water from entering the trench during excavation.

5.24 During construction there will be temporary loss of saltmarsh habitat however, the Applicant is confident that within a year there will be signs of saltmarsh recolonisation, as has been demonstrated by the TOWF cables route. Monitoring is proposed for a period of five years which will identify whether contingency steps will need to be implemented should recolonisation not be successful or should occur at a slower rate than agreed with NE.

Duration of impact

5.25 Cables installation in the mudflats and saltmarsh is predicted to take a maximum of 6 weeks and will be carried out between mid-July and the end of August to avoid sensitive times of year for SPA bird species. The actual period of activity in the saltmarsh (rather than mudflats) is predicted to be 4 days, with backfilling of the trench taking place as soon as possible after excavation (typically at most within 48 hours). After one year of monitoring, it is expected that signs of saltmarsh recovery will be evident (as demonstrated by the TOWF monitoring information). It is anticipated that timescales for recolonisation of the Nemo Link cables route would be similar to TOWF.

5.26 The compound will be in use throughout the duration of the excavation of the TJP and the cables installation works. Following completion of the works, the land will be allowed to recolonise naturally; it is anticipated that this will take approximately five years. To protect the working compound during recolonisation the area will be fenced following completion of the installation works and monitoring of recolonisation will take place for 5 years. During this time weed species will be removed by hand or where appropriate spot treated with herbicide. These maintenance works will be covered by a reinstatement plan covering all of the land to be reinstated following completion of the installation works for Nemo Link.

Direct impact on populations of Annex II Species

5.27 There will be no direct impact on populations of Annex II species.

Change to composition of habitats

5.28 In the short term there would be a change in composition of the saltmarsh habitat along the cables route and in the working areas. However, following completion of the works it is anticipated that the saltmarsh will recolonise naturally and annual monitoring for five years with contingency measures in place will ensure that this is the case.

Degradation of physical or biological processes

5.29 During construction there may be use of a cofferdam to prevent water ingress to the cables channel. Following construction the cofferdam will be removed. The excavated cables trench will be backfilled with excavated material and the area will be allowed to recolonise naturally. Ground levels will be restored to original levels which will allow natural tidal patterns and deposition of material to resume.

6.0 FUTURE MONITORING AND MANAGEMENT

6.1 Monitoring surveys of the affected saltmarsh will be undertaken for five years following cables installation and the results will be submitted to NE and KWT.

Monitoring regime for Nemo Link Cables

6.2 The mitigation strategy that will be used by the Nemo Link will be based on that employed by the TOWF scheme due to the proven success of these methods (see paragraph 2.21 above).

Pre-start Baseline Survey

6.3 In the period of June to mid-July preceding the start of works the saltmarsh within the cable easement will be surveyed to determine baseline conditions. This will be a repeat of the 2013 NVC survey reported in Appendix 3 and will provide a contemporary baseline for future monitoring.

6.4 A sequence of photographs will be taken of the vegetation communities from the landward edge to the seaward edge of the saltmarsh. The locations of photos will be recorded using a Global Positioning System (GPS). A photograph will be taken at least every 10m along the proposed cables route through the saltmarsh.

6.5 Saltmarsh species and percentage coverage within a 1m quadrat will also be recorded at each photo point.

6.6 The information collected using the above methods will allow comparison with the results of post completion monitoring surveys.

6.7 An initial post-completion monitoring survey will be undertaken following reinstatement of ground levels. The survey will involve taking photographs at each of the locations identified in the pre-commencement survey. Locations will be identified using GPS. Saltmarsh species and percentage coverage within a 1m quadrat will also be recorded at each photograph location.

6.8 Repeat monitoring surveys will be undertaken monthly for 1 year following installation (Year 1). This will involve taking photographs at each of the locations identified in the pre-commencement survey. Locations will be identified using GPS. Saltmarsh species and percentage coverage within a 1m quadrat will also be recorded at each photo point. This is a longer initial survey period than that used by TOWF as the installation will be undertaken later in the growing season. Recolonisation is unlikely to progress quickly over the winter months. Subsequent post-completion monitoring surveys will be undertaken annually at a similar time of year as the baseline survey.

6.9 Annual surveys of the saltmarsh will then be undertaken for four years following the completion of the monthly monitoring period (Years 2 to 5).

6.10 Monitoring reports will be produced at the end of Years 1, 2, 3, 4 and 5. These will report on the level of saltmarsh recolonisation progress in terms of overall coverage and species composition. Recommendations will also be made with regard to implementation of saltmarsh recolonisation contingency.

Saltmarsh Recolonisation Contingency

6.11 The advice of NE will be sought on the success of the saltmarsh restoration on receipt of each 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. After three growing seasons, cover of less than 66% would be a trigger 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, with evidence of on-going colonisation; or strong evidence emerging from monitoring vegetation cover is recovering to the 95% levels.

6.12 Material for seeding the saltmarsh will be selected from sources agreed with NE. . A method statement will be submitted for approval by NE and KWT and any licence necessary will be sought.

7.0 SPA BIRDS

7.1 Pegwell Bay forms a part of the Thanet Coast and Sandwich Bay Special Protection Area (SPA), which is a long stretch of rocky shore, adjoining areas of estuary, sand dune, maritime grassland, saltmarsh and grazing marsh. The SPA qualifies under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the migratory bird species turnstone. The SPA as a whole is used by large numbers of migratory birds as they make landfall in Britain in spring or depart for continental Europe in autumn.

7.2 The Ramsar citation sheet confirms that the Thanet Coast and Sandwich Bay Ramsar site supports:

- Nationally important numbers of ringed plover during the migration periods (649 individuals representing an average of 2% of the GB population – 5 year peak mean 1998/9-2002/3);
- Nationally important numbers of greenshank during the migration periods (35 individuals representing an average of 5.8% of the GB population – 5 year peak mean 1998/9-2002/3);
- Nationally important numbers of red-throated diver during the winter period (57 individuals representing an average of 1.1% of the GB population – 5 year peak mean 1998/9-2002/3).

Further updates in the Wetland Bird Survey Report 2007-08

7.3 The 5-year peak mean average count for golden plover in Pegwell Bay (03/04 – 07/08) is 6,125 birds, which exceeds the national GB threshold of 4,000 birds.

7.4 The 5-year peak mean average count for lapwing in Pegwell Bay (03/04 – 07/08) is 11,105 birds, which exceeds the national GB threshold of 6,200 birds.

7.5 TEP carried out a winter bird survey in 2008 to 2009. Survey visits were undertaken once a month from November 2008 to March 2009 and May 2009 with an additional visit being undertaken in February (six visits).

Findings of the 2008-09 Winter Birds and Migration Survey

7.6 None of the birds observed within the Pegwell Bay survey area in winter 2008-09 were recorded at numbers exceeding GB thresholds, as defined by the BTO.

7.7 As wildfowl and wader counts were only undertaken once each survey month, and twice in February 2009, it is unlikely that monthly peak counts were recorded during survey days. It is known that monthly peak counts within the Pegwell Bay Bird Report often exceeded those recorded during survey days. However the detailed information on wader and wildfowl distribution gathered during the winter 2008-09 survey has identified sensitive locations within the Pegwell Bay. The works set out in Chapter 2 will take place within the Planning Application red line boundary as shown on Planning Drawing 1 (TEP Drawing Ref: D2700.17B). The cables routeing options considered the sensitive locations for wader and wildfowl and the proposed red line boundary avoids these areas.

7.8 The Pegwell Bay bird populations will be most sensitive to disturbance during the winter months and migratory period (October to February and May) during which large numbers of important wader species are present (lapwing, golden plover, turnstone and grey plover). The main migratory species which use the Pegwell Bay (turnstone, sanderling and grey plover) tend to peak during the spring migration in May although a more prolonged ringed plover/turnstone autumn migration occurs over several weeks in August and also September.

7.9 The Winter Bird Survey strongly indicates that the Pegwell Bay bird populations will be most sensitive to disturbance during the period October to February and also in May. Recommendations from the survey stated that construction related activities on the mudflats of the Pegwell Bay avoid periods October to February and May where project timescales allow. It was strongly advised that no construction activities are undertaken in February when wintering birds will be especially sensitive to losing valuable feeding time due to disturbance (Stillman and Goss-Custard, 2002).

Proposed Works and Mitigation

7.10 The route of the subsea and onshore underground cables and location of the TJP and other joint pits, and the compound have been chosen to avoid ecologically sensitive receptors wherever possible.

7.11 Construction activities on the intertidal habitats of the Pegwell Bay will not be carried out between October and March to avoid overwintering bird interest of the SSSI and SPA. Works will be carried out only between mid-July and the end of August, avoiding wintering birds, and after breeding of redshank and oystercatcher is complete.

7.12 Prior to commencement, walkover surveys will be carried out to ensure breeding birds are not directly affected by the works, and would not be indirectly affected by disturbance.

7.13 Although works are comfortably expected to be complete within a six week window, as described at paragraph 2.20, should there be inclement weather, it would be possible to continue into September prior to arrival of wintering birds at the beginning of October. However, this contingency would be initiated only following liaison with and advice from NE.

Monitoring

7.14 There is no proposed monitoring for SPA birds as the cables will be installed outside of the sensitive periods for wintering birds.

Appraisal of Likely Significant Effects

7.15 An appraisal of the Likely Significant Effects of the project on SPA bird species against the criteria used by NE, set out in paragraph 3.8, is presented in the following paragraphs.

Area of habitat that will be reduced

7.16 Habitat for SPA bird species will be temporarily reduced during cables installation. A corridor of 1,515m with a working width of 20m is anticipated. However, this is summer working, when SPA birds do not depend on this habitat.

7.17 The impact on mudflats (3900m^2 excavated) will be very short lived in respect of invertebrate prey for SPA birds. Recovery is expected within the first winter following works. In the excavated saltmarsh (720m^2), it is anticipated that the saltmarsh structure will have recolonised to pre-installation conditions within five years.

7.18 Should natural recolonisation be found to be unsuccessful through the monitoring surveys, as confirmed by NE, reseeding from an agreed source in will be used to revegetate the disturbed saltmarsh areas. A method statement for reseeding will be submitted for approval by NE and KWT and any licence necessary will be sought.

Scale of impact

7.19 The works will be completed before arrival of wintering species, and the impact on feeding areas of mudflats will be very short-lived, as this is the intertidal habitat which will recover most rapidly[12]. The scale of impact is not perceptible in terms of the scale of the SPA's total winter feeding resource.

Duration of impact

7.20 Cables installation in the intertidal area is predicted to take a maximum of 6 weeks and will be carried out between mid-July and the end of August to avoid sensitive times of year for SPA bird species. Should there be inclement weather, it would be possible to continue into September prior to arrival of wintering birds at the beginning of October. However, this contingency would be initiated only following liaison with and advice from NE.

Direct impact on populations of Annex II Species

7.21 There will be no direct impact on populations of Annex II species.

Change to composition of habitats

7.22 There will be a temporary change to the composition of habitat along the trench excavation zone however, it is anticipated that natural recolonisation of the saltmarsh will take five years, and the mudflats will recover very rapidly in respect of invertebrates. The invertebrate communities provide a food source for the SPA birds

[12] BERR (2008) states that '*Rates of recovery of invertebrate communities appear to be associated with the rate of recovery of the seabed sediment characteristics. Experiments undertaken to record recovery given different intensities of disturbance revealed that when sediment was removed to a depth of 10cm recovery of the faunal component occurred within 64 days of the disturbance. However, when sediment was removed to 20cm depth, recovery was not complete until after 107 days but had occurred within 208 days of the disturbance. Thus recovery at more intensely disturbed sites took nearly twice as long. Nevertheless, the higher intensity disturbance did not have a significantly greater effect on the community than was found in the less intense disturbance*' (Dernie *et al*., 2003). The report also states that cabling could take longer than the experiments above for recovery due to the depths of disturbance different structure. However, the majority of the communities are within the top 10 to 20cm of the sediment indicating that recovery may be influenced strongly when disturbance intensity changes between these depths but may not differ too much once disturbance occurs below this depth.

and research has shown that rates of recovery for invertebrate communities can occur within one year of disturbance from cables installation. However, the invertebrates which are found within the proposed cables route are also found across the Pegwell Bay, so there will be no loss of food source for SPA birds.

Degradation of physical or biological processes

7.23 There will be a temporary disturbance to physical and biological processes during cables installation as there may be use of a cofferdam. However, following completion of the cables installation works which could take up to 6 weeks, the cofferdam will be removed to allow physical and biological processes to continue. Only the proposed cables route will be affected by the cables installation works, the remaining Pegwell Bay will remain unaffected and will be suitable for use by SPA birds.

8.0 RAMSAR INVERTEBRATES

8.1 Detailed intertidal sediment and invertebrate surveys of Pegwell Bay north of the River Stour were undertaken by ecologists from TEP and Centre for Marine and Coastal Studies (CMACS) on 13th and 14th August 2009.

8.2 Four transects were taken at right angles to the shoreline associated with Cliffs End and the A256. Along each transect, four sample points were identified which represented the upper, mid-upper, mid-lower and lower shore.

8.3 A total of 42 taxa were recorded across all points. Most of the species sampled were polychaetes (19 taxa), followed by crustaceans (15 taxa) and molluscs (4 taxa). The average total abundance across all sampling locations was 3,930 individuals per m^2 and the average species richness was 13 species.

8.4 The shore at Pegwell Bay was dominated by well sorted medium to very fine sands which made up at least 75% of the sediment.

8.5 Four separate biotopes were identified by analysing the sediment and invertebrate survey results. These were as follows:

- The mid shore : '*Cerastoderma edule* and polychaetes in littoral muddy sand' (LS.LSa.MuSa.CerPo)
- The upper shore : '*Bathyporeia pilosa* and *Corophium arenarium* in littoral muddy sand' (part) (LS.LSa.MuSa.BatCare)
- The north eastern end of the shore : '*Nephtys cirrosa* dominated littoral fine sand' (LS.LSa.FiSa.PoNcir)
- Lower shore adjacent to north bank of River Stour: '*Cerastoderma edule* and polychaetes in littoral muddy sand' (part) LS.LSa.MuSa.CerPo).

8.6 During the June 2013 botanical update survey (survey records presented in Appendix 3) observations were made in relation to supporting habitat for onshore invertebrates as advised by NE (see Appendix 1). The survey confirmed that the cable route corridor has relatively few areas of habitat likely to be of most interest to the Red Data Book invertebrates known on site (see summary in Chapter 5 above). However, sea aster (*Aster tripolium*) is widespread within Zone 3 and also present within Zones 6

and 7. These were not flowering at the time of survey but have potential to support invertebrates, particularly when in flower.

8.7 Bare ground, litter and debris were also present in Zone 3, providing further potential to support invertebrates. The presence of a shrew indicates that this zone rarely floods and also supports species of invertebrates, supporting small predators.

8.8 Zone 6 contains a greater amount of litter and debris and vegetation, in distinct lines parallel with the shore, indicating tidal wash. This area has a greater potential to support invertebrate species, due to sheltering opportunities, although regular inundation from the tide is likely to affect the suitability of the habitat.

8.9 Zone 7 largely lacks litter and debris, due to regular inundation by tidal waters. It is likely that regular deposition of such features occurs, however regular disturbance from the tides moves litter and debris either further into the saltmarsh or back into the mudflats.

Proposed Works and Mitigation

8.10 Debris and other mobile food sources for invertebrates such as drift wood will be moved by hand rake to outside the cables corridor prior to the excavation of the cables trench and jointing pits and compound area, and the placing of weight-bearing mats.

8.11 During cables installation, excavated material will be set to one side of the trench and will not be disturbed by construction traffic or workers until the trench is backfilled. Setting the excavated material to one side immediately after excavation will reduce the potential for smothering invertebrates and allow for invertebrates to move out of the area if necessary.

8.12 Should natural recolonisation be unsuccessful or at a rate which is below NE's expectations, turves will be taken from existing areas of the corresponding saltmarsh habitat based on the NVC survey. A survey undertaken prior to turf translocation will identify areas suitable to support invertebrates. Recolonisation using turves as a contingency will provide a reasonable probability of rapid recovery of saltmarsh flora, particularly areas of flowering plants.

Appraisal of Likely Significant Effects

8.13 An appraisal of the Likely Significant Effects of the project on Ramsar invertebrates against the criteria use by NE, set out in paragraph 3.8 is presented in the following paragraphs.

Area of habitat that will be reduced

8.14 Habitat for Ramsar invertebrate species will be reduced temporarily during cables installation. However, material will be excavated carefully avoiding where practicable mixing of soil sediments and smothering of invertebrates. Excavated material will be placed to one side of the cables trench where invertebrates will be able to move out of the construction area.

8.15 Monitoring for invertebrates will be carried out for a period of five years following completion of the works by which time it is anticipated that the saltmarsh structure will have recolonised to pre-cables installation conditions.

Scale of impact

8.16 Within the saltmarsh (where the Notable invertebrates are found) a corridor of up to 215m length and width of up to 20m will be affected by temporary works. The temporary working compound will affect some 60m² saltmarsh.

8.17 However, vegetation will only be significantly damaged in the excavation trench (645m^2) and TJP (75m²). The total area of saltmarsh vegetation affected in terms of supporting notable terrestrial invertebrates is 720m² (the balance being covered temporarily by weight-bearing mats). The working area will be affected for a maximum period of 6weeks. The remaining Bay area will be available for use by SAC invertebrates throughout the duration of the works.

Duration of impact

8.18 Cables installation in the intertidal area is predicted to take a maximum of 6 weeks and will be carried out between mid-July and the end of August.

Direct impact on populations of Annex II Species

8.19 There will be no direct impact on populations of Annex II species.

Change to composition of habitats

8.20 There will be a temporary change in the composition of the habitats for Ramsar invertebrates within the red line boundary during cables construction. However, the rest of the Pegwell Bay which also provides suitable habitats for Ramsar invertebrates will remain undisturbed. There will be no barrier to prevent onshore invertebrates moving from the construction area.

Degradation of physical or biological processes

8.21 There will be temporary disturbance to physical and biological processes during cables installation and excavation of the TJP. However following completion of the installation works physical and biological processes will resume. The remaining land that forms Pegwell Bay outside of the red line boundary will be undisturbed throughout the duration of the works.

9.0 LANDFILL

9.1 The EA raised concern regarding the proposed method of cables installation with Pegwell Bay Country Park as there are no records available that detail the depth of the chalk cap over the former landfill site. Disturbance to the landfill cap could cause contamination.

9.2 The Applicant now proposes to lay the cables in a trough on top of the existing surface within the Pegwell Bay Country Park to the boundary of Stonelees Nature Reserve. The cables trough will then be overburdened with clean inert fill which finishes in a chalk cap. Levels will be finished to appropriate gradients for slopes for wheeled access. Detailed method statements for cables installation within the Country Park will be provided to the EA, NE and TDC prior to the commencement of works. An assessment of the effect on Traffic and Transport for the additional material for the capping has been provided as part of additional information submitted to the planning authorities and is appended to TEP Document Reference 2700.131 Letter to TDC and DDC detailing amendments to the application red line boundary.

10.0 NATTERJACK TOADS

10.1 A natterjack toad reintroduction programme for Stonelees Nature Reserve and Pegwell Bay National Nature Reserve (NNR) began in 2001. Confidential information regarding natterjack toad (*Epidalea calamita*) was provided to TEP by KWT, on the basis that it was not placed in the public domain, but was used to inform the method for cables installation. A review of natterjack toad information and assessment of the effects of cables installation is presented in the 'Natterjack Toad Briefing Note' (TEP Document Reference: 2700.143 presented at Appendix 4 of this report). This document is also confidential and will only be circulated to ecological consultees.

10.2 From a review of annual survey monitoring data from between 2008 and 2012 inclusive, winter survival of natterjack toads was first recorded in 2010. Successful breeding and toadlet emergence was recorded for the first time in the project in 2012. The monitoring report results indicate that at least 200 toadlets left the breeding pools that season.

10.3 The natterjack toad breeding pools are located between 25m and 120m east of the proposed cable route. Based on the phase 1 habitat survey, the unimproved grassland field in which the pools are located is surrounded to the north and west by broadleaved plantation and to the south by broadleaved woodland. These habitats are considered unsuitable for natterjack toads and represent a barrier to dispersal. However, habitat to the east comprises saltmarsh which is not a barrier to dispersal of toads and toadlets.

10.4 Saltmarsh habitat extends to the north and south of the locations of natterjack toad ponds. Saltmarsh lies between 150m and 250m east of the cable route at the north and south points of the natterjack field. The field lies adjacent to that part of the saltmarsh which extends furthest west, with saltmarsh immediately to the north and south lying further to the east, further away from the proposed cable route.

Proposed Works and Mitigation

10.5 The impact of the cable installation works to the north and south of the natterjack breeding area is negligible. However, for the purposes of securing the works, a natterjack licence will be obtained from NE for works within 500m of the natterjack field.

10.6 The proposed cables installation corridor avoids all natterjack toad ponds. The areas of saltmarsh affected by cable installation works are isolated from the breeding ponds by a minimum distance of approximately 1km. It is anticipated that there will be no effects of the cables installation on natterjack toads within the saltmarsh and mudflats.

10.7 For the remaining cables route through Pegwell Bay Country Park and Stonelees Nature Reserve, mitigation measures comprising leaving buffer strips of long grass to the west of the cables route or a trapping exercise followed by the erection of suitable fencing would be used to exclude the natterjack toads from the construction area. The method of mitigation will be determined during the licencing process in consultation with NE. On completion of the cable works which is anticipated to take up to 12 weeks, the fence will be removed and the footprint of the fence and works are will be made good and reinstated into the natterjack habitat area. Detailed mitigation would be decided in consultation and agreement with NE and KWT.

10.8 Under both mitigation options, the cables works (including the fencing works under the second option) would ideally be carried out during the period December to January, inclusive. Depending on weather conditions in the winter season, this window could potentially be extended to a period November to February inclusive.

10.9 During works, the breeding ponds will be protected from siltation and pollution events using standard pollution control measures that are incorporated into a Construction Environment Management Plan. Specifically this will include the temporary storage of arisings within the “excluded area” prior to backfilling, control over run-off and sedimentation etc. During consultation that will be undertaken during the licencing application period, these measures will also be assessed to determine the robustness of the methods and if required additional measures will be implemented.

10.10 Under the terms and conditions of the NE licence which will be sought, long term management and maintenance of the affected population and its habitats must be secured and the mechanism for this must be described in the licence application.

10.11 Monitoring and maintenance of the natterjack population is the responsibility of KWT. However, it is anticipated that a sum of money to be agreed with KWT will be secured to contribute towards these duties for the 10 year period following completion of this

section of cable. It is anticipated this transfer of funds could be secured through a Section 106 Agreement or similar arrangement.

Appraisal of Effect on Favourable Conservation Status

10.12 An appraisal of the Likely Significant Effects of the project on natterjack toads against the criteria used by NE, set out in paragraph 3.8, is presented in the following paragraphs.

Area of habitat that will be reduced

10.13 During installation of the cables, there will be a narrow corridor of potential terrestrial natterjack toad habitat that will be temporarily unavailable. Following completion of the works, the area above the cables corridor will be suitable for use by natterjack toads. Following completion of the works there would need to be a permanent easement of 5m wide along the length of the cables route. Although this area would be suitable for use by natterjack toad, hibernacula in this area would be unsuitable. The net effect on habitat availability and connectivity would be imperceptible.

Scale of impact

10.14 A narrow corridor of approximately 1,150m with a maximum width of 16.5m including the temporary working area of 10-15m will be affected during cables installation. The remaining Pegwell Bay Country Park and Stonelees Nature Reserve area will be available for use by natterjack toads throughout the duration of the works.

Duration of impact

10.15 Cables in the saltmarsh and mudflats will be installed between mid-July and the end of August to avoid sensitive times of year for SPA bird species. Cables installation in Pegwell Bay Country Park and Stonelees Nature Reserve will be carried out for a period of up to 12 weeks.

Change to composition of habitats

10.16 A temporary corridor will be unsuitable for use by natterjack toad for up to 12 weeks during cables installation. During this time the remaining Pegwell Bay Country Park and Stonelees Nature Reserve will be suitable for use by natterjack toads

Degradation of physical or biological processes

10.17 There will be no degradation of physical or biological processes.

Conclusion

10.18 Given the securing of a NE licence, itself contingent on a scheme of fencing and habitat management and reinstatement, there is no predicted adverse effect on favourable conservation status for natterjack toads, nor on the purposes of the KWT programme.

11.0 CUMULATIVE AND IN-COMBINATION EFFECTS

Grid Connection

11.1 Concern has been expressed regarding the effects of the connection of the Nemo Link to the high voltage transmission system ('the national grid') at Canterbury.

11.2 The grid connection is subject to a different consent process from that for the Nemo Link as it falls in the ambit of the Planning Act 2008. That is similar to the case that has applied for many years with regard to applications under the Electricity Act 1989 where applications for generation under section 36 have been considered separately from those for the grid connection under section 37 (where the grid connection has been an overhead line).

11.3 Under the Planning Act 2008, separate applications are made for generation and for a grid connection comprising an overhead line. A clear example is the recent confirmation of a Development Consent Order for the Hinkley C Nuclear Power Station. A new connection comprising many kilometres of overhead line is proposed to ensure this new generation plant is connected to the transmission system. The final design of the connection is yet to be determined and the application for consent for the power station considered the likely cumulative effects based on information available. The documentation related to the application is available via the planning portal. The link below is to the Cumulative Effects chapter of the ES: http://infrastructure.planningportal.gov.uk/wp-content/ipc/uploads/projects/EN010001/2.%20Post-Submission/Application%20Documents/Environmental%20Statement/4.12%20Volume%2011%20-%20Cumulative%20Effects/4.12%20-%20Volume%2011%20-%20Cumulative%20Effects.pdf

11.4 The assessment refers to National Grid Electricity Transmission's (NGET) route corridor as there was not greater information available on the alignment of the overhead line or details of which pylons may be used or the types of pylons. This level of assessment was deemed appropriate for the application and a Development Consent Order has been granted. (The decision is subject to applications for judicial review but not in regard to any aspect of the process followed in relation to cumulative effects and the grid connection.)

11.5 A similar approach to cumulative effects has been taken for the Nemo Link planning application. Chapter 17 of the ES considers the potential for cumulative effects and these are also considered in the Information for Habitat Regulations Assessment Report.

11.6 Potential connection options (whether by overhead line or underground) were assessed and the following effects on Natura 200 designated sites were identified.

- **Thanet Coast and Sandwich Bay SPA and Ramsar** - Potential for disturbance of breeding and overwintering bird species and potential for bird collision risk through construction and operation of overhead lines.

- **Stodmarsh SAC and Blean Complex SAC** - There is the potential for habitat impacts arising from loss of Annex I habitats. There is also the potential for impacts on Annex II species through direct construction activities, habitat loss and habitat alteration resulting from changes in hydrology.

- **Stodmarsh SPA** – There is potential for disturbance of breeding and overwintering bird species and potential loss of habitats supporting breeding and overwintering birds. Potential collision risk through construction and operation of overhead lines only.

- **Stodmarsh Ramsar Site** - Potential loss of wetland habitats affecting wetland invertebrates. Potential changes in habitats through direct impacts and changes in hydrology. Potential disturbance of breeding and overwintering bird species and potential loss of habitats supporting breeding and overwintering birds. Potential collision risk through construction and operation of overhead lines only.

- **The Swale SPA** – Potential for disturbance of breeding and overwintering bird species and potential loss of habitats supporting breeding and overwintering birds. Potential for bird collision risk through construction and operation of overhead lines only.

- **The Swale Ramsar** - The potential loss of wetland habitats affecting wetland invertebrates. Potential changes in habitats through direct impacts and changes in hydrology. Potential disturbance of breeding and overwintering bird

species and potential loss of habitats supporting breeding and overwintering birds. Potential collision risk through construction and operation of overhead lines only.

11.7 Although the sites are generally designated for different habitats and species, Thanet Coast and Sandwich Bay, Stodmarsh and The Swale Natura 2000 sites all support important populations of breeding and overwintering birds. Nemo Link identified potential for habitat loss and disturbance impacts at multiple sites (from any of the potential connection options) which may result in a cumulative impact on birds using these sites and moving between them. Such effects could be avoided by careful routeing of the NGET grid connection. Installation works could also be timed to be undertaken outside of the main migratory periods. Assuming such mitigation can be implemented, there are no anticipated cumulative effects on Natura 2000 sites.

11.8 Sandwich Bay to Hacklinge Marshes SSSI is the only nationally designated site that may potentially be affected by the UK onshore elements of the Nemo Link and NETS connection options.

11.9 Due to the proximity of Sandwich Bay to Hacklinge Marshes SSSI to the former power station site, the installation of overhead lines or underground cables (for any of the potential connection options) has the potential to adversely impact on this site; however direct effects are considered unlikely to occur. The Nemo Link high voltage direct current (HVDC) underground cable would pass through a separate part of this designated area. The HVDC underground cables would pass through the Sandwich Bay to Hacklinge Marshes SSSI in the intertidal area of Sandwich Bay and Stonelees Nature Reserve, and would result in temporary losses of saltmarsh and grassland habitats. The NGET grid connection route could avoid the SSSI, avoiding risk of cumulative effects occurring on this site.

11.10 The information provided is sufficiently robust to draw the conclusion that there is very low likelihood of any cumulative effects on Pegwell Bay or any other Natura 2000 site or any European Protected Species arising from the effects of the Nemo Link together with those arising from a grid connection.

11.11 If in due course NGET makes an application for an overhead line as part or all of the grid connection, its environmental impact assessment will need to consider possible

cumulative effects. In making that assessment it will have the benefit of knowledge of its proposals together with the information on the Nemo Link proposals.

12.0 CONCLUSION

12.1 The Nemo Link cables installation across intertidal habitats in Pegwell Bay has the potential to affect the integrity of the Thanet Coast and Sandwich Bay SPA and Ramsar site, as advised by NE in its letter of 10th June 2013 to TDC and DDC.

12.2 NE has asked for a description of the "reasonable worst-case scenario" for cables installation. Following a review of literature and experience arising from other saltmarsh cable installations and habitat restoration schemes; the proposed method and mitigation measures are detailed at Chapter 2 of this report.

12.3 The literature review and case studies are described at Chapters 3 and 4. An updated walkover of the intertidal habitats took place in June 2013 and this is summarised in Chapter 5 (detail at Appendix 3). Chapter 6 sets out proposals for a 5 year post-installation monitoring scheme. The proposed cables installation methods have taken account of this information.

12.4 A reasonable worst-case scenario would involve the excavation of a trench some of 1m deep and 3m wide, with machinery and temporarily-stored turves, sands and muds being retained on weight-bearing mats alongside the trench. Backfilling would happen within days of cable installation and the works would take place in 6 weeks in the mid-July to end August window of opportunity that avoids SPA wintering birds.

12.5 Prior surveys would be carried out to ensure the works avoided deep mature creeks, breeding birds, and ensured that habitats of value for Red Data Book invertebrates were marked out for special conservation measures. Works would be supervised by an ecologist. Pre-start monitoring would utilise fixed-point photography and GPS-fixed vegetation mapping.

12.6 On completion of backfilling and habitat restoration, the working area would be monitored for 5 years to assess the speed of habitat recovery, and contingency measures would be implemented to remedy slow progress, typically consisting of inoculation of saltmarsh vegetation from surrounding areas.

12.7 Referring to Table 1 in Chapter 2, the total area of saltmarsh affected would be approximately 0.33ha, of which ca. 720m^2 would be excavated and backfilled, the remainder (3360m^2) being affected by the temporary placing of weight-bearing mats

and backfill and consequent short-term compaction and seepage damage to vegetation.

12.8 Although the Nemo Link is considered by NE to be capable of having a Likely Significant Effect on the SPA and Ramsar site, it has asked for the information in this document to be provided in order for it to conclude whether there would be an 'Adverse Effect on Integrity of the Site'.

12.9 The Applicant believes that, provided the monitoring and mitigation measures described in this document are implemented, there would be no adverse effect on integrity. The Applicant would be prepared to be bound by a condition attached to consents given by Thanet District Council, Dover District Council and the Marine Management Organisation, requiring the detailed agreement and implementation of a Monitoring and Mitigation Plan in broad accordance with the methods outlined in this document.

12.10 To eliminate the risk of contamination by disturbing the capping layer of the former landfill site within Pegwell Bay Country Park, the Applicant proposes to use an overburden for the cables route throughout Pegwell Bay Country Park to the boundary with Stonelees Nature Reserve and to use a lower cables trough, reducing the amount of overburden required per metre for safe burial of the cables.

12.11 In relation to Natterjack toads, a European Protected Species, NE has asked for further detail on population size, location and current status, along with proposals for protecting animals and breeding ponds. This information is provided in Chapter 10. A scheme for the protection and management of natterjack toads and their habitats can be drawn up and secured under licence from NE, thereby ensuring no effect on the favourable conservation status of the species.

12.12 In relation to cumulative and in-combination effects, the Applicant's view is that if the eventual form of the grid connection requires express consent, for example as a Nationally Significant Infrastructure Project (NSIP) under the Planning Act 2008, it would be subject to formal procedures including consultation and a Habitats Regulations Assessment to determine the potential impacts on European designated sites. The determining authority would take account of relevant policy including National Policy Statements (NPSs) and cumulative effects. It would also take account of representations received.

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Briefing Note

NE's view on the impact on Saltmarsh interest features of The Wash and North Norfolk Coast Special Area of Conservation (SAC) from Lincs Offshore Wind Farm (OWF) cable installation, December 2012

Correspondence

Letter: NE to Marine Management Organisation, dated 20th February 2012
RE: Revised Lincs OWF Cable Burial Plan: Feedback on additional information

Note: NE's view on the impact on the Saltmarsh interest feature of The Wash and North Norfolk Coast Special Area of Conservation (SAC) from Lincs Offshore Wind Farm (OWF) cable installation, dated December 2012

Letter: NE to Marine Management Organisation, dated 13th February 2013
RE: Race Bank Offshore Wind Farm: Marine Licence variations

Letter: NE to Marine Management Organisation, dated 12th April 2013
RE: Race Bank Offshore Wind Farm (OWF): Scoping Opinion for Appropriate Assessment (AA)

Letter: NE to TEP dated August 9th 2013, Project Nemo draft additional information. Comments in reference to the following submitted draft document: Effect on Integrity of European Nature Conservation Interests. Applicant's submission

APPENDIX 1:

Representation from Natural England to Thanet District Council

Date: 10 June 2013
Our ref: 87547
Your ref: F/TH/13/01444

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Thanet District Council
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Dear Cherry

Planning consultation: Installation of 3.1km underground high voltage cable, 1000MW & outline app erection of converter station, sub building etc.
Location: Former Richborough power station, Sandwich road, Ramsgate.

Thank you for your consultation on the above dated 07 March 2013 which was received by Natural England on the same day.

Natural England is a non-departmental public body. Our statutory purpose is to ensure that the natural environment is conserved, enhanced, and managed for the benefit of present and future generations, thereby contributing to sustainable development.

This reply comprises our statutory consultation response under provisions of Article 20 of the Town and Country Planning (Development Management Procedure) (England) Order 2010, Regulation 61 (3) of the Conservation of Habitats and Species Regulations 2010 (The Conservation Regulations) and Section 28(I) of the Wildlife and Countryside Act 1981 (as amended).

The application site is within Sandwich Bay and Hacklinge Marshes Site of Special Scientific Interest (SSSI). This SSSI is part of the Thanet Coast and Sandwich Bay Special Protection Area (SPA),Thanet Coast and Sandwich Bay Wetland of International Importance under the Ramsar Convention (Ramsar Site) and Sandwich Bay Special Area of Conservation (SAC).

Natura 2000 site – Objection
Natural England is of the view that the proposal, as submitted **is likely to have a significant effect** on the interest features for which Thanet Coast and Sandwich Bay SPA and Ramsar Site, have been classified. Under Regulation 61 of the *Conservation of Habitats and Species Regulations 2010* (as amended), Natural England advises that your Authority undertakes an Appropriate Assessment to assess the implications of this proposal on the sites' conservation objectives.[1] Annex 1 of this letter contains our advice to your Authority on the scope and content of this Appropriate Assessment.

[1] This reply comprises our statutory consultation response under provisions of Article 20 of the Town and Country Planning (Development Management Procedure) (England) Order 2010, Regulation 61 (3) of the *Conservation of Habitats and Species Regulations 2010 (as amended),* (The Habitat Regulations) and Section 28(I) of *the Wildlife and Countryside Act 1981* (as amended).

SSSI Interest – Summer and breeding bird / water quality / light pollution on unit 11 of SSSI
No objection – with conditions
This application is within Sandwich Bay and Hacklinge Marshes SSSI. For the impacts relating to the SSSI only, Natural England is satisfied that there are not likely to be adverse impacts as a result of the proposal being carried out in strict accordance with the details of the application as submitted and the additional conditions. Should the details of this application change, Natural England draws your attention to Section 28(I) of the *Wildlife and Countryside Act 1981* (as amended), requiring your authority to re-consult Natural England.

Conditions
These conditions relate to specific SSSI interests only (see above):

Summer and breeding birds
These conditions are taken from appendix 8.7 of the Environment Statement (ES) – section entitled Implication and Recommendations section 1.11- 1.15 and section 6.13-6.15.

- No construction related activities (which are likely to cause disturbance to breeding birds) are to be undertaken in areas of salt marsh used by redshank and oystercatcher during their nesting season which begins in mid-April and finishes in mid-July (Area A – including 100 metre buffer, Area B and Area C)

- Prior to any vegetation removal works commencing on the salt marsh habitat, a pre-construction walkover survey at the beginning of the breeding season should be conducted to determine whether any birds (specifically of note are SSSI features; redshank and oystercatcher) are nesting in the area proposed for works. A pre-clearance check no more than 48 hours prior to the day the clearance works are undertaken should be conducted and if breeding birds are discovered works will be subject to delay.

- The practice of clearing vegetation within areas of salt marsh to discourage nesting is NOT recommended since this could encourage redshank nesting.

The need to avoid the over-wintering bird interest of both the SSSI and SPA will be considered within the Appropriate Assessment and this will require no working within the intertidal habitats during the wintering months of October to March. Natural England therefore advises that an appropriately worded condition should be attached to any planning consent granted to reflect this works timing restriction –see Annex 1.

Sewage and surface water impacts
Natural England will rely on the assessment and conditions required by Environment Agency (EA) on:

1) The appropriate sewage requirement for the Converter Station, section 7.136, states ‘Foul drainage will be required. The total staffing of the combined sites is very low. Flows are to be separated (substation, converter station and temporary workforce) thus reducing the total flows at any location. No discharge to the river or watercourses is to be made. A self-contained septic tank option for each site is to be provided with the effluent contained and transported off site at appropriate intervals.
In the longer term, consideration will be given to linking these sources and providing a (possibly pumped) discharge to Southern Water public sewers located to the east.’

2) The required SuDS scheme for surface water management, section 7.132 states ‘The surface water drainage design is to be based on best practice guidance such as CIRIA ‘SuDS Manual’ and advice received from EA.’ Currently section 7.42 states ‘The former Richborough Power Station site does not connect surface water to a public network. The

area is drained via a private on-site drainage network with direct discharges into the surrounding land drains and the River Stour to the south and west.'

Natural England defers to the Environment Agency for advice on the foul and surface water systems. However, we are pleased to see that foul drainage will be to a sealed unit and that it will taken off site. This should be secured by an appropriately worded condition. With regard to surface water drainage, we note that this will be to the existing drainage system. This should incorporate appropriate oil interceptors to prevent contaminants entering the water system. We would recommend that this is secured by an appropriately worded condition.

Lighting pollution in relation to invertebrate species
Lighting in relation to ecology is mentioned in section 8.206 stating 'Potential lighting and noise impacts that may disturb habitats and protected species in adjacent areas will be reduced using standard methods such as lighting regimes and noise mitigation measures' and in section 8.251 lighting is considered specifically in relation to bats.

It is also likely that the invertebrate species that form part of the interest feature of the SSSI on unit 11 of the SSSI which is adjacent to the convertor station will be light sensitive, a lighting strategy to prevent the invertebrates from being drawn from the site should be implemented.

These conditions are required to ensure that the development, as submitted, will not impact upon the features of special interest for which Sandwich Bay to Hacklinge Marshes is notified.

If your Authority is minded to grant consent for this application without the conditions recommended above, we refer you to Section 28I (6) of the *Wildlife and Countryside Act 1981* (as amended), specifically the duty placed upon your authority, requiring that your Authority;

- Provide notice to Natural England of the permission, and of its terms, the notice to include a statement of how (if at all) your authority has taken account of Natural England's advice; and
- Shall not grant a permission which would allow the operations to start before the end of a period of 21 days beginning with the date of that notice.

European Protected species
Natural England **objects** to the proposed development. The survey report provided by the applicant indicates that –*Natterjack Toads*- are using features that are to be affected by the proposed development. Unfortunately the information supplied is insufficient for Natural England to provide advice on the likely impact on the species. We advise the council to ensure the information in annex 2 of this letter is supplied.

Designated Landscapes
This proposal does not appear to be either located within, or within the setting of, any nationally designated landscape. All proposals however should complement and where possible enhance local distinctiveness and be guided by your Authority's landscape character assessment where available, and the policies protecting landscape character in your local plan or development framework.

Other advice
We would expect the Local Planning Authority (LPA) to assess and consider the other possible impacts resulting from this proposal on the following when determining this application:

- local sites (biodiversity and geodiversity)
- local landscape character
- local or national biodiversity priority habitats and species.

Natural England does not hold locally specific information relating to the above. These remain material considerations in the determination of this planning application and we recommend that you seek further information from the appropriate bodies (which may include the local records centre, your local wildlife trust or other recording society and a local landscape characterisation document) in order to ensure the LPA has sufficient information to fully understand the impact of the proposal before it determines the application. A more comprehensive list of local groups can be found at Wildlife and Countryside link.

If the LPA is aware of, or representations from other parties highlight the possible presence of a protected or Biodiversity Action Plan (BAP) species on the site, the authority should request survey information from the applicant before determining the application. The Government has provided advice[2] on BAP and protected species and their consideration in the planning system.

Natural England Standing Advice for Protected Species is available on our website to help local planning authorities better understand the impact of development on protected or BAP species should they be identified as an issue at particular developments. This also sets out when, following receipt of survey information, the authority should undertake further consultation with Natural England.

Testing of Alternatives
The applicants have demonstrated within the ES section 2 and appendix 3.1 their consideration and consultation, to which Natural England were party, on alternative sites for this project as a whole (offshore cable, cable landing and convertor station and the ongoing connection).

Many of the alternatives are no longer viable or present significant concerns with regard to the natural environment.

Natural England currently reserves it's position regarding commenting further on the alternative sites for landing the offshore cable and the siting of the convertor station until the further information has been provided on this application, to determine the extent of any adverse impacts on the designated sites.

See below related comments to cumulative and in-combination effects.

Cumulative and In-combination effects
This planning application relates to the landing of an offshore cable at Pegwell Bay and it's connection and building of a convertor station at the former Richborough power station, in addition this project requires related infrastructure that does not form part of this planning application, i.e. the offshore cable and the power line connection to the National Grid.

As stated in our scoping letter to both Thanet (NE ref 62031 CK/Nemo/Richborough Scoping dated 03/9/2012) and Dover (NE ref 63999 DOV/12/00610 dated 17/9/2012) cumulative and in-combination effects should be considered.

The marine licence from the Marine Management Organisation (MMO), which includes works regarding both the intertidal and offshore cabling, is currently being assessed by our Marine Team and a response is due before the end of June; at which stage if we have any concerns regarding significant effects with regard to this proposal, we will raise them.

The ongoing connection from the convertor station to the national grid via the substation at North Canterbury is currently an ongoing consultation that Natural England has been involved with. The detail in this ES highlights the potential impact of this route however, more detail has been provided at the scoping stage of the Richborough connection project proposed by National Grid. The

[2] Paragraph 98 and 99 of ODPM Circular 06/2005

preferred route, is north of Stodmarsh SSSI / SPA / Ramsar, which under a proposed scenario 2 the new 400kV cables would follow the route of the current 132kV cable, which would be removed. Power lines can result in impact through direct habitat loss, indirect habitat loss (displacement and barrier effects) and bird mortality (electrocution and collision). This preferred route does not directly impact on international or national designated habitat (i.e. there is no land take) nor does it over sail any sites. Also as it replaces existing infrastructure the scale of change is not so significant. However, we are still waiting to assess the impacts on the bird species of the SSSIs and SPAs in the area included linked land that may extend several kilometres beyond the site boundary. We are currently waiting to review the first set of winter surveys for birds in this area and, therefore, we are unable advise that this route has no potential to impact on the birds of these designated sites, particularly if large numbers of birds susceptible to electrocution and collision are using the area; then, of course, we would have strong concerns. However, in addition to route planning other mitigation measures can be included to reduce these types of impacts such as removing earth wires and modifying earthing methods; modifying line, pole and tower design; installing underground cables; and conspicuous marking of lines, poles and towers. Once the level of risk is determined this would if appropriate necessitate what form of mitigation could be used. However, until all the evidence is available we are unable to conclude that no significant impacts would result from the overhead line.

In order for us to advise the council whether there are any cumulative and / or in-combination effects the impacts (including any mitigation) of this current proposal must firstly be correctly assessed. It can then be considered whether any remaining impacts are likely to result in significant impacts cumulatively or in-combination with the potential impacts of other projects including the two additional proposals related to this application. Until the precise impacts of this current project are established we are unable to advise further.

We would be happy to comment further should the need arise but if in the meantime you have any queries please do not hesitate to contact us.

For any queries relating to the specific advice in this letter only please contact Angela Marlow on 0300 060 3893. For any new consultations, or to provide further information on this consultation please send your correspondences to consultations@naturalengland.org.uk.

We really value your feedback to help us improve the service we offer. We have attached a feedback form to this letter and welcome any comments you might have about our service.

Yours sincerely

[redacted]
Land Use Ashford Operation Team

Annex 1: Natural England's detailed comments in relation to planning application reference F/TH/13/01444

The detail below is required to enable Natural England to advise on the implications of any impacts when consulted by the local planning authority undertaking the Habitats Regulations Assessment and when consulted on the outcome of the Adverse Effect On the Integrity of the site (AEOI) test as part of the appropriate assessment.

1) Impacts on intertidal habitat

As submitted, the proposal is likely to have a significant effect on the features for which the Thanet Coast and Sandwich Bay SPA and Ramsar Site have been classified. There is currently insufficient information provided to enable us to advise on the scale of such effects, therefore we request that the following information is provided in order for the local planning authority to complete an appropriate assessment of the impacts of the proposal, on the features of the above designated sites:

- Additional detail of the proposed installation method of the cable across the salt marsh and mudflats, including details of any proposed mitigation. If the exact method is not yet known then a 'reasonable worst case scenario' should be detailed and the impacts assessed. This information needs to include detail such as access routes to the site, type of machinery to be used on the intertidal areas, how many such vehicles will be on the intertidal areas at any one time and for how long it is anticipated they will be on the site for. This detail should be provided in order for the impacts of this supporting habitats of the above SPA and Ramsar to be assessed.

- Further detail should be provided on the proposed reinstatement of the salt marsh (including subsequent intervention should monitoring indicate that this is necessary) to ensure that the area of salt marsh disturbed will, based on previous evidence, recover, and where monitoring shows recovery is not occurring as anticipated, a contingency plan is in place.

- Further detail on a post installation monitoring strategy and how pre-construction survey data will be used to inform this.

- A review of the monitoring data from the Thanet offshore wind farm cable (and other similar case studies) to help inform the likely impacts of cabling, the proposals for salt marsh reinstatement and options for mitigation.

- Clarity should be provided on the exact size, siting and predicted impacts of the transmission joint pit (TJP) (15m by 5m) in Appendix 8.9 Information for HRA.pdf section 1.22 and the associated construction compound of (40m by 20m see figure 2.7). At the site visit on 30/04/2013 we were shown an area of rough grassland not within the salt marsh as indicated in the drawings where the TJP would be located; this is a preferable location however, we have concerns that given the size of the pit this cannot be located wholly within the rough grassland and will encroach onto the salt marsh. This information needs to be provided accurately to understand the area of salt marsh to be temporarily lost and assess the impact on the integrity of the site.

2) SPA and Ramsar - overwintering bird interest

- Survey findings contained within the TEP report '1430.01.024 Winter Bird Survey', indicate

that the Pegwell Bay bird populations will be most sensitive to disturbance during the period October to February (SSSI and SPA birds), Natural England note that March is also an important month for these wintering birds.

Natural England welcome the proposal to conduct work on the intertidal habitats outside of the key winter months to avoid disturbance to wintering birds of the SPA: However this needs to include the months of October – March, therefore we suggest the Appropriate Assessment and application reflects this and demonstrates how the applicant proposes to restrict their work to the short window of opportunity (mid-July to Sept) that the SPA and SSSI bird interest requires.

3) Terrestrial Invertebrates

- The Ramsar designation covers an assemblage of invertebrates a number of them are Red Data Book species and may be located within the salt marsh. A general invertebrate survey is likely to indicate a M311 assemblage.

- From records we hold on S41 species in the location we know that the upper salt marsh transition zone, if it has any stands of restharrow may well support the moth, *Aplasta ononaria*. From the salt marsh records around the coast there are records for *Artosa fulvolineata* (upper salt marsh litter zone species), *Haplodrassus dalmatensis* (bare ground, dune edge, so possible on upper salt marsh transitional bare ground), *Chlorita viridula* on upper salt marsh in areas with any sea wormwood), and possibly *Pseudeuophrys obsoleta*, in any drift area containing large seashells, though it does seem more to favour shingle drift deposits rather than salt marsh. These S41 species, if present, in addition to having their own value, stand as a proxy for good supporting habitat. Key supporting features on the mid and upper marsh are also large stands of flowering plants, as the pollen and nectar resource on that habitat is often sparse.

- Due to the rarity of these species they may well not be picked up in any general survey therefore, we suggest that a precautionary approach is taken and that the presence of the supporting habitat is considered instead, and mitigation is proposed to address the impacts of the trenching on that habitat.

- Therefore we request that these habitat features are mapped in relation to the proposed route and the impact assessed, and if required appropriate mitigation is proposed. This may be a simple as collecting the drift litter up and therefore the invertebrates, rather than running over it, burying it or otherwise neglecting it.

4) Landfill

- There is concern regarding the exact location and extent of the landfill within the country park, and there appears to be some discrepancies within the ES; any disturbance of the landfill could result in pollution into the designated site:

- Clarification from records as to the area of the landfill.

- A proposal to overlay and bund the cable in chalk where it crosses the landfill and beyond to a ‘safe’ distance before trenching to allow for any inaccuracy in these records of where the landfill is located and reduce the risk to disturbing the contamination.

5) **Cumulative and In-combination effects**:

- On establishing the effects of this application after any mitigation measures have been applied, the applicant should consider the cumulative and in-combination effects of this proposal with other projects including the two related projects (i.e. the offshore cable and the overhead line connection to the national grid).

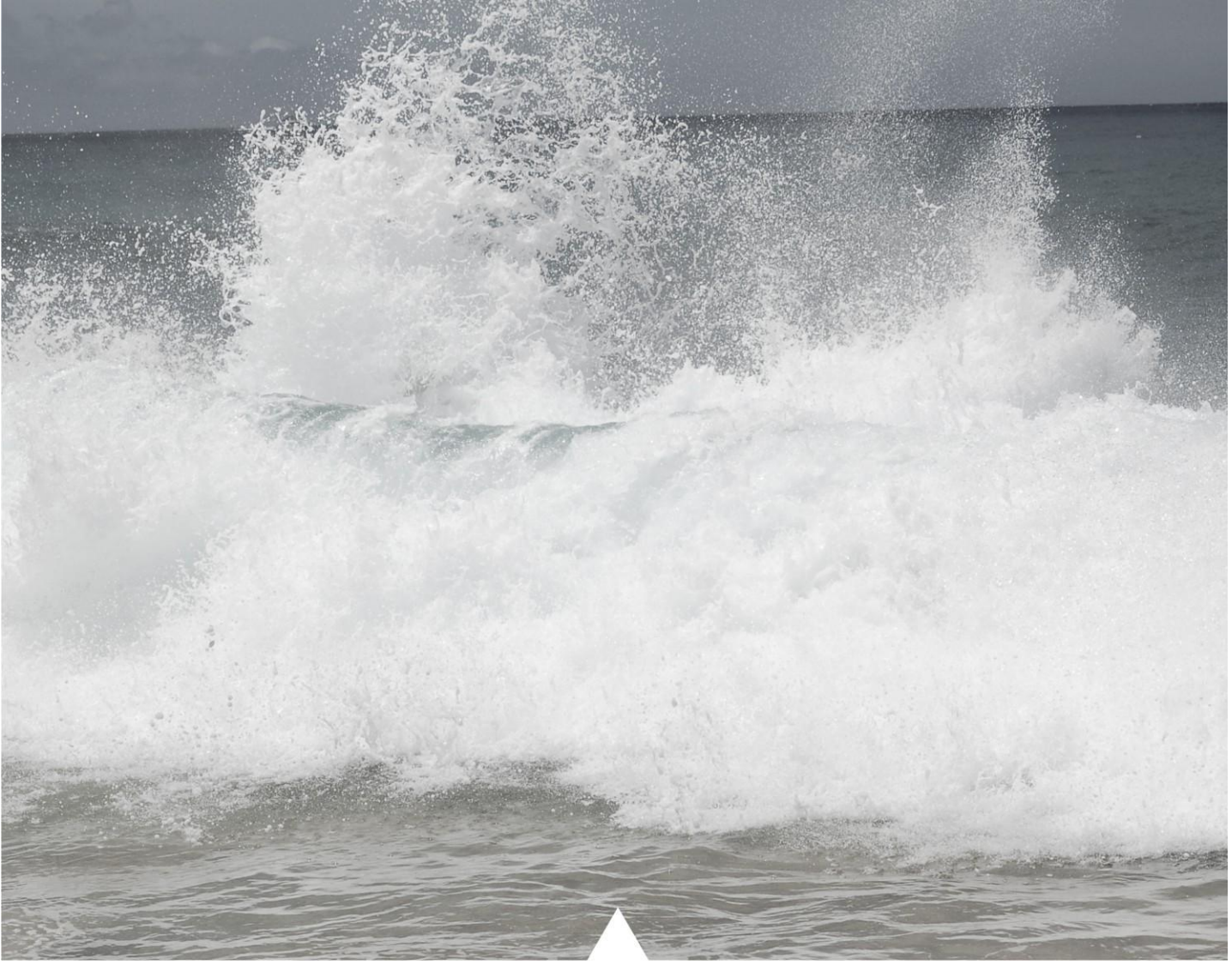
Annex 2 Detailed requirements for European Protected Species

European protected species on site – Natterjack Toads
Clarity on the following to be provided:

- Survey effort and results (including any baseline data that KWT have on monitoring)
- Proximity of breeding ponds to the pipeline route
- Assessment of terrestrial habitat that will be crossed in respect of its ability to support natterjack toads
- Duration of works in proximity to the breeding ponds and proposed time of year when installation is proposed
- Working width for installation
- Measures that they are proposing to prevent the killing or injuring of natterjacks (at any stage of their lifecycle)
- How any impacts to habitats (terrestrial or aquatic) will be compensated / mitigated for
- How indirect impacts such as siltation and water quality will be minimised / managed

APPENDIX 2:

Review of Intertidal Cable Installation Techniques



Review of Intertidal Cable Installation Techniques

Nemo Link

July 2013

PMSS

A member of TÜV SÜD

Review of Intertidal Cable Installation Techniques

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July 2013

Document Control

Responsible for	Job Title	Name	Date
Content	Cable Engineer	[redacted]	25/07/2013
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Signatures in this approval box have checked this document in line with the requirements of QP16

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Abbreviations

AA	Appropriate Assessment
HDD	Horizontal directional drilling
HDPE	High Density Polyethylene
HRA	Habitats Regulations Assessment
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
LGPE	Low Ground Pressure Excavator
LSE	Likely Significant Effect
MCCA	Marine and Coastal Access Act 2009
MHWS	Mean High Water Springs
MLW	Mean Low Water
MMO	Marine Management Organisation
MW	Megawatt
NGNLL	National Grid Nemo Link Ltd
NNR	National Nature Reserve
PMSS	Project Management Support Services Limited
SAC	Special Area of Conservation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
SNCA	Statutory Nature Conservation Agencies
TCPA	Town and Country Planning Act
TDC	Thanet District Council
TJP	Transition Jointing Pit

1. Introduction

1.1. Background

The Nemo Link ("the Project") is a proposed electrical interconnector, with an approximate capacity of 1000 megawatts ("MW"), which will allow transfer of electrical power between the high voltage electrical grid systems of Belgium and the United Kingdom. It is proposed that the Project runs from Richborough in Kent to Zeebrugge in Belgium.

The Project's promoters (National Grid Nemo Link Limited ("NGNLL") and Elia Asset S.A. ("Elia")) (together "the Promoters") submitted consent applications in February 2013 for the onshore and offshore aspects of the Project in the UK, France and Belgium. This included an application under Part 4 of the Marine and Coastal Access Act 2009 ("MCCA") for permission to install subsea cables between the mean high water spring ("MHWS") tide mark at Pegwell Bay in Kent out to the median line between England and France. A simultaneous application was also made under section 90 of the Town and Country Planning Act 1990 ("TCPA") for the onshore elements of the Project comprising the HVDC cable between Mean Low Water, converter station and substation at the former Richborough power station.

During the process of consent determination for the elements of the Project lying between MLW and the converter station in the UK, the competent authorities (namely Thanet District Council ("TDC") and the Marine Management Organisation ("MMO")) have requested further information on potential installation techniques for the installation of the Project through the saltmarsh in Pegwell Bay.

Pegwell Bay is designated under both the European Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora ("the Habitats Directive") and European Council Directive 2009/147/EC on the conservation of wild birds (codified version) ("the Birds Directive") for its nature conservation value and is also subject to national conservation designations. Pegwell Bay is covered by the following international and national nature conservation designations:

- Thanet Coast and Sandwich Special Protection Area ("SPA");
- Sandwich Bay Special Area of Conservation ("SAC")
- Thanet Coast and Sandwich Bay Wetland of International Importance especially as Waterfowl Habitat ("Ramsar site");
- Sandwich Bay to Hacklinge Bay Site of Special Scientific Interest ("SSSI"); and
- Sandwich and Pegwell Bay National Nature Reserve ("NNR").

The Conservation of Habitats and Species Regulations 2010 ("the Habitats Regulations") require competent authorities to undertake Habitats Regulations Assessments ("HRA") where the potential exists for a plan or project to affect a European site of conservation importance[1]. An HRA is a two stage process; firstly the competent authority must undertake a test of likely

[1] A European site is defined as being either a SAC or a SPA. Government policy as outlined in the addendum to Planning Policy Statement 9 ("PPS 9") (DCLG, 2005) is that Ramsar sites should also be subject to the provisions of the Habitats Regulations and their qualifying features.

significant effects ("LSE test"), which identifies whether a plan or project is likely to cause a significant effect on that site. If no effect is identified, then the plan or project can be progressed. Should a likely significant effect be identified, then the competent authority must undertake the next step, an Appropriate Assessment ("AA"). The identification of a likely significant effect ("LSE") does not mean that that effect will be manifested, but rather that the potential for an effect exists and that the competent authority must progress to the next stage of assessment. The purpose of this document is therefore to inform an AA.

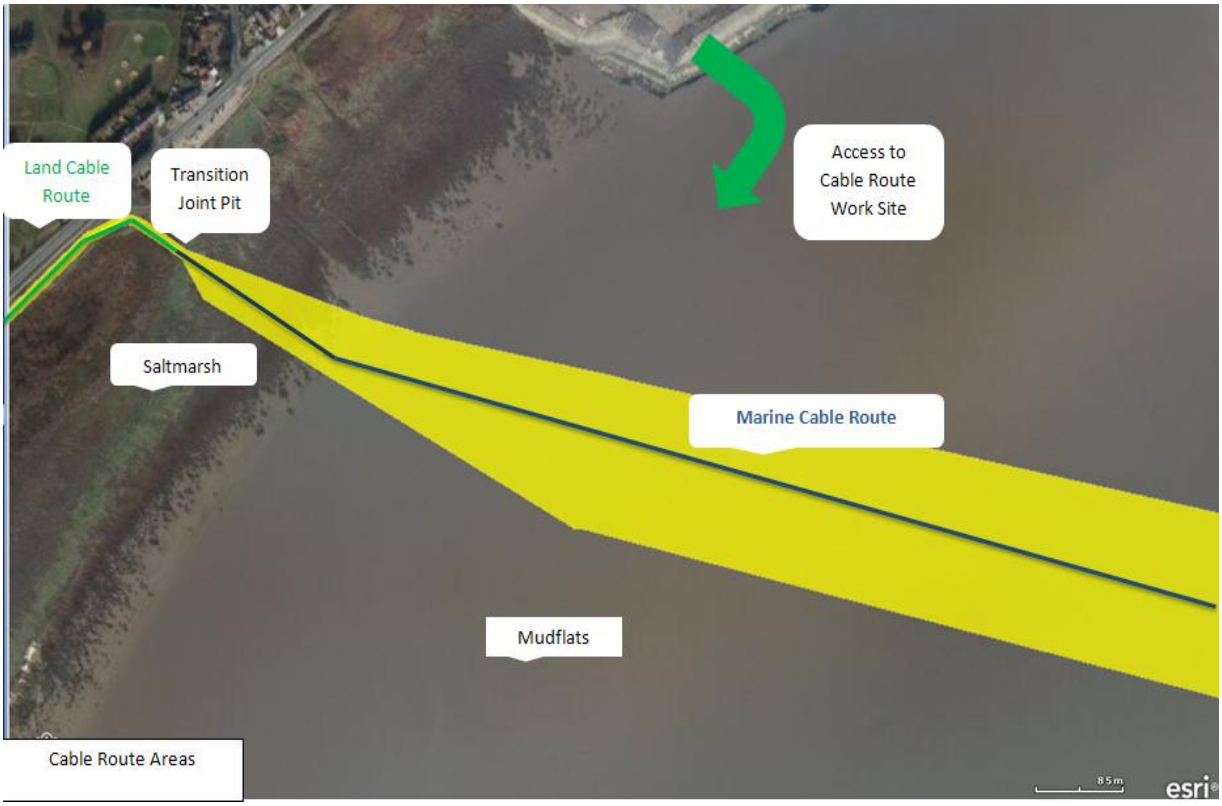

Figure 1. Cable Installation Area

1.2. Purpose of document

The purpose of this document is to provide a review of potential installation techniques, indicative timescales and outline methods of working for the installation of the Project's cable system through the saltmarsh and intertidal area in Pegwell Bay. This review will assess a range of techniques suitable for cable installation in this environment and provide recommendations based on the suitability of the assessed technologies from an environment and technical viewpoint. This description of installation techniques will provide a "realistic worst case scenario" ("RWCS") to inform the AA.

Installation techniques are described in terms of:

- Suitability to the conditions at the site;
- Footprint;
- Burial depth capability;

- Estimated volumes of excavation in the saltmarsh area;
- Requirements for a temporary access track;
- Level of activity that will take place on the saltmarsh;
- Reinstatement measures; and
- Technical risks.

1.3. Document structure

Section 2 discusses appropriate installation techniques taking into account the nature of the Project's cable system and the site characteristics within Pegwell Bay. Section 3 provides an outline installation plan for installing the cable system in the intertidal area.

Section 4 provides an outline installation plan for installing the cable system in the saltmarsh area and Section 5 details the conclusion of the review of installation techniques.

1.4. Best practice, mitigation and monitoring

As a responsible project developer, NGNNL is keen to ensure that any adverse effects on the environment are mitigated and that full recovery occurs after installation. Installing electricity cables within intertidal environments has been achieved successfully, with the adjacent export cables for the Thanet Offshore Wind Farm ("Thanet") project being a key example. In addition to this, the Race Bank Offshore Wind Farm ("Race Bank") project, has recently had an open-cut cable installation application consented, following agreement with Natural England and the Local Planning Authorities ("LPA") of a series of pre-construction documents, which enabled the competent authority, in this case the MMO, to conclude no adverse effect on the integrity of The Wash and North Norfolk Coast Special Area of Conservation ("SAC").

Following the award of consent and prior to installation works being undertaken, NGNLL proposes to engage the relevant authorities and statutory nature conservation agencies ("SNCA") in the development of the following suite of best practice documentation:

- Environmental Monitoring Plan ("EMP");
- Construction Code of Practice ("CoCP");
- Risk assessments ("RA");
- Method Statements and Task Plans;
- Detailed contingency plan;
- Detailed saltmarsh mitigation and reinstatement plan; and
- Detailed saltmarsh monitoring plan.

The agreement of this suite of documentation, to be developed in an iterative fashion with Natural England, allowed the application for an open-cut intertidal installation to be successfully consented in the case of the Race Bank project and NGNLL would hope that both the MMO and Natural England draws upon their experience from both the Thanet and Race Bank projects when determining this application.

2. Suitable Installation Techniques

2.1. Considerations in selecting appropriate installation techniques

The submarine cable system for the Project will consist of two High Voltage Direct Current ("HVDC") insulated and armoured cable cores bundled together as a single package (the package may also include a small fibre optic cable as can been seen in Figure 2 below). Each armoured HVDC cable core will be approximately 250mm in diameter giving overall bundle dimensions of 250mm x 500mm.

Figure 2. Typical bundled HVDC cable cores and a smaller fibre optic cable during installation.

A submarine cable is normally landed by hauling directly onshore from the cable installation vessel stationed seaward of the low water ("LW") mark. The cable will be hauled using a winch positioned at the onshore land / submarine cable transition jointing pit ("TJP"). To reduce pulling tensions over long distances (pull-ins can exceed 1000m), floats can be attached to the cable as it leaves the vessel. These floats are then removed as the cable grounds at the LW mark. Here the cable is transferred temporarily onto rollers again to reduce pulling load. Once the cable end has been pulled to its destination, the remaining cable float / rollers are removed and the cable is settled onto the seabed onto its pre-planned route. Typically this pull-in process may take approximately 6 – 12 hours.

Figure 3. General layout during cable pull in across intertidal area.

Figure 4. Removal of floats as cable is pulled ashore.

In the majority of cases, marine HVDC cables are installed by direct burial with the trench excavation starting immediately after pull in to the shore (i.e. the cables are positioned into the trench and the trench is backfilled).

If a technical decision is made that the cables cannot be installed by direct burial, then an indirect method of cable installation may be chosen. This normally entails the pre-installation and burial of a cable duct (usually a high density polyethylene ("HDPE") or steel pipe) through which the cable can be pulled later without further disturbance of the above ground conditions.

The remainder of Section 2 outlines options for cable installation that could be considered for cable installation through the Pegwell Bay saltmarsh.

2.2. Screening exercise

Prior to the selection of feasible installation techniques, a screening exercise was undertaken of all suitable installation techniques that may be suitable for use in the Pegwell Bay intertidal area. A screening matrix was produced and this is included as Appendix A. An assessment of these methods allows for an initial ranking based upon their overall risk (environmental, consenting and technical) to the project.

These rankings have then been ranked by colour, as **High Risk** → **Low Risk**

The key options considered practicable are discussed in the Section 2.4 to 2.8 below. However, it must be noted that the installation technique selected may be a combination of those options outlined within this document, or may be a bespoke hybrid of any of these technologies. The actual installation tool cannot be selected until after consent has been awarded and a financial decision made to execute the project. As such, the following techniques can be considered as outlining the Rochdale Envelope for the installation phase of the Project. Proprietary tools (such as "Spiderplough" or "Nessie") have not been assessed, but rather a generic installation tool type described, as the naming of a proprietary device at this stage may exclude competition from the final bidding phase for the installation of the cable system.

2.3. Mitigation Measures

Independent of whichever installation and protection method is chosen, a suite of mitigation measures will be required to minimise any remaining risks. These mitigation measures will form part of the method statements and task plans and will be fully reviewed by and agreed with the relevant authorities prior to cable installation.

Typical measures may include:

- Flood risk:
  - Sectionalise trenching operations; and
  - Work only during neap tides.

- Ground compaction risk:
  - Use low ground pressure excavators; and
  - Install temporary track ways using bog mats or aluminium roadway.

2.4. Open trench and backfill

This option is the most widely used method for coastal cable installation and protection and has been successfully consented and undertaken at a number of UK locations. Open trench and backfill is normally carried out immediately after cable landing to minimise the time that cable trenches are left open. Trenches are dug in sections, using backhoe excavators in close proximity to the cable bundle. The cable bundle is lifted into the trench by a second excavator. The trench is then immediately backfilled. This method would be suitable for the saltmarsh area, in that the excavation works can be closely controlled by sectioning. This would mean that trenches are not left open for extended periods thus reducing the risk from inundation. The saltmarsh area is higher in the tidal frame and therefore direct excavation should be easier in the drier ground conditions, although temporary localised dewatering techniques and working at neap tides may be considered if deemed necessary. Low ground pressure excavators ("LGPE") can be used if ground compaction in the saltmarsh or low ground bearing pressures in the mudflat area is considered of concern. Methods to mitigate this may also include the use of bog mats or rolled steel / aluminium sheeting to remove the potential for direct interaction between the excavator and the saltmarsh surface.

2.4.1. Suitability to conditions at the site

Initial shore based survey (MMT, 2012) indicates that ground conditions are suitable for direct excavation by backhoe. This can be inferred by the successful installation of the Thanet project's export cables, which used a combination of land cable plough and LGPE in similar ground conditions.

2.4.2. Footprint

The cable bundle will be buried in a single trench. An area on one side of the trench may be required for the temporary track way (such as bog mats or steel / aluminium track), with an area on the other side for temporary spoil storage. The total estimated affected swathe width would be approximately 20m (see Section 3.1.2) based on a burial depth of approximately 1m (the Thanet project used a working width of 15m and this may be achievable for the Project, depending on the type of installation technique selected).

2.4.3. Burial depth capability

The burial depth will be driven by a requirement to ensure that the cable remains buried and protected throughout its operational life and following decommissioning if the cable system is left in situ. Therefore it is the intention of NGNLL to aim for a burial depth of 1m, in a manner analogous to that achieved by the Thanet project. It is worth noting that the area affected will increase as depth increases and therefore the selected depth will be the minimum possible to ensure cable integrity is maintained.

2.4.4. Estimated volumes of excavation

Based on a trench width of 1m at the base, depth 1m with 45 degree (°) angled sides it is anticipated that approximately 430m³ of substrate will be excavated in the saltmarsh area (215m route length) and approximately 2,600m³ in the mudflat (1,300m route length). However, it should be noted that the volume estimated for mudflat excavation is likely to be a precautionary overestimate, as it is likely that an offshore burial tool (such as a cable plough or jetting tool) would be used for the majority of the installation in the mudflat, based on the distance that an offshore vessel (such as a cable barge) could install the cable while afloat (see Section 2.8).

2.4.5. Requirements for a temporary access track

A temporary access track will be required through the saltmarsh area to allow necessary access. Further investigation of ground bearing capability in the mudflats will be required; however, given that a combination of LGPE and land cable ploughs installed the export cable for the Thanet project in an adjacent location, it is reasonable to expect that ground bearing capability in the mudflat will be sufficient for requirements.

2.4.6. Type and amount of activity that will take place on the saltmarsh

Excavator moving along temporary track way during cable pull in for support and guidance. Two excavators sequentially excavating and backfilling trench sections during cable burial and protection.

2.4.7. Reinstatement measures

Following installation of the cables, initial reinstatement would be by controlled backfill of excavated materials.

2.4.8. Technical, consenting and environmental risks

This technique requires tight control of the trench excavation to avoid issues such as trench collapse or cable damage; however, this can be effectively mitigated through the agreement of appropriate method statements and the adoption of best practice. Flooding risk can be controlled by sectional working and timing (neap tides).

This technique was previously consented for the adjacent Thanet project and a combination of land cable plough and LGPE was successfully used to install the export cables for the Thanet project. In an e-mail correspondence from Natural England following the Thanet project's export cable installation (Ingrid Chudley, February 2010), Natural England confirmed that the Thanet project's installation had proceeded well and to their satisfaction. Following submission of two annual monitoring reports Natural England confirmed no further monitoring was necessary due to the rapid and successful vegetation recolonisation.

This technique is therefore considered a **Low Risk** from a technical, consenting and environmental perspective.

2.5. Cable lay and bury using tracked or skidded plough or chain cutting tool

This method of cable protection uses a specialist cable burial tool to directly embed the cable into the ground and is an offshoot from systems initially pioneered to install agricultural drainage pipes (Figures 6 and 7). A key advantage of this technique is that ground disturbance is kept to a minimum and backfilling occurs immediately after passage of the vehicle. The affected swathe width is therefore kept to a minimum. Basic machines use towed ploughed shares as the burial tool, with either a sea-based or land-based tractor unit. In more difficult ground conditions, this can be augmented by incorporation of mechanical cutting tools such as chain trenchers. A second vehicle (normally a backhoe LGPE) normally precedes the burial vehicle to align the cable onto the cable route before burial.

As the cable bundle passes directly through the tool this has to be sized and radiused to maintain the allowed cable bending parameters. The cable bending values for the NEMO cable will be larger than typical to date for offshore wind farms and some bespoke development of normal cable handling methods and tools may be therefore be required to ensure the suitability of this technique.

The actual saltmarsh surface may be subject to compaction although this could be reduced by installation of a temporary track way for passage of the vehicle. However, the ground pressures associated with these types of vehicle are low; the total ground pressure of a fully equipped and cable-laden trenching machine may be expected to exert no more than 2.5t/m^2, which is less than a typical 4 x 4 vehicle would be expected to exert (Centrica, 2012).

As a continuous single pass solution, timescales to implement this solution are expected to be shorter than direct excavation methods.

2.5.1. Suitability to the conditions at the site

Initial shore based survey (MMT, 2012) indicates that ground conditions could be suitable for cable by ploughing. A cable plough solution was used successfully in 2010 for the nearby Thanet project's export cables.

2.5.2. Footprint

The cable bundle will be buried in a single pass. The area affected will be the swathe passed over by the plough or tracked tool, which is estimated at 12m based on the values outlined by Centrica (2012). This may increase to 15m if track ways are used to improve bearing capacity.

2.5.3. Burial depth capability

The targeted burial depth will be determined by the tool used for cable installation; however, the depth of burial targeted will be driven by a requirement to ensure that the cable remains buried and protected throughout its operational life and following decommissioning if the cable system is left in situ. Therefore a maximum depth of 2m is anticipated, although it would be the intention of NGNLL to aim for a burial depth of 1m – 1.5m, in a manner analogous to that achieved by the Thanet project. However, burial depth may be determined by the tool selected for cable burial, as certain tools will have a pre-determined burial depth.

2.5.4. Estimated volumes of excavation

A 75m³ starter pit at either end of the cable route for a ploughed or trenched solution may be required (a starter pit will be definitely required at the landward end, although one at the seaward end may not be required, dependent upon the offshore burial tool selected), in addition to material disturbed from the direct installation. However, this material is largely replaced following ploughing or trenching and restoration can be undertaken soon after installation using a LGPE.

2.5.5. Requirements for a temporary access track

A temporary access track may be required through the saltmarsh area to allow necessary access. Further investigation of ground bearing capability in mudflats may also be required; however, given that a combination of LGPE and land cable ploughs installed the export cable for the Thanet project in an adjacent location, it is reasonable to expect that ground bearing capability in the mudflat will be sufficient for requirements.

2.5.6. Type and amount of activity that will take place on the saltmarsh

Only a single pass will be required by cable burial vehicles; however, LGPE will be required to install starter pits and to precede the cable installation.

2.5.7. Reinstatement measures

No direct backfilling required, although a degree of ground levelling may be required, as was undertaken on the Thanet and Lincs Offshore Wind Farm (“Lincs”) projects (see Section 2.5.8). This is to ensure that ground levels are returned to a similar profile as before installation, to ensure that creeks do not form in the area where cables have been installed. This is particularly important from both a nature conservation and cable integrity viewpoint.

2.5.8. Technical, consenting and environmental risks

A similar technique was previously used successfully to install the export cables for the Thanet project. In an e-mail correspondence from Natural England following the Thanet installation (Ingrid Chudley, February 2010), Natural England confirmed that the Thanet project’s

installation had proceeded well and to their satisfaction. In addition, Centrica Renewable Energy Limited ("Centrica") successfully installed the export cables for the Lincs project using a chain trencher and has recently (June 2013) had an application for the installation of up to four (4) export cables within The Wash and north Norfolk Coast SAC consented by the MMO using a combination of LGPE, chain trenchers or cable plough. Cable installation by trenchers or cable ploughs has been successfully used at a number of locations around the UK coastline. However it is anticipated that the minimum bending radius of the cable system required for the Project may be more than for the Thanet or Lincs cables, due to the size and type of cable required. Therefore without further work to assess the suitability of existing systems, it is not certain that this technique will be appropriate for the installation of the Nemo cable system, or it may be the case that a bespoke tool is required to be procured specifically for this task. Therefore, this technique is therefore considered a **Moderate Risk** from a technical, consenting and environmental perspective

Figure 5. Post-lay cable burial tool

Figure 6. Post-lay cable burial tool showing tractor unit

2.6. Pre-installation of ducts

Pre-installation of buried ducts allows the installation works in the saltmarsh area to be separated from the actual cable pull in schedule. It can also be timed to ensure optimum recovery of the saltmarsh area, or avoidance of the critical overwintering or breeding periods. This can also be useful where there are seasonal restrictions on access to the site. However this system requires extended excavation works as a duct will be required for each cable core and the ducts will each be larger than the cable core

In this option, a sectional plastic HDPE duct is pre-installed to act as a route guide and protection for the cable. Typically these ducts will be at least twice the diameter of the cable and bundled cables are normally separated such that each individual cable core has its own duct. These trenches can be excavated by open cut or vehicle ploughing/trenching techniques such as those proposed for cables in Sections 2.4 and 2.5 above. The main difference with direct burial is that here each cable will require its own duct, therefore increasing the trenching effort and ground disturbance.

Due to the poor thermal conduction properties of the air gap around the cable cores in the ducts it is normal to fill them with a product such as bentonite after cable installation. The filling of bentonite improves and makes a more uniform thermal characteristic. This filling process requires careful control and management to avoid spillage and subsequent leakage and risk would be mitigated by the adoption of proper working practises and the agreement of the suite of documentation outlined in Section 1.4.

2.6.1. Suitability to the conditions at the site

Initial indications suggest that this technique could be successfully used and installed via either an open-cut technique or by a cable plough / trencher. This can be inferred by the successful installation of the Thanet project's export cables, which used a combination of land cable plough and LGPE.

2.6.2. Footprint

Each cable core will require a duct to be installed prior to pull in. An area on one side of the trench will be required for the temporary track way (e.g. bog mats or aluminium / steel track way) and should an open cut installed technique be preferred, then an area will be required for temporary spoil storage. The total estimated affected swathe width would be expected not to exceed 20m based on a burial depth of 1m.

2.6.3. Burial depth capability

The targeted burial depth will be determined by the tool used for cable installation; however, the depth of burial targeted will be driven by a requirement to ensure that the cable remains buried and protected throughout its operational life and following decommissioning if the cable system is left in situ. Therefore it is the intention of NGNLL to aim for a burial depth of 1m, as outlined in Section 2.4.3.

2.6.4. Estimated volumes of excavation

Should a LPGE be used, based on a trench width of 1m at the base containing twin ducts with 45° angled sides it is anticipated that approximately 430m³ of substrate will be excavated in the saltmarsh area (215m route length) and approximately 2,600m³ in the mudflat. Again, the volume stated here is likely to be a precautionary overestimate, as an offshore burial tool may be used for a proportion of this, as described in Section 2.4.4 and 2.8.

If a cable plough or chain trencher were used, then the ducts may be buried to a greater depth than 1m; however, the volume excavated would be less, due to the nature of the installation method.

2.6.5. Requirements for a temporary access track

A temporary access track will be required through the saltmarsh area to allow necessary access. Further investigation of ground bearing capability in mudflats will be required; however, given that a combination of LGPE and land cable ploughs installed the export cable for the Thanet project in an adjacent location, it is reasonable to expect that ground bearing capability in the mudflat will be sufficient for requirements.

2.6.6. Type and amount of activity that will take place on the saltmarsh

Excavators, cable plough or trencher, travelling and working on temporary access track alongside cable route on the saltmarsh, during duct excavation and backfill. Excavators travelling and working alongside cable route during duct excavation and backfill on mudflat.

2.6.7. Reinstatement measures

Controlled backfill of excavated materials. Further measures may be agreed with the relevant competent authority and the Statutory Nature Conservation Agencies ("SNCA") following tool selection.

2.6.8. Technical, consenting and environmental risks

This technique requires a tight control of the trench excavation to ensure ducts are level / straight if cable pull in problems are to be avoided. Risks also exist around the potential blockage of ducts or bentonite spillage.

As the ducts will be installed using a combination of open-cut, chain trencher or cable plough this therefore carries the same risks as those techniques outlined previously, but with the additional considerations outlined above. Based on this additional risk, this technique is therefore considered a **Moderate Risk** from a technical, consenting and environmental perspective.

Figure 7. Pre installation of cable ducts.

2.7. Horizontal directionally drilled ducts

Before a horizontal direction drilling (“HDD”) technique can be used to pre-install cable ducts, a programme of extensive pre-installation invasive geotechnical surveys will be required to confirm that this technique is practicable. Access is required to the saltmarsh site for drill progress tracking during the works and as a route for a return “mud” pipe. Given the sensitive nature of the Pegwell Bay site, this level of disturbance would be similar to that created by the installation of cables by either a cable plough or chain trencher.

The HDD installation process works by multi-pass extended drilling to create a bore that is suitable for final pull through of a plastic pipe cable duct. This duct will be typically twice the cable diameter and a duct is required for each cable core. During drilling the drill bit is flooded with pumped “mud” (bentonite or similar) for lubrication and removal of drill cuttings (approximately 200m^3/duct). Several passes of drill bit are required to achieve suitable bore to allow ducts to be pulled in

To carry out the drilling significant “launch” and “recovery” secure work sites (200m^2+ each) are required at each end of the drilled route for the drilling equipment. This equipment includes the drill rig itself, mud pumps, storage and recovery systems, and equipment for handling of the drill cuttings. An additional area is also required for pre-assembly of the 200m long ducts before pull in.

The duct installation process typically would take 2 – 4 weeks and again can be carried out at a time that best suits the environmental constraints prior to cable installation. It is normal for the duct ends to be sealed and temporarily buried until the cable installation is planned. Immediately prior to cable installation the duct ends are excavated and uncapped to allow cable pull through. After cable installation they are re-sealed and buried before being bentonite filled to improve their thermal properties.

There are two primary risks associated specifically to this process:

- Failure to achieve the drilled bore required due to unforeseen ground conditions (bore collapse in soft ground, drill stuck in hard ground or obstructed by rocks/debris). The Lincs project experienced major problems in this respect due to the presence of unknown sediments, with the key lesson learned being the need for extensive pre-survey to confirm suitability of this technique; and
- Unplanned escape of the drilling mud to the surface due to ground fractures.

Of these, the first risk can be reduced through a detailed site specific geotechnical campaign, while the second can be mitigated as far as possible through the adoption of proper working practises and the agreement of methods of working and contingency plans with the relevant authorities.

2.7.1. Suitability to the conditions at the site

Cannot be confirmed without extensive site-specific geotechnical works to confirm ground conditions.

2.7.2. Footprint

Route through saltmarsh required for “mud” return pipe. Launch and recovery sites including “mud” pits required at each end of drill.

2.7.3. Burial depth capability

Up to 10m, although cable rating may be affected if deeper depths are required.

2.7.4. Estimated volumes of excavation

Approximately 200m³ for each launch and recovery site.

2.7.5. Requirements for a temporary access track

Route for “mud” return pipe required.

2.7.6. Type and amount of activity that will take place on the saltmarsh

Minor access (usually on foot) for drill head tracking during drilling.

2.7.7. Reinstatement measures

Reinstatement of launch and recovery sites and exposure of pipe ends required during cable pull-in.

2.7.8. Technical, consenting and environmental risks

This option is considered **high risk** without detailed site-specific geotechnical data. A risk also exists regarding drill bits getting stuck or drill bore collapse, resulting in failure of drill. As outlined above there is also the risk of drilling "mud" bentonite leakage into ground or spillage, through an unplanned "blow-out" event.

Figure 8. HDD Drilling "launch" site

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Figure 9. HDD drilling rig

2.8. Jetting Sledge

In shallow water areas including intertidal zones a towed jetting sledge can be used for direct burial of the cable bundle into the seabed. This method can be after the cable bundle has been laid on the seabed. Using a similar technique to cable ploughing, this burial method works by also injecting seawater into the seabed immediately around the cable. This additional water provides temporary local fluidisation of the seabed which allows the cable tool to pass more easily through the ground and place the cable bundle at the required depth. These sledges can be towed by tracked excavator in the dry (e.g. at low tide) or by shallow draft vessel when the area is flooded (e.g. at high tide).

An advantage of this method is that there is minimal seabed disturbance. The operation is best carried out when the intertidal area is flooded (at high tide) as this then provides the local water source for the injection pumps although it can be carried out in the dry with water pumped from the closest source. The water pumps are usually remote to the jetting sledge being mounted on the towing vehicle or vessel mounted with water then piped to the sledge.

This method is only suitable for burial in soft sediment (sand/mud) sea beds. Although similar to cable ploughing use of the water injection reduces the towing forces required from the towing vehicle/vessel, again reducing the potential for ground disturbance.

Jetting sledges can also carry out cable burial in shallow water areas so extending their potential for use offshore (typically out to 10m+ water depths for sledges using surface mounted water pumps.)

2.8.1. Suitability to the conditions at the site

Detailed analysis of core samples for soil strengths would be required to confirm suitability of this method in mudflats. This method is not suitable for saltmarsh areas.

2.8.2. Footprint

12m maximum track width of sledge and towing vehicle / vessel .

2.8.3. Burial depth capability

Typically down to 2m but deeper in very soft sea bed material. Material is not excavate, but is moved and replaced in the case of a plough, or fluidised with a jetting tool.

2.8.4. Estimated volumes of excavation

75m^3 launch pit at start of burial in the mudflat, although this could be combined with a cable plough / chain trencher.

2.8.5. Requirements for a temporary access track

Not required.

2.8.6. Type and amount of activity that will take place on the saltmarsh

Not applicable as method not suitable in saltmarsh.

2.8.7. Reinstatement measures

None required. Beach material reconsolidates within a few tidal cycles.

2.8.8. Technical, consenting and environmental risks

This option is normally considered **Low Risk.** The volume and pressure of the injected water need to be carefully controlled to allow the cable to sink but without causing excessive sediment dispersal.

Local ground conditions also have to remain firm enough to support the sledge.

Recent developments of dynamically positioned shallow draft towing vessels have simplified the deployment of these sledges where previously anchored barges had to be used.

Figure 10. Cable Jetting Sledge

3. Installation plan – intertidal area

The purpose of this section is to provide a more detailed description of the activities involved in cable installation in both the mudflat and saltmarsh area at Pegwell Bay (Section 4 solely describes operations in the saltmarsh area). The description includes details of the expected:

- Working corridor;
- Access arrangements during installation;
- Location and size of compounds for set up and storage of equipment;
- Type and number of vehicles involved in operation;
- Equipment involved;
- Number of personnel expected to be on site;
- Phasing and duration of the works; and
- Environmental management measures.

As specific installation techniques will not be confirmed until a construction contractor has been appointed (which will be following the award of project consents) this document describes the expected realistic worst case scenario ("RWCS") with regards to each of the above aspects of installation.

For the purposes of assessment, a RWCS of open trenching and backfill has been assumed. This was the technique consented in 2007 for the installation of up to two export cables for the Thanet project, although a cable plough was ultimately used for installation, albeit with starter pits at both the landward and seaward ends of the cable corridor, which were installed using a LGPE. NGNLL is investigating whether the alternative method of cable-laying and burial using ploughs is feasible, but at this stage it cannot be guaranteed without further tooling and testing, something which would not be achieved until tendering of the works.

3.1.1. Transition Joint Pit location

Assumptions have been made regarding the location of the TJP and its associated working compound on saltmarsh to the north east of Pegwell Bay Country Park. It may be possible to reduce the size of the working compound for the TJP to avoid saltmarsh but for the purposes of developing the RWCS, it for the purposes of this assessment, is assumed it would be sited in saltmarsh.

During design and EIA stages, other locations for the TJP were considered, but the alternative would be within the Pegwell Bay Country Park which is a former landfill site, so the installation would have carried risks of contamination affecting both the cables and the wider environment.

The TJP will be an excavated pit of approximated 187m^3 (estimated as 15m long x 5m wide x up to 2.5m deep) with a reinforced concrete plinth laid in its base. The cables will be jointed on the plinth and once this is undertaken, the excavation will be backfilled to original ground levels. On completion of works, there will not be any visible sign of the TJP on the surface (i.e. there will be not be any man hole covers) and full recovery of the saltmarsh would be expected within a short

timescale (i.e. within a five year period). The TJP would be surrounded by a Heras fence, or similar structure, to ensure the safety of the general public during the jointing process.

The works will be supported by a temporary lay down area of approximately 42m x 31m (total area 1,302m^2) as outlined in the red line boundary for the onshore ES.

3.1.2. Working width for cable installation

A RWCS of 20m working width for cables installation has been assumed. This assumption has been underpinned by the following outline requirements:

- 3m wide trench (based upon 1m width at bottom and 1m depth, assuming 45° slope for stability);
- Approximately 3m width required for temporary storage of excavated material; and
- 6m width of protective track way (e.g. bog mats or aluminium / steel track way).

The remaining area would be utilised as incidental space between the above components. In particularly soft ground, it may be necessary to leave a space of 2 – 3m between the edge of the track way and the edge of the trench to ensure the safety of those working on the installation.

A 20m working width is considered to be a sufficient RWCS, although NGNLL notes that a 15m working width was achieved for the Thanet project and should be achievable here, unless local ground conditions dictate otherwise. It should also be noted that the Thanet project installed two export cables, whereas NGNLL only plans to install one bundled cable. In places the swathe may be slightly wider (e.g. up to 25m in total) to allow for vehicle turning or additional storage of excavated material. Based on this, the total length of saltmarsh vegetation affected is estimated to be approximately 215m with a maximum area impacted of 4,300m^2.

3.1.3. Cable installation operations

The interconnector cable link consists of two HVDC cable cores bundled together. The cable bundle section through the saltmarsh will be installed as part of the intertidal area shore landing route which runs from the low water mark (“LWM”) to the TJP in the vicinity of the service station landward of the saltmarsh area. The total length of cable installation across both mudflat and saltmarsh will be approximately 1515m. Initial placement of this cable route section into the area will take place as part of a single shore landing operation as follows:

- A temporary secure site compound will be established in the vicinity of the TJP for storage of plant, welfare facilities and siting of hauling winch;
- Walk over topographical surveys will carried out on planned cable routes;
- Sensitive work areas will be surveyed and protected;
- A cable hauling winch is installed in the vicinity of TJP onshore;
- HVDC cable cores are delivered by sea to a location offshore of Pegwell Bay on board a shallow draft pontoon/barge;
- The barge is moored offshore in a suitable location on the cable route where it can maintain position throughout a full tidal cycle; and

- The cables ends on board the barge are brought out of their storage tanks on board and led though a cable hauler where they are bundled together to a chute on the stern. The cable bundle will be hauled ashore from this chute using a wire and shore mounted winch.

Figure 11. Cable Laying Barge in Pegwell Bay

The operations undertaken on the day of the pull-in will be:

- The cable route corridor onshore will be temporarily marked and secured by fencing for safety during the pull in operations. This area is also to be patrolled by security staff during the pull in operations to ensure that the pull in area is kept clear and safe;
- Wire hauling rope is established between shore winch and barge;
- HVDC cable core ends on barge are attached to hauling wire. Cable cores may be bundled prior to loading on to the barge, or may be bound together in a bundle as they leave the barge;
- Winch starts to pull cable bundle ashore. As it leaves barge floats are attached to cable bundle to reduce pulling tension;
- Pull in continues until cable bundle end reaches LWM. Here floats are removed and the cable bundle is placed onto temporary rollers;
- Pull in continues until cable bundle end reaches TJP and is secured;
- Cable bundle is lifted off rollers onto cable route onshore; and
- Remaining floats are removed from cable bundle offshore and it is lowered onto planned cable route.

This operation is normally completed within 24 hours and protection works for this cable route section can then commence.

3.2. Working area and compounds

The temporary main work compound will be a fenced area of approximately 1,302m^2 located within the upper saltmarsh and modified grassland, as outlined in the red line boundary for the onshore ES, containing welfare facilities and temporary overnight storage facilities for plant. It is required for the duration of the cable landing, protection and jointing operations. The main working area will be the cable route corridor from the TJP to the LWM. The typical estimated maximum affected swathe width during cable installation will be approximately 20m (see Section 3.1.2) centred on the cable route. It is assumed that all of this area will all be in use during the cable pull in, with it being worked on in sections during the cable installation and protection works.

3.3. Access arrangements

Direct road access in the vicinity of the service station to the compound is required and access will be controlled by 24/7 security. The largest vehicle traffic will be low loader delivery/collection of backhoe excavators at the beginning and end of the works. No bulk deliveries of materials are expected during the cable landing and protection works. Access to the saltmarsh will be by temporary track way (matting or aluminium track way) and restricted to operational plant only.

3.4. Equipment and vehicles

During cable landing and protection works the key motorised plant and vehicles required are as follows.

- Generator to service welfare facilities in compound;
- Three tracked backhoe excavators for cable control during pull in and to undertake excavation for cable protection;
- Dumper truck for transport of materials and rollers;
- Winch (self-contained and diesel powered) at TJP for cable landing;
- Tractor/trailer for equipment movement in beach area; and
- Cars, vans, and Minibus for transport of personnel.

Figure 12. Cable landing on beach rollers in Pegwell Bay

3.5. Personnel

During cable landing works typical cable team would be expected to be as follows:

- Beach master – Controls cable landing operation and communicates with vessel;
- Cable riggers (6 – 10) – Carry out cable rigging and handling work;
- Survey team (2) – Monitor and record cable position during landing;
- Security and safety team (4) – Monitor safety and maintain site security;
- Dive Team (4+) – Removal/attachment of offshore cable floats offshore of LW mark.
- Plant operators (6); and
- Environmental monitoring/survey (onshore 1 / offshore 1) – Monitoring of noise, pollution, archaeology, flora/fauna.

Appropriate contractor briefings / tool box talks will be delivered to ensure that all contractors are aware of their responsibilities.

All team members will wear correct PPE including high visibility clothing whilst working in the mudflats/saltmarsh areas.

During cable installation works the typical cable team would be as follows:

- Beach master – Controls cable landing operation and communicates with vessel;

- Cable riggers (4) – Carry out cable rigging and handling work;
- Survey team (2) – Monitor and record cable position during protection works;
- Security and safety team (4) – Monitor safety and maintain site security;
- Plant operators (6); and
- Environmental monitoring/survey (onshore 1 / offshore 1) – Monitoring of noise, pollution, archaeology, flora/fauna.

During cable jointing works typical cable team as follows:

- Beach master – Controls cable landing operation – communicates with vessel;
- Cable riggers (2) – Carry out cable rigging and handling work;
- Cable Jointers (6) – Monitor and record cable position during protection works;
- Security and safety team (2) – Monitor safety and maintain site security;
- Plant operators (2); and
- Environmental monitoring (onshore 1).

3.6. Working hours and installation timescales

Working hours for the cable landing and protection works need to be flexible to suit local tidal conditions but intertidal work does not normally extend beyond available daylight hours. However, dependent upon operational needs, extensions may be required to these periods. Barge operations offshore will require 24 hour working as will cable jointing processes onshore. Security will be provided at works compounds on a 24 hour basis.

The programme set out within this document for cable installation in both the mudflat and saltmarsh is sequential, with an estimated 32 days being required to complete the installation. It is anticipated that 7-day working will be used to take best advantage of tides and reduce the risk of over-run. This programme therefore allows 10 days “float” within the overall six-week window of between mid-July and the end of August. This demonstrates that the programme is feasible.

The majority of time is spent on the mudflats, and cable installation works in the saltmarsh zone will take approximately four days (within the 32 days). On the saltmarsh, it is anticipated that excavated material would be replaced within the trench within 48 hours of excavation, conditions and installation techniques allowing.

There would only be a requirement to have the bog mats or aluminium track way in place while the preparation, installation and demobilisation works are being undertaken. The protective track would therefore not be expected to be in place for more than 14 days, dependent upon the tool selected.

3.7. Duration and phasing of work

Typical work durations are expected to be as follows:

- Set up site compound and winch – 7 days;
- Cable Landing – 1 day (daylight hours);

- Cable installation – 14 days (comprising approximately 4 days in saltmarsh and 10 days on mudflats);
- Cable jointing – 7 days (continuous); and
- Clear work compound – 3 days.

Actual schedules may vary due to tidal and weather conditions. It may also be necessary to carry out some cable installation works at specific times, e.g. saltmarsh installation during neap tides. Installation through the mudflats may also need to be scheduled for spring tides, to allow the maximum working window. The programme will be confirmed once an installation tool has been selected and a contractor appointed.

3.8. Environmental management

The measures listed below will be utilised to ensure any adverse effects on the environment at site will be minimised:

- Site briefings and task specific risk assessments will be undertaken to ensure all workers are aware of potential risks to the environment and the relevant mitigation or management measures;
- Work will not take place outside of any advised periods necessary to avoid impacts on breeding and wintering birds;
- A walk over survey for nesting birds will be undertaken in the areas where work will take place (e.g. access routes and the cable corridor as appropriate) directly prior to work commencing to ensure the site is free of nesting birds;
- Pre and post works photo surveys will be undertaken along the cable route and access routes;
- 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;
- 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 the weight and movement of the vehicles;
- Once the cable has been buried, the soil will be backfilled using all reasonably practicable efforts to maintain the substrate profile;
- Equipment/vehicles will be switched off when not in use;
- Appropriate bunding will be used around any fuel or chemical storage areas at the works compound; and
- Vehicles and equipment will have integral drip trays.

4. Installation plan – shore landing: saltmarsh specific

Operations in the saltmarsh area are carried out in two phases – cable landing and cable installation. The information below relates specifically to the saltmarsh installation. The environmental management measures detailed in Section 3.7 above will also be used in the saltmarsh area.

4.1. Working area and compounds

Details of the works area and compounds are expected to be as follows:

- The main working compound will be sited outside of the saltmarsh area (likely to be adjacent to the service station);
- The working swathe (20m) area is to be temporarily fenced to ensure that public safety is maintained;
- Pre and post work topographical surveys will be carried out; and
- Measures will be taken to minimise ground damage and compaction.

4.2. Access arrangements

Details of the proposed access arrangements are expected to be as follows:

- A temporary access route with ground protection will be established alongside the cable route. This will form the main plant working area for laying and burial of the cable system; and
- Access to the cable route crossing the saltmarsh will be limited to that required for the specific saltmarsh cable operations only.

4.3. Equipment and vehicles

Equipment and vehicle requirements are expected to be as follows:

- Up to three tracked backhoe excavator 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 protection 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
- During saltmarsh works all vehicles will be confined to the temporary track ways to avoid ground compaction.

4.4. Personnel

During cable landing works typical cable team working in the saltmarsh area is expected to be as follows:

- Beach master – Controls cable landing operation and communicates with vessel;
- Cable riggers (6 – 10) – Carry out cable rigging and handling work;
- Survey team (2) – Monitor and record cable position during landing;
- Security and safety team (4) – Monitor safety and maintain site security; and
- Plant operators (6).

During cable protection works typical cable team working in the saltmarsh area is expected to be as follows:

- Beach master – Controls cable landing operation – communicates with vessel;
- Cable riggers (4) – Carry out cable rigging and handling work;
- Survey team (2) – Monitor and record cable position during protection works;
- Security and safety team (4) – Monitor safety and maintain site security; and
- Plant operators (6).

Appropriate environmental and consenting support will be provided as necessary and agreed with the appropriate parties prior to construction.

4.5. Working hours

Occasionally 24hr working may be needed in the saltmarsh area to take into account tidal conditions; however, normally working would be restricted to available daylight hours.

4.6. Duration and phasing of work

Typical concurrent work durations may be expected to be as follows:

- Set up on saltmarsh site – temporary track way, fencing and cable rollers – 1 day;
- Cable landing – 1 day (daylight); and
- Cable installation – 3 days (may not be concurrent if it necessary to work in specific tidal conditions such as neap tides).

These timescales are indicative, however and can only be confirmed once an installation tool and contractor have been selected.

4.7. Environmental management

Specific additional measures listed below will be utilised to reduce construction related effects on the saltmarsh:

- Protection of ground surface to avoid unnecessary compaction through use of bog-mats or aluminium track way;

- Creation of temporary roadway (bog mats or aluminium track way) from which all plant operations are carried out;
- Limiting access by personnel and vehicles to specific routes. No transiting of unprotected saltmarsh area; and
- Agreement of post-construction monitoring plan.

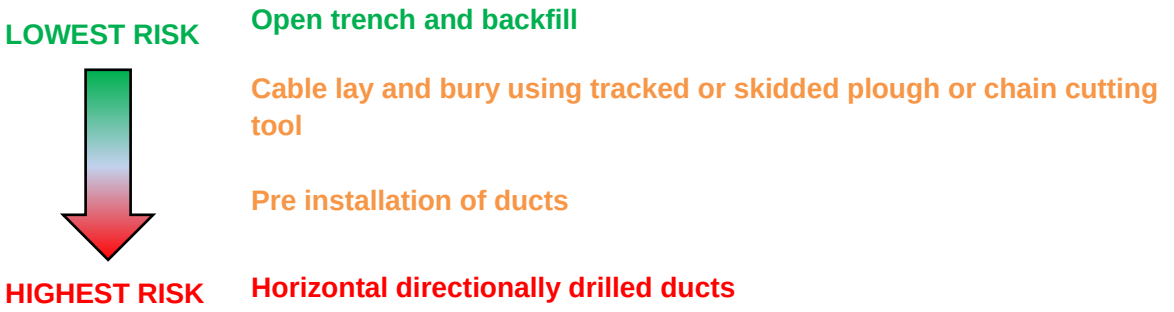
The Project will endeavour to maintain the substrate profile in the excavated material, but experience has shown that this is not always feasible, particularly in the mudflats and lower saltmarsh, where substrates are much softer.

The development of a suitable and robust saltmarsh installation and reinstatement plan will ensure that impacts on the saltmarsh arising from the cable installation will be reduced as far as possible. At present, best practise would suggest allowing natural revegetation of the saltmarsh communities, as has successfully occurred at both the Thanet and Lincs projects. While it may be possible to cut and replace “turves” from the upper 20cm of trench excavation, there is a risk that the turves may disintegrate or be extremely difficult to replace. Additional plant and equipment would be needed to cut and/or re-lay the “turves”, which itself carries risk of greater damage to the saltmarsh from extra trafficking or delays in reinstatement. As such, natural revegetation is proposed as the primary method of recolonisation, in a similar manner to that agreed for the Thanet and Lincs export cable installations.

5. Conclusions

This report has screened and considered a number of options for potential cable burial through Pegwell Bay, based on environmental, technical and consenting risks. For those techniques taken forward for more detailed consideration in this report, outline programmes have been identified and estimates made regarding the size of installation teams that may be required. This exercise has been undertaken to inform further assessment by the Competent Authorities and will be refined further following consent award, when the final installation tool is selected.

Of the four techniques taken forward for assessment, the hierarchy of preferred techniques based on this assessment, from least risk to greatest risk is:



Based on the work undertaken and reported in this document, all four techniques would be suitable, although a detailed pre-construction survey would be required before HDD can be considered as an option for cable installation.

An outline cable installation plan for installation of the cables in the saltmarsh and intertidal area has been drawn up based on the lower risk techniques presented above i.e. open trench and backfill. The installation plans detailed in Section 3 (intertidal) and Section 4 (saltmarsh) provide details of the realistic worst case scenario.

6. References

MMT (2012). Onshore Survey Report Nemo – UK to Belgium Interconnector UK Landfall survey 2010 – 2011.

7. Appendix A

7.1. Summary table of intertidal zone cable installation and protection methods.

Method	Burial	Width of swathe affected	Burial depth capability	Cable bundle burial?	Estimated volume of excavation	Temporary roadway required?	Technical risk	Comments	Feasibility
Open trench / Backfill	Inside duct or direct burial	Maximum of 20m	1m targeted	Yes	Worst case of 2,400m^3 mudflat and 430m^3 saltmarsh	Yes, on saltmarsh	Low	Most widely used cable installation and protection method (direct burial)	
Cable lay and bury using a tracked or skidded plough	Direct burial	12m	Up to 2m	Yes with adapted cable guides	Starter pit 75m^3 and minor displacement equal to cable / tool volume	Depends on ground bearing capacity checks	Medium	May need tool development to meet cable bundle handling specification	
Pipeline plough (Flexible product duct)	Inside pre-installed plastic ducts	12m	Up to 2m	No – use one duct / cable	300m^3 starter pit and displacement	Depends on ground bearing capacity checks	Medium	Extended working time. Requires two ducts. Discounted from further assessment.	
V plough	Inside pre-installed ducts or direct burial	25m for 2 ducts	Up to 2m	Yes if direct burial	7500m^3 min	Yes, on saltmarsh	Medium	Extended working time. Discounted from further assessment.	
Surface lay carrier pipe	Inside pre-installed duct	20m for 2 pipes	Surface	No – use one pipe / cable	0m^3	Yes, on saltmarsh	Low	Poor security and permanent feature. Requires long term maintenance. Discounted from further assessment.	
Surface lay with embankment over the top	Direct lay	8m	Up to 5m	Yes	0m^3	Yes, on saltmarsh	Low	Not a practical solution due to habitat damage. Discounted from further assessment.	
Deep HDD	Inside HDPE duct	0m	Typically 10m max. Cable rating can be a issue in deep burial.	No – use one pipe per cable	Starter and reception pits 100m^3 each – also drill cuttings disposal	Yes - access required for drilling fluid return pipe and drill location system. Also pre-survey requirement	High, due to drill refusal resulting from inadequate pre-construction survey	Requires extensive and deep survey bores to assess ground conditions.	
Mixture of trench in saltmarsh and upper intertidal and jetting tool where possible	Direct burial	Maximum of 20m	1m targeted	Yes	Dependent upon potential distance that cable can be jetted, but less than open trench / backfill	Yes, on saltmarsh	Low to Medium	Jetting only suitable for mudflat area	
Jetting tool	Direct burial	12m	Up to 3m	Yes	Starter pit 75m^3 mudflats	Depends on ground bearing capacity checks	Ground conditions have to be suitable for jetting	Only suitable for mudflat area	Mudflat only
Ducts above saltmarsh surface contained in walkway	Steel duct	2m	n/a	2m	0m^3	Permanent Structure	Low	Not considered practicable in view of change to natural landscape and impacts upon Natura 2000 site. Discounted from further assessment.	

8. Record of Changes

Rev #	Date	Description	Approved
A	2013-07-22	Final PMSS draft	Kit Hawkins
B			
C			
D			
E			
F			
G			
0	2013-07-22	First draft for issue	Kit Hawkins
1	2013-07-25	Final draft for issue	Dave Bean
2	2013-07-30	Final following client additions	Kit Hawkins
3	2013-08-02	Final to consultees	Kit Hawkins
4			
5			
6			

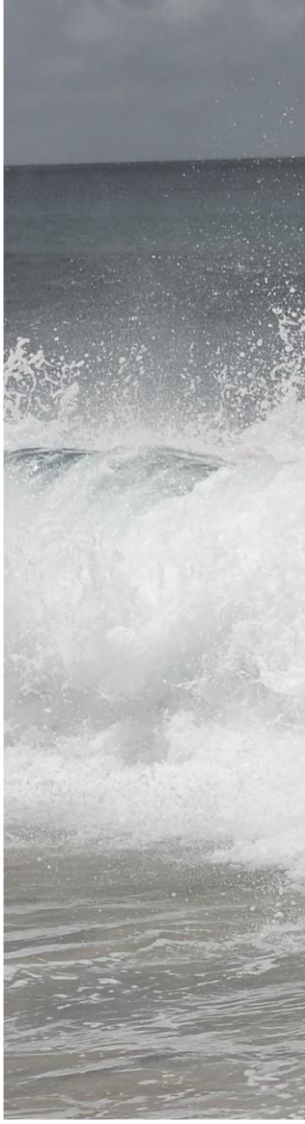
9. Distribution List

#	Function Title	Company	Name (optional)
1	-	TEP	-
2	-	National Grid	Mark Pearce
3	-	National Grid	Andy Hilton
4	-	Elia	Tim Schyvens
Notes:			

Corporate Headquarters:

PMSS
Broadwater House
Broadwater Road
Romsey
Hampshire. SO51 8GT

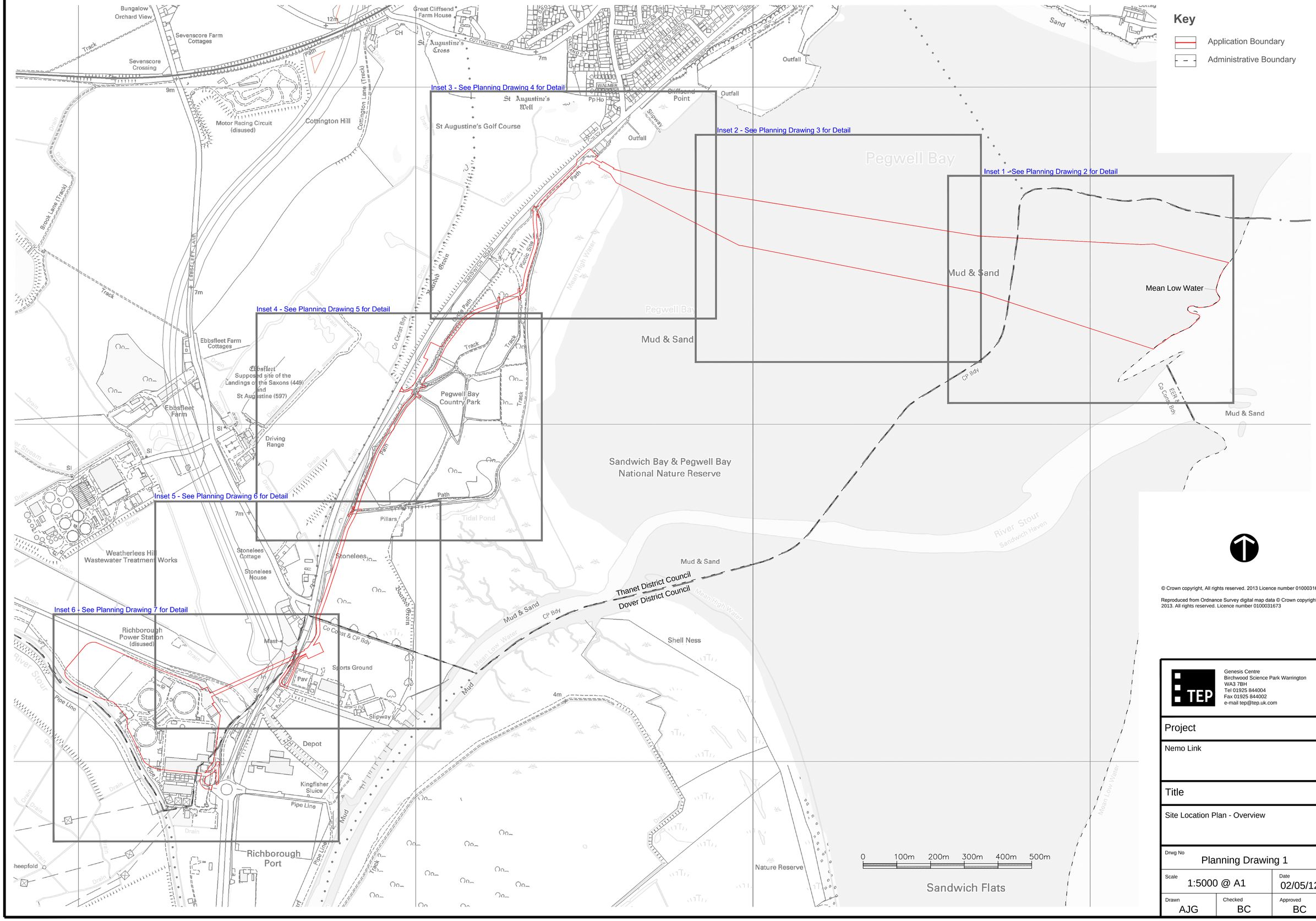
[redacted]



www.pmss.com

APPENDIX 3:

Planning Drawing 1



TEP
Genesis Centre
Birchwood Science Park Warrington
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Tel 01925 844004
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e-mail tep@tep.uk.com

Project

Nemo Link

Title

Site Location Plan - Overview

Drwg No Planning Drawing 1

Scale	Date
1:5000 @ A1	02/05/12

Drawn	Checked	Approved
AJG	BC	BC

D2700.017B

APPENDIX 4:

NVC Survey 2011 and

Detailed Saltmarsh Habitat Assessment 2013

NATIONAL VEGETATION CLASSIFICATION (NVC) SURVEY FORM

1.0 GENERAL DETAILS

Site Name	Nemo Stage 3		
Job Number	2700	**Document reference**	2700.037
Site Location	Pegwell Bay, Cliffs End, East Kent		
Date(s)	23rd and 24th August 2011		
Surveyor(s)	Val Gateley & Chris Booler		
Weather	Mild with some light showers and sunny intervals		
Seasonal Constraints	The survey was undertaken during the optimum season for NVC surveys. There are therefore no seasonal constraints.		
Methods	Quadrats were recorded using standard NVC methodology (Rodwell, 2006). Quadrat data analysed using TABLEFIT (Version 1, Hill, 1996) producing a list of the five NVC communities most similar to the vegetation of the site for each quadrat/area. A survey to determine the presence/absence of nesting birds within the survey area was undertaken on the 15th August 2011 following TEP Method Statement 2700.014 in agreement with Kent Wildlife Trust and Natural England. No nesting activity was identified within the survey area prior to or during the NVC survey.		
Drawing Ref:	G2700.108A		
Written	Val Gateley		
Checked	Peter Gateley		
Authorised	Rachel Hayward		

2.0 INTRODUCTION

The surveyed saltmarsh area of Pegwell Bay forms part of the estuarine system of the River Stour, established on the inner muddy fringes of the bay, abutting the A256 Sandwich Road that runs along the coast. The area forms part of the Sandwich and Pegwell Bay National Nature Reserve and also lies within the designated areas of the Thanet Coast and Sandwich Bay Special Protection Area (SPA) and Ramsar Site, Sandwich Bay Special Area of Conservation (SAC) and Sandwich Bay and Hacklinge Marshes Site of Special Scientific Interest (SSSI). The survey area lies between the car park for the Pegwell Bay Country Park and the Sportsman's Inn on the A256 to the north-east.

The purpose of the surveys is to determine the type and locations of saltmarsh communities within the landing area of the proposed UK to Belgium interconnector scheme. The information will be used to inform proposals for the route of the cable and location of a joint pit required to connect the offshore and onshore cables. The survey information will also be used to monitor the recovery of the habitats following he proposed works.

3.0 NVC SURVEY

Zone	Quadrats	Habitat / Vegetation Community Description
1	Zone 1 forms a narrow strip lying along the extreme inland edge of the saltmarsh, on a bank down from the road edge to the fringes of the dried-out saltpan area of Zone 2. Analysis of the five samples recorded here shows that there is a generally dense neutral grassland sward, a version of MG1a, the red fescue (*Festuca rubra*) sub-community of *Arrhenatherum elatius* mesotrophic grassland, but with some patches of tall ruderal herbs and a strong coastal element due to the presence of sea couch making parts of the bank transitional between MG1 and SM24 *Elymus pycnanthus* (*Elytrigia atherica*, sea couch) saltmarsh community.		
	1.1	**OV24a 28** | 52 14 100 32| Urtica-Gal ap tall herb Typical OV24 28 | 44 17 85 36| Urtica-Gal ap tall herb OV24b 27 | 44 22 60 39| Urtica-Gal ap tall herb Arr ela-Rub fru OV25 21 | 38 23 35 51| Urtic-Cir arv tall herb W 6 18 | 42 20 30 42| Aln glut-Urtic dio wood
	1.2	**MG 1a 48** | 65 47 58 60| Arrhenatherum elatius Festuca rubra SD 7e 46 | 51 32 70 74| Ammoph aren-Fest rubra Elym pycnanthus SM24 46 | 91 23 85 56| Elymus pycnanthus MG 1 43 | 60 61 47 48| Arrhenatherum elatius SD 9 42 | 53 56 48 64| Ammoph aren-Arrhen elat
	1.3	**MG 1a 61** | 88 49 89 58| Arrhenatherum elatius Festuca rubra MG 1 60 | 74 56 78 60| Arrhenatherum elatius OV25c 50 | 76 50 71 45| Urtic-Cir arv tall herb Lol per-Pap rho W24b 47 | 55 51 78 47| Rub fr-Hol la underscb Arr ela-Her sph MG 1b 42 | 85 38 58 42| Arrhenatherum elatius Urtica dioica
	1.4	**MG 1a 39** | 65 36 58 46| Arrhenatherum elatius Festuca rubra MG 1 33 | 49 38 50 47| Arrhenatherum elatius W24b 33 | 27 27 74 49| Rub fr-Hol la underscb Arr ela-Her sph SD 9 29 | 49 39 38 49| Ammoph aren-Arrhen elat SD 9a 29 | 52 33 39 48| Ammoph aren-Arrhen elat Arrhen elatius
	1.5	**SM24 44** | 91 17 100 52| Elymus pycnanthus SD 7e 39 | 45 22 70 62| Ammoph aren-Fest rubra Elym pycnanthus MC11 31 | 63 33 52 32| Fest rubra-Daucus carot MC 4 29 | 47 34 70 29| Brassica oleracea cliff MC11c 28 | 46 36 54 32| Fest rubra-Daucus carot Sanguis minor
2	Zone 2 lies along the foot of the Zone 1 bank, a broad area dominated by mainly bare cracked mud at the time of the survey but with a notable fringe of common cord-grass (*Spartina anglica*) and sea purslane (*Atriplex portucaloides*), with smaller separate patches of similar vegetation also to the north-east of the main pan area. In NVC terms this type is referable to SM6 *Spartina anglica* saltmarsh community; establishment of sea purslane within this community is reported by Rodwell et al (2000) and parts of the zone are locally dominated by this species, forming patches of SM14 *Halimione portulacoides* salt-marsh community within the SM6.		
	2.1	**SM14a 56** | 69 37 100 61| Halimione portulacoides Typical SM 9 55 |100 73 39 47| Suaeda maritima SM14 54 | 62 50 68 68| Halimione portulacoides SM14c 54 | 61 60 60 77| Halimione portulacoides Puccin maritim SM26 49 | 57 65 51 74| Inula crithmoides

Zone	Quadrats	Habitat / Vegetation Community Description
2	2.2	**SM 6 77** | 85 53 100 90| Spartina anglica SM 9 51 | 96 64 39 45| Suaeda maritima SM 8 34 | 67 46 35 39| Annual Salicornia SM10 28 | 58 47 30 27| Transitional low marsh SM11 19 | 44 44 14 40| Aster trip discoideum
	2.3	**SM 6 74** | 85 44 96 99| Spartina anglica SM 9 41 | 96 53 27 42| Suaeda maritima SM12a 31 | 71 66 0 80| Aster trip rayed Coastal SM10 29 | 73 50 16 19| Transitional low marsh SM 8 21 | 67 38 3 32| Annual Salicornia
	2.4	**SM14a 51** | 69 37 100 49| Halimione portulacoides Typical SM 6 51 | 56 37 96 56| Spartina anglica SM14 45 | 57 42 67 53| Halimione portulacoides SM14c 39 | 45 44 57 56| Halimione portulacoides Puccin maritim SM26 35 | 43 48 50 54| Inula crithmoides
	2.5	**SM 6 65** | 56 37 96 100| Spartina anglica SM12a 25 | 58 64 0 83| Aster trip rayed Coastal SM 9 23 | 67 39 11 34| Suaeda maritima SM10 13 | 44 36 6 8| Transitional low marsh SM13a 13 | 40 41 3 5| Puccinellia salt-marsh Typical
3	Zone 3 forms a narrow sea aster (*Aster tripolium*) and sea purslane dominated fringe around the seaward edge of Zone 2. The vegetation mostly resembles SM12a, coastal stands of *Aster tripolium* saltmarsh community as opposed to the inland form of this vegetation type and in places the vegetation merges into SM14 saltmarsh community.	
	3.1	**SM14a 71** |100 56 100 62| Halimione portulacoides Typical SM14 70 | 94 70 70 66| Halimione portulacoides SM14c 66 | 76 81 61 77| Halimione portulacoides Puccin maritim SM12a 58 | 81 92 53 44| Aster trip rayed Coastal SM13a 50 | 94 91 12 44| Puccinellia salt-marsh Typical
	3.2	**SM12a 53** | 71 56 58 60| Aster trip rayed Coastal SM14c 50 | 65 48 60 62| Halimione portulacoides Puccin maritim SM26 48 | 69 58 51 50| Inula crithmoides SM14 41 | 62 35 68 44| Halimione portulacoides SM 9 39 |100 52 25 33| Suaeda maritime
	3.3	**SM12a 50** | 58 53 58 80| Aster trip rayed Coastal SM12b 43 | 39 22 96 62| Aster trip rayed Inland SM26 31 | 57 54 32 29| Inula crithmoides SM14c 30 | 49 43 38 47| Halimione portulacoides Puccin maritim SM25 30 | 65 45 32 26| Suaeda vera drift-line
	3.4	**SM12a 58** | 71 66 58 71| Aster trip rayed Coastal SM14c 50 | 65 56 59 54| Halimione portulacoides Puccin maritim SM 9 42 |100 60 27 26| Suaeda maritima SM26 38 | 57 54 50 38| Inula crithmoides SM25b 38 | 45 58 46 59| Suaeda vera drift-line Halimione portu
	3.5	**SM12a 60** | 71 66 58 84| Aster trip rayed Coastal SM12b 44 | 39 22 96 63| Aster trip rayed Inland SM14c 40 | 65 56 38 45| Halimione portulacoides Puccin maritim SM 9 38 |100 60 11 16| Suaeda maritima SM25b 30 | 45 58 29 56| Suaeda vera drift-line Halimione portu

Zone	Quadrats	Habitat / Vegetation Community Description
4	Zone 4 forms a block in the north-eastern part of the study area, enclosing two large 'islands' of Zone 2 type, and also a broad strip between Zones 5 and 7. This is mainly a species-poor SM24 *Elymus pycnanthus* saltmarsh community, strongly dominated by sea couch, with a richer patch of SM26a, the *Puccinellia maritima* sub-community of *Inula crithmoides* vegetation in the extreme southern end (Q4.1).	
	4.1	**SM26a 66** | 82 53 77 78| Inula crithmoides Puccin maritim SM14c 64 |100 51 73 67| Halimione portulacoides Puccin maritim SM25b 59 | 85 63 53 72| Suaeda vera drift-line Halimione portu SM26 55 | 74 56 57 67| Inula crithmoides SM14 53 |100 38 77 52| Halimione portulacoides
	4.2	**SM24 96** | 91 100 100 100| Elymus pycnanthus SM26b 85 | 85 100 84 100| Inula crithmoides Elymus pycnanth SM25a 63 | 58 100 69 100| Suaeda vera drift-line Elymus pycnanth SM25 56 | 58 100 55 91| Suaeda vera drift-line SM26 39 | 43 100 38 71| Inula crithmoides
	4.3	**SM24 89** | 91 77 100 92| Elymus pycnanthus SM26b 79 | 85 71 84 100| Inula crithmoides Elymus pycnanth SM25 64 | 58 78 73 96| Suaeda vera drift-line SM25a 63 | 58 89 69 100| Suaeda vera drift-line Elymus pycnanth SM26 48 | 43 81 56 82| Inula crithmoides
	4.4	**SM24 78** | 59 100 97 100| Elymus pycnanthus SM25a 46 | 29 100 63 100| Suaeda vera drift-line Elymus pycnanth SM26b 45 | 42 100 48 100| Inula crithmoides Elymus pycnanth SD 7e 31 | 22 100 39 100| Ammoph aren-Fest rubra Elym pycnanthus SM25 24 | 24 100 24 86| Suaeda vera drift-line
	4.5	**SM24 78** | 59 100 97 100| Elymus pycnanthus SM25a 46 | 29 100 63 100| Suaeda vera drift-line Elymus pycnanth SM26b 45 | 42 100 48 100| Inula crithmoides Elymus pycnanth SD 7e 31 | 22 100 39 100| Ammoph aren-Fest rubra Elym pycnanthus SM25 24 | 24 100 24 86| Suaeda vera drift-line
5	This forms a strip between Zones 3 and 4, parallel to the coastline. The vegetation is mainly dominated by dense sea purslane and represents a version of SM14a type, the typical sub-community of *Halimione portulacoides* saltmarsh. As in other zones there are also elements of SM26 type, but mainly SM26b, the sea couch sub-community of this vegetation.	
	5.1	**SM14a 60** | 54 30 100 85| Halimione portulacoides Typical SM26b 49 | 85 53 39 86| Inula crithmoides Elymus pycnanth SM25 49 | 58 59 50 93| Suaeda vera drift-line SM14 45 | 41 35 66 91| Halimione portulacoides SM26 43 | 43 60 50 95| Inula crithmoides
	5.2	**SM14a 67** | 54 40 100 99| Halimione portulacoides Typical SM26b 57 | 85 71 39 100| Inula crithmoides Elymus pycnanth SM25 52 | 58 78 50 100| Suaeda vera drift-line SM14 48 | 41 46 66 100| Halimione portulacoides SM26 46 | 43 81 50 100| Inula crithmoides
	5.3	**SM26b 62** | 85 53 65 100| Inula crithmoides Elymus pycnanth SM14a 60 | 54 30 100 88| Halimione portulacoides Typical SM25 54 | 58 59 59 100| Suaeda vera drift-line SM24 48 | 91 58 32 68| Elymus pycnanthus SM26 45 | 43 60 55 100| Inula crithmoides

Zone	Quadrats	Habitat / Vegetation Community Description
5	5.4	**SM26b 63** | 85 35 84 91| Inula crithmoides Elymus pycnanth SM25 52 | 58 39 68 95| Suaeda vera drift-line SM14a 52 | 54 20 100 74| Halimione portulacoides Typical SM24 47 | 91 38 53 65| Elymus pycnanthus SM26 41 | 43 40 56 92| Inula crithmoides
	5.5	**SM14a 58** | 54 24 100 89| Halimione portulacoides Typical SM26 52 | 57 65 53 100| Inula crithmoides SM26b 49 | 85 42 48 94| Inula crithmoides Elymus pycnanth SM14 48 | 52 35 66 95| Halimione portulacoides SM25 47 | 58 47 53 100| Suaeda vera drift-line
6	Zone 6 forms a block of dense mixed vegetation in the north-eastern part of the site. The main type is SM13a, the typical sub-community of *Puccinellia maritima* saltmarsh, with a mix of mainly common saltmarsh grass (*Puccinellia maritima*) and sea aster, but also quite frequent sea purslane giving rise to some patches of SM14c type also, the *Puccinellia maritima* sub-community.	
	6.1	**SM14c 86** | 92 69 99 95| Halimione portulacoides Puccin maritim SM13a 84 |100 72 100 77| Puccinellia salt-marsh Typical SM13 83 |100 64 100 82| Puccinellia salt-marsh SM14 79 |100 55 100 85| Halimione portulacoides SM25b 70 | 75 78 70 87| Suaeda vera drift-line Halimione portu
	6.2	**SM13a 96** |100 93 100 93| Puccinellia salt-marsh Typical SM12a 95 | 94 89 99 100| Aster trip rayed Coastal SM13 90 |100 75 100 93| Puccinellia salt-marsh SM14c 66 | 92 80 51 76| Halimione portulacoides Puccin maritim SM10 59 | 98 70 44 69| Transitional low marsh
	6.3	**SM13a 97** |100 93 100 97| Puccinellia salt-marsh Typical SM13 89 |100 75 100 90| Puccinellia salt-marsh SM12a 85 | 78 70 99 99| Aster trip rayed Coastal SM14c 67 | 92 80 53 76| Halimione portulacoides Puccin maritim SM10 62 | 98 70 49 74| Transitional low marsh
	6.4	**SM13a 94** |100 87 100 92| Puccinellia salt-marsh Typical SM12a 92 |100 87 91 94| Aster trip rayed Coastal SM13 90 |100 73 100 96| Puccinellia salt-marsh SM14c 68 | 92 69 62 83| Halimione portulacoides Puccin maritim SM14 59 |100 55 55 72| Halimione portulacoides
	6.5	**SM14 75** | 94 59 85 81| Halimione portulacoides SM14c 72 | 76 68 77 90| Halimione portulacoides Puccin maritim SM14a 71 |100 47 100 73| Halimione portulacoides Typical SM12a 64 | 94 89 57 40| Aster trip rayed Coastal SM25b 61 | 64 81 63 82| Suaeda vera drift-line Halimione portu
7	All along the frontage of the saltmarsh area this zone forms a broad fringe dominated by common cord-grass and glasswort (*Salicornia* species) fraying into totally bare mud along its seaward edge. The vegetation here merges SM6 Spartina anglica type with SM8 annual *Salicornia* saltmarsh community, typical of such frontal situations.	
	7.1	**SM 8 76** | 67 64 97 91| Annual Salicornia SM 6 62 | 81 76 51 78| Spartina anglica SM11 29 | 36 52 31 84| Aster trip discoideum SM 9 24 | 45 55 13 69| Suaeda maritima SM10 23 | 29 39 31 74| Transitional low marsh

Zone	Quadrats	Habitat / Vegetation Community Description
7	7.2	**SM 6 85** | 85 66 100 100| Spartina anglica SM 8 52 | 67 58 62 53| Annual Salicornia SM 9 49 | 96 80 16 47| Suaeda maritima SM10 32 | 58 59 28 31| Transitional low marsh SM11 25 | 44 55 20 50| Aster trip discoideum
	7.3	**SM 8 75** |100 52 100 77| Annual Salicornia SM10 68 | 82 59 73 87| Transitional low marsh SM 9 67 |100 67 59 74| Suaeda maritima SM13a 56 | 94 75 32 70| Puccinellia salt-marsh Typical SM11 53 | 74 63 45 83| Aster trip discoideum
	7.4	**SM 8 66** |100 38 97 73| Annual Salicornia SM12a 54 | 94 76 29 62| Aster trip rayed Coastal SM13a 45 |100 72 9 58| Puccinellia salt-marsh Typical SM 6 40 |100 43 30 52| Spartina anglica SM13 39 |100 64 5 36| Puccinellia salt-marsh
	7.5	**SM 6 61** | 85 38 100 67| Spartina anglica SM 8 50 | 67 33 97 54| Annual Salicornia SM12a 41 | 71 56 28 69| Aster trip rayed Coastal SM 9 38 |100 52 16 48| Suaeda maritima SM14c 37 | 73 59 22 41| Halimione portulacoides Puccin maritim
8	On the inland fringe this narrow strip lies along the western edge of the Zone 2 pan and along the base of the south-western extreme of the Zone 1 bank. There is a mix of typical saltmarsh species growing mainly in a matrix of sea club-rush (*Bolboschoenus maritimus*) forming a ribbon of S21 *Scirpus maritimus* swamp with some elements of SM24 *Elymus pycnanthus* saltmarsh community.	
	8.1	**S21 55** | 70 16 100 86| Scirpus maritimus swamp S21a 53 | 93 13 100 82| Scirpus maritimus swamp Scirpus maritim S21b 49 | 57 17 83 83| Scirpus maritimus swamp Atrip hastata S21c 39 | 33 15 70 86| Scirpus maritimus swamp Agros stolonif S21d 33 | 24 16 62 81| Scirpus maritimus swamp Poten anserina
	8.2	**S21 41** | 70 18 100 49| Scirpus maritimus swamp S21a 39 | 93 14 100 47| Scirpus maritimus swamp Scirpus maritim S21b 37 | 57 19 83 48| Scirpus maritimus swamp Atrip hastata SM 9 31 | 96 40 25 25| Suaeda maritima SM26 30 | 69 51 19 28| Inula crithmoides
	8.3	**SM16b 38** | 79 42 43 40| Juncus gerardii Typical SM16 34 | 61 31 51 49| Juncus gerardii SM16d 32 | 65 26 77 31| Juncus gerardii Festuca rubra SM16c 28 | 52 31 42 45| Juncus gerardii Fes rub-Gla mar SM16e 27 | 41 26 50 46| Juncus gerardii Leontodon autu
	8.4	**SM24 38** | 91 25 83 37| Elymus pycnanthus SM26b 36 | 85 23 78 38| Inula crithmoides Elymus pycnanth SM 8 33 | 67 21 97 32| Annual Salicornia SM26 32 | 69 45 25 47| Inula crithmoides SM25a 32 | 58 29 55 38| Suaeda vera drift-line Elymus pycnanth
	8.5	**SM24 65** | 91 46 100 62| Elymus pycnanthus SM26b 56 | 85 42 78 59| Inula crithmoides Elymus pycnanth SM25a 52 | 58 53 69 60| Suaeda vera drift-line Elymus pycnanth S21 40 | 80 36 81 32| Scirpus maritimus swamp

5.0 QUADRAT SPECIES LISTS

1 = rare; 2 = few; 3 = several; 4 = 4-10%; 5 = 11-25%; 6 = 26-33%; 7 = 34-50%; 8 = 51-75%; 9 = 76-90%; 10 = 100%(cover within quadrat area)

Quadrat 1.1		**Quadrat 1.2**		**Quadrat 1.3**	
Urtica dioica	7	Festuca rubra	7	Arrhenatherum elatius	7
Foeniculum vulgare	5	Elytrigia atherica	6	Elytrigia atherica	7
Potentilla reptans	4	Arrhenatherum elatius	5	Lolium perenne	4
Lamium purpureum	4	Leucanthemum vulgare	3	Festuca rubra	4
Sonchus oleraceus	4	Foeniculum vulgare	3	Foeniculum vulgare	4
Elytrigia atherica	4	Achillea millefolium	1	Convolvulus arvensis	3
Malva sylvestris	4	Trifolium repens	1	Dactylis glomerata	2
Smyrnium olusatrum	3	Plantago coronopus	1	Plantago lanceolata	2
Rubus fruticosus agg.	2	Senecio jacobaea	1	Smyrnium olusatrum	2
Mycelis muralis	2	Plantago lanceolata	1	Urtica dioica	2
Picris echioides	1			Plantago coronopus	2
Eupatorium cannabinum	1			Picris echioides	1
				Rubus fruticosus agg.	1
				Geranium dissectum	1
Quadrat 1.4		**Quadrat 1.5**		**Quadrat 2.1**	
Arrhenatherum elatius	5	Elytrigia atherica	7	Atriplex portulacoides	8
Elytrigia atherica	5	Festuca rubra	6	Spartina anglica	5
Festuca rubra	5	Foeniculum vulgare	4	Suaeda maritima	4
Foeniculum vulgare	4	Moss sp.	4	Salicornia sp.	4
Leucanthemum vulgare	4	Honckenya peploides	3		
Achillea millefolium	4	Senecio vulgaris	3		
Moss sp.	3	Medicago lupulina	2		
Plantago coronopus	2	Dactylis glomerata	2		
Centaurea scabiosa	2	Plantago lanceolata	2		
Smyrnium olusatrum	1	Medicago sativa	2		
Medicago lupulina	1	Plantago coronopus	2		
Plantago lanceolata	1	Achillea millefolium	1		
Quadrat 2.2		**Quadrat 2.3**		**Quadrat 2.4**	
Spartina anglica	9	Spartina anglica	9	Atriplex portulacoides	7
Suaeda maritima	4	Suaeda maritima	4	Spartina anglica	7
Salicornia sp.	4	Atriplex prostrata	2	Atriplex prostrata	2
Atriplex prostrata	3	Salicornia sp.	2	Suaeda maritima	2
		Aster tripolium	1		
Quadrat 2.5		**Quadrat 3.1**		**Quadrat 3.2**	
Spartina anglica	10	Atriplex portulacoides	8	Aster tripolium	7
Suaeda maritima	3	Aster tripolium	5	Atriplex portulacoides	7
Atriplex prostrata	2	Spartina anglica	4	Salicornia sp.	5
Aster tripolium	1	Suaeda maritima	3	Spartina anglica	4
		Puccinellia maritima	2	Suaeda maritima	3
				Atriplex prostrata	1
				Elytrigia atherica	1
Quadrat 3.3		**Quadrat 3.4**		**Quadrat 3.5**	
Aster tripolium	9	Aster tripolium	8	Aster tripolium	9
Atriplex portulacoides	5	Atriplex portulacoides	6	Atriplex portulacoides	5
Suaeda maritima	4	Spartina anglica	4	Spartina anglica	4
Spartina anglica	3	Suaeda maritima	4	Suaeda maritima	3
		Salicornia sp.	2	Salicornia sp.	1

Quadrat 4.1		Quadrat 4.2		Quadrat 4.3	
Atriplex portulacoides	7	Elytrigia atherica	9	Elytrigia atherica	8
Limonium vulgare	7	Atriplex portulacoides	5	Atriplex portulacoides	7
Salicornia sp.	4			Atriplex littoralis	1
Inula conyza	4				
Elytrigia atherica	4				
Puccinellia maritima	3				
Suaeda maritima	3				
Spartina anglica	2				
Spergularia media	1				
Aster tripolium	1				
Quadrat 4.4		**Quadrat 4.5**		**Quadrat 5.1**	
Elytrigia atherica	10	Elytrigia atherica	10	Atriplex portulacoides	10
				Atriplex prostrata	4
				Elytrigia atherica	2
				Aster tripolium	1
Quadrat 5.2		**Quadrat 5.3**		**Quadrat 5.4**	
Atriplex portulacoides	10	Atriplex portulacoides	10	Atriplex portulacoides	10
Elytrigia atherica	2	Elytrigia atherica	4	Elytrigia atherica	5
Atriplex littoralis	1	Atriplex littoralis	1	Atriplex prostrata	3
				Inula crithmoides	2
				Aster tripolium	1
Quadrat 5.5		**Quadrat 6.1**		**Quadrat 6.2**	
Atriplex portulacoides	10	Atriplex portulacoides	7	Puccinellia maritima	8
Elytrigia atherica	3	Puccinellia maritima	7	Aster tripolium	6
Aster tripolium	2	Aster tripolium	4	Spartina anglica	4
Salicornia sp.	2	Spartina anglica	3	Atriplex portulacoides	3
		Suaeda maritima	2	Suaeda maritima	2
		Limonium vulgare	2	Salicornia sp.	1
		Atriplex prostrata	1		
Quadrat 6.3		**Quadrat 6.4**		**Quadrat 6.5**	
Aster tripolium	7	Puccinellia maritima	8	Atriplex portulacoides	9
Puccinellia maritima	7	Aster tripolium	5	Puccinellia maritima	4
Atriplex portulacoides	3	Atriplex portulacoides	4	Aster tripolium	4
Suaeda maritima	3	Spartina anglica	4	Spartina anglica	4
Salicornia sp.	1	Salicornia sp.	1	Suaeda maritima	2
		Spergularia media	1	Spergularia media	1
		Suaeda maritima	1		
Quadrat 7.1		**Quadrat 7.2**		**Quadrat 7.3**	
Salicornia sp.	8	Spartina anglica	8	Salicornia sp.	8
Spartina anglica	5	Salicornia sp.	5	Suaeda maritima	5
		Suaeda maritima	2	Puccinellia maritima	4
				Spartina anglica	4
				Atriplex portulacoides	2
Quadrat 7.4		**Quadrat 7.5**		**Quadrat 8.1**	
Salicornia sp.	9	Salicornia sp.	7	Bolboschoenus maritimus	9
Spartina anglica	4	Spartina anglica	7	Atriplex portulacoides	4
Atriplex portulacoides	4	Atriplex portulacoides	4	Aster tripolium	2
Aster tripolium	4	Aster tripolium	4	Suaeda maritima	2
Spergularia media	2	Suaeda maritima	2	Salicornia sp.	1
Puccinellia maritima	1	Limonium vulgare	1	Inula conyza	1
				Atriplex prostrata	1
				Elytrigia atherica	1

Quadrat 8.2		Quadrat 8.3		Quadrat 8.4	
Bolboschoenus maritimus	8	Festuca rubra	6	Elytrigia atherica	6
Salicornia sp.	5	Bolboschoenus maritimus	5	Salicornia sp.	6
Atriplex portulacoides	4	Juncus gerardii	5	Bolboschoenus maritimus	5
Atriplex prostrata	4	Phragmites australis	4	Atriplex portulacoides	4
Aster tripolium	3	Salicornia sp.	4	Aster tripolium	3
Suaeda maritima	3	Elytrigia atherica	3	Suaeda maritima	3
Elytrigia atherica	2	Atriplex portulacoides	3	Phragmites australis	2
		Aster tripolium	2	Triglochin maritima	2
		Atriplex prostrata	2		
		Suaeda maritima	2		
		Triglochin maritima	1		
Quadrat 8.5					
Elytrigia atherica	8				
Bolboschoenus maritimus	6				
Atriplex portulacoides	4				
Aster tripolium	3				
Triglochin maritima	3				

6.0 SUMMARY

A total of eight vegetation communities were identified within the survey area, including seven saltmarsh communities and a neutral grassland community with a strong coastal element. The differing saltmarsh communities have formed due to difference in ground conditions across the saltmarsh and the resulting saltwater inundation experienced by the different areas during tidal inundation.

Zone 2 (SM6) and Zone 7 (SM6/SM8) are similar in composition, despite the location of Zone 2 adjacent to the inland areas and neutral grassland areas and the location of Zone 7 on the coastal edge of the saltmarsh. However, the ground level in Zone 2 is lower than the surrounding area and contains a tidal pool for long periods and therefore experiences similar saltwater levels as Zone 7 due to the retention of this water.

In general the different saltmarsh habitat zones run parallel with the coast, reflecting the differing saltwater inundation experienced through differing tide heights.

Zone 4 supports a low diversity of species and is dominated by sea couch.

Zone 1 is a strip of neutral grassland, and although it supports a range of coastal species it is not classified as an area of saltmarsh habitat. This is likely to be due to the raised ground levels in this area and previous disturbance through construction of Sandwich Road and the cycle track.

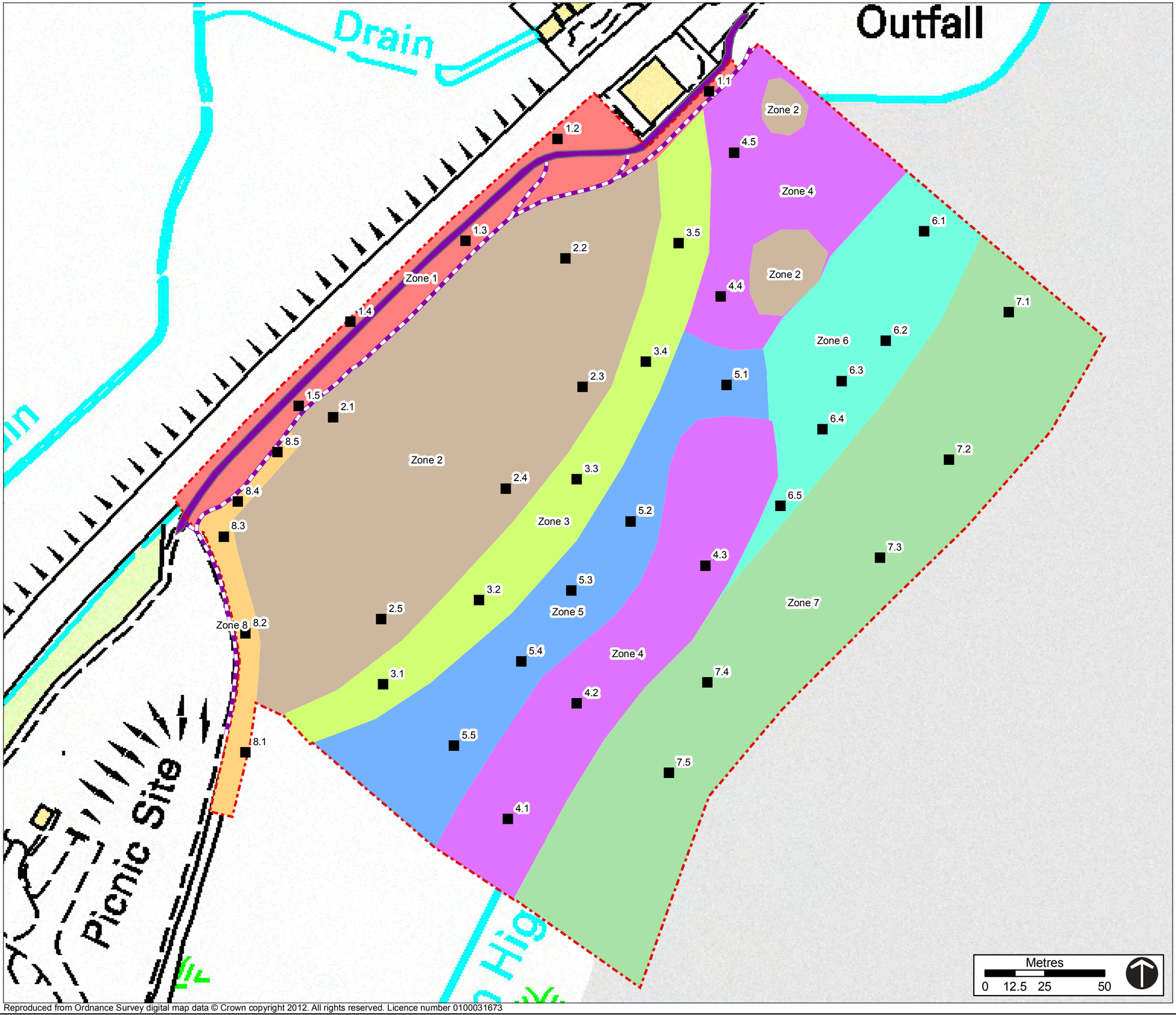
In general the saltmarsh habitats are in good condition, although disturbance from previous works and public access to the mudflats is more apparent in the north of the survey area, with some minor desire lines being apparent through the vegetation.

7.0 CONCLUSIONS

The saltmarsh communities present are typical of such habitats and are common within Pegwell Bay. Currently disturbance to these habitats is limited to the desire line/footpath running parallel with the cycle track and public access to the mudflats in the north of the survey area.

It is recommended that any cable route proposals should focus on the north of the survey area where there has already been disturbance to the saltmarsh habitats and these appear to be recovering well. Additionally, where possible the cable route should be routed through the neutral grassland of Zone 1 in preference to saltmarsh habitats to reduce the impact on these habitats.

The proposed offshore cable route will affect saltmarsh habitats within Zones 2, 3, 4, 6 and 7. The proposed onshore cable will affect saltmarsh habitats within Zones 2, 3 and 8 and will also affect the grassland habitats within Zone 1. The Transition Joint Pit will be located within saltmarsh habitat zones 3 and 4. Although the proposed cable installation works affect a range of saltmarsh habitats, the area affected is a small proportion of the saltmarsh habitats present. The cable has been routed through the north of Pegwell Bay to avoid impacts on higher quality saltmarsh habitats. The impact on the Saltmarsh Communities within Pegwell Bay will be minor and the small areas that will be affected by the proposals can be reinstated following installation through mitigation.



Key

- Survey Area
- Cycle path
- Desire line/footpath

National Vegetation Classification Survey Results

- Quadrat locations (1.1 - 8.5)

Vegetation communities:

- Zone 1, MG1a - *Arrhenatherum elatius* grassland, *Festuca rubra* sub-community
- Zone 2, SM6 - *Spartina anglica* saltmarsh community
- Zone 3, SM12a - Rayed *Aster tripolium* stands
- Zone 4, SM24 - *Elymus pycnanthus* saltmarsh community
- Zone 5, SM14a - *Halimione portulacoides* saltmarsh community, *Halimione portulacoides* sub-community
- Zone 6, SM13a - *Puccinellia maritima* saltmarsh community, *Puccinellia maritima* sub-community
- Zone 7, Matrix of SM8 Annual *Salicornia* salt-marsh community and SM6 *Spartina anglica* saltmarsh community
- Zone 8. SM21 - *Suaeda vera-Limonium binervosum* saltmarsh community

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Project:

Nemo Link

Title:

Figure 8.3
Saltmarsh NVC Survey

Map No.		
G2700.108A		
Scale: See Scale Bar		Date: 26/11/2012
Drawn: VJG	Checked: CM	Approved: RH

DETAILED SALTMARSH HABITAT ASSESSMENT FORM

1.0 GENERAL DETAILS

Site Name	Nemo Stage 3		
Job Number	2700	**Document reference**	2700.139
Site Location	Pegwell Bay, Cliffs End, East Kent		
Date(s)	25th June 2013		
Surveyor(s)	Chris Booler		
Weather	The survey was undertaken during clear, bright weather from low tide (approx. 9.30am) until 11:45am.		
Seasonal Constraints	There were no seasonal constraints.		
Methods	A walkover survey was undertaken by Chris Booler CEnv MCIEEM on the 25th June 2013, in agreement with Kent Wildlife Trust. Habitats and features of interest were recorded by taking GPS readings and photographs. The NVC survey undertaken by TEP in 2011 (2700.034) was also referred to throughout the survey to allow accurate mapping of habitat types and features of interest.		
Drawing Ref:	G2700.123		
Photograph Sheet Ref	2700.148 – Points 1, 2, & 3. 2700.149 – Points 3, 4, 5, 6, & 7. 2700.150 – Points 7, 8, 9 &10. 2700.151 – Points 10, 11 & 12. 2700.152 – Points 12, 13 & 14.		
Written	Chris Booler		
Checked	Francis Hesketh		
Authorised	Francis Hesketh		

2.0 INTRODUCTION

The surveyed saltmarsh area of Pegwell Bay forms part of the estuarine system of the River Stour, established on the inner muddy fringes of the bay, abutting the A256 Sandwich Road that runs along the coast. The area forms part of the Sandwich and Pegwell Bay National Nature Reserve and also lies within the designated areas of the Thanet Coast and Sandwich Bay Special Protection Area (SPA) and Ramsar Site, Sandwich Bay Special Area of Conservation (SAC) and Sandwich Bay and Hacklinge Marshes Site of Special Scientific Interest (SSSI). The survey area lies between the car park for the Pegwell Bay Country Park and the Sportsman's Inn on the A256 to the north-east.

The purpose of the survey was to:

- Map Saltmarsh Zones (Pioneer. Lower, Middle, Upper and transitional saltmarsh zones) and compare to NVC survey results undertaken in 2011 (TEP 2700.034).
- Identify any creeks within and adjacent to the red line boundary.
- Identify other non-intertidal habitats.
- Areas of potential invertebrate interest, such as;

- Upper saltmarsh transitional habitat with stands of restharrow (*Ononis sp*).
- Upper saltmarsh litter zone
- Upper saltmarsh bare ground
- Upper saltmarsh with sea wormwood (*Seriphidium maritimum*).
- Drift areas with large seashells or shingle
- Large stands of flowering plants on middle or upper shore.

The information will be used to assess the potential impacts of cable installation through the saltmarsh habitats, in relation to habitat structure, composition and potential to support Red Data Book Invertebrates.

3.0 SURVEY RESULTS

Refer to TEP drawing G2700.123 for point locations.

Point 1	
Pegwell Bay (PB) Photograph 1 – View Eastwards	GPS Reading 51° 19.49'N 1° 21.894E
Additional Photos	PB Photograph 2 – Desire Line
	PB Photograph 3 – Vegetation composition
NVC (Zone 1) – MG1 Upper and Transitional Saltmarsh	
Description – Vegetation here is dominated by dense sea couch (*Elytrigia atherica*), and lacks flowering plants, except for rare individuals against the desire line where vegetation is more disturbed (mallow sp (*Malva sp*) and red valerian (*Centranthus ruber*) in photos). Dense vegetation lacking litter zone, and bare ground. No Sea wormwood or restharrow sp identified.	

Point 2	
PB Photograph 4 – View Westwards	GPS Reading 51° 19.489'N 1° 21.896'E
Additional Photos	
NVC (Zone 1) – MG1 Upper and Transitional Saltmarsh	
Description – Vegetation here is dominated by dense sea couch, and lacks flowering plants, except for rare individuals against the desire line where vegetation is more disturbed (common mallow and red valerian in photos). Dense vegetation lacking litter zone, and bare ground. No Sea wormwood or restharrow sp identified.	

Point 3	
PB Photograph 5 – View Westwards	GPS Reading 51° 19.487'N 1° 21.904'E

Additional Photos	PB Photograph 6 - Vegetation composition
	PB Photograph 7 – Example of debris
	PB Photograph 8 – Example of debris
	PB Photograph 9 – Example of debris
	PB Photograph 10 – Example of debris and bare ground
NVC (Zone 3) - SM12a Middle Saltmarsh	
Description – Vegetation here is dominated by a mix of sea aster (*Aster tripolium*) and sea purslane (*Atriplex portulacoides*). Ground is dry with small areas of bare ground and some debris, including wooden beams, and plastic bottles etc. Sea aster could provide invertebrate interest when in flower. Additionally a small number of greater sea spurrey (*Spergularia media*) plants flowering during survey. No Sea wormwood or restharrow sp identified, although some small areas of bare ground also present. Shrew sp. identified beneath a piece of wood indicating that this part of the saltmarsh is infrequently immersed, and also that invertebrate prey items are common.	

Point 4	
PB Photograph 11 – View Westwards from east end of Joint Transition Pit.	GPS Reading 51° 19.475'N 1° 21.924'E
Additional Photos	PB Photograph 12 - Vegetation composition
	PB Photograph 13 – Vegetation contrast between Zone 3 and Zone 4
NVC (Zone 4) - SM24 Upper Saltmarsh	
Description – Vegetation here is dominated by dense sea couch, and lacks flowering plants. Ground is dry and obviously raised above the levels of the adjacent Zones 3 and 6, where sea couch is virtually absent. No Sea wormwood or restharrow sp identified. Debris also missing from this zone. Location of Joint Transition Pit which lies across Zones 4 and 3.	

Point 5	
PB Photograph 14 – Transition between wet and dry saltmarsh zones.	GPS Reading 51° 19.456'N 1° 21.934'E
Additional Photos	PB Photograph 15 - Vegetation composition
NVC (Zone 6) - SM13a Lower Saltmarsh	
Description – Saltmarsh at a lower ground level and holding standing water. Vegetation dominated by common saltmarsh grass (*Puccinella maritima*), sea purslane with some sea aster and lacks flowering plants. No Sea wormwood or restharrow sp identified. Sea aster could provide invertebrate interest when in flower.	

Point 6	
PB Photograph 16 – Vegetation composition and standing water	GPS Reading 51° 19.475'N 1° 21.947'E
Additional Photos	NA
NVC (Zone 6) - SM13a Lower Saltmarsh	
Description – Saltmarsh at a lower ground level and holding standing water. Vegetation dominated by common saltmarsh grass (*Puccinella maritima*), sea purslane with some sea aster and lacks flowering plants. No Sea wormwood or restharrow sp identified. Sea aster could provide invertebrate interest when in flower. Small amount of litter debris consisting of generally plastic cups and bottles.	

Point 7	
PB Photograph 17 – Differences in vegetation composition between lower 'channels' and raised islands.	GPS Reading 51° 19.464'N 1° 21.949'E
Additional Photos	PB Photograph 18 – Difference in vegetation composition between the raised Zone 4 and lower zone 6 (South facing view).
	PB Photograph 19 - Differences in vegetation composition between lower 'channels' and raised islands.
NVC (Zone 6) - SM13a Lower Saltmarsh	
Description – Saltmarsh at a lower ground level and holding standing water. Vegetation dominated by common saltmarsh grass (*Puccinella maritima*), sea purslane with some sea aster and lacks flowering plants. No Sea wormwood or restharrow sp identified. Sea aster could provide invertebrate interest when in flower.	

Point 8	
PB Photograph 20 – North point of litter zone, line marking tidal wash zone with greater level of deposited rubbish and vegetation.	GPS Reading 51° 19.464'N 1° 21.975'E
Additional Photos	PB Photograph 21 – Deposited wood
	PB Photograph 22 – Deposited plastic and vegetation
	PB Photograph 23 – Deposited carpet tiles and plastic
	PB Photograph 24 – Deposited general rubbish and vegetation
	PB Photograph 25 - Deposited general rubbish and vegetation
NVC (Zone 6) - SM13a Lower Saltmarsh	

Description – Distinct line of deposited vegetation and rubbish indicating the landward extent of rubbish deposition. Similar lines of deposited vegetation and debris are present between this point and the saltmarsh edge indicating different depositing areas with differing tidal heights. No Sea wormwood or restharrow sp identified. Sea aster could provide invertebrate interest when in flower. Litter debris consisting of vegetation and a range of debris types could provide some invertebrate interest.

Point 9	
PB Photograph 26 – South point of litter zone, line marking tidal wash zone with greater level of deposited rubbish and vegetation.	GPS Reading 51° 19.439'N 1° 21.972'E
Additional Photos	NA
NVC (Zone 6) - SM13a Lower Saltmarsh	
Description – Distinct line of deposited vegetation and rubbish indicating the landward extent of rubbish deposition. Similar lines of deposited vegetation and debris are present between this point and the saltmarsh edge indicating different depositing areas with differing tidal heights. No Sea wormwood or restharrow sp identified. Sea aster could provide invertebrate interest when in flower. Litter debris consisting of vegetation and a range of debris types could provide some invertebrate interest.	

Point 10	
PB Photograph 27 – Vegetation transition into seaward zone of vegetation.	GPS Reading 51° 19.464'N 1° 21.975'E
Additional Photos	PB Photograph 28 – Greater sea spurry
NVC (Zone 7) - SM6 & SM8 Pinoneer Saltmarsh	
Description – Lower saltmarsh zone, All along the frontage of the saltmarsh area this zone forms a broad fringe dominated by common cord-grass and glasswort. No Sea wormwood or restharrow sp identified. Greater sea spurrey is scattered throughout the zone, which could provide some interest for invertebrates when in flower.	

Point 11	
PB Photograph 29 – Small creeks becoming apparent.	GPS Reading 51° 19.447'N 1° 22.006'E
Additional Photos	PB Photograph 30 – Small creeks becoming apparent
	PB Photograph 31 - Small creeks becoming

	apparent
	PB Photograph 32 - Small creeks becoming apparent
NVC (Zone 7) - SM6 & SM8 Pioneer Saltmarsh	
Description – Lower saltmarsh zone, all along the frontage of the saltmarsh area this zone forms a broad fringe dominated by common cord-grass and glasswort. Small creeks become apparent closer to the edge of the saltmarsh with deeper creeks appearing. No Sea wormwood or restharrow sp identified. Greater sea spurrey is scattered throughout the zone, which could provide some interest for invertebrates when in flower.	

Point 12	
PB Photograph 33 – Edge of saltmarsh	GPS Reading 51° 19.435'N 1° 22.025'E
Additional Photos	PB Photograph 34 – Shallow creek also used as a footpath to access mudflats.
	PB Photograph 35 – Edge of mudflats and creeks.
	PB Photograph 36 – Saltmarsh islands within edge of mudflats.
	PB Photograph 37. – Southwest facing view of saltmarsh/mudflat interface.
NVC (Zone 7) - SM6 & SM8 Pioneer Saltmarsh	
Description – Lower saltmarsh zone, all along the frontage of the saltmarsh area this zone forms a broad fringe dominated by common cord-grass and glasswort (*Salicornia sp.*). Saltmarsh peters out into the mudflats with a number of creeks running back into the saltmarsh. Aerial photograph, accurately describes the saltmarsh edge and it is possible to determine the route of creeks from aerial photographs. Creeks are maximum of 30-40cm below the highest ridges where saltmarsh persists. Shells are abundant hear and form part of the mudflats, providing stability to the sediments.	

Point 13	
PB Photograph 38 – Example of a creek.	GPS Reading 51° 19.435'N 1° 22.025'E
Additional Photos	PB Photograph 39 – Example of creeks
	PB Photograph 40 – Edge of saltmarsh
	PB Photograph 41 – Edge of saltmarsh
	PB Photograph 42 – Example of creeks
	PB Photograph 43 - High number of shells in sediments
	PB Photograph 44 – Creeks within Saltmarsh
NVC (Zone 7) - SM6 & SM8 Pioneer Saltmarsh	
Description – Lower saltmarsh zone, all along the frontage of the saltmarsh area this zone forms a broad fringe	

dominated by common cord-grass and glasswort. Creeks are a feature of the seaward edge of the saltmarsh.

No Sea wormwood or restharrow sp. identified.

Point 14	
PB Photograph 45 – Area southwest of service station, showing range of flowering plants and areas of bare ground.	NA
Additional Photos	NA
NVC (Zone 1) – MG1 and SM24	
Description – Modified grassland area southwest of service station, with a range of flowering plants and areas of bare ground which may be used by species of invertebrates. Zone between the cycle path and desire line footpath also includes a great number of flowering plants. No Sea wormwood or restharrow sp identified. Flowering species included oxeye daisy, common mallow, birds foot trefoil, scarlet pimpernel, tufted vetch, poppy, melilot, kidney vetch, red valerian.	

4.0 SUMMARY AND DISCUSSION

Saltmarsh Structure

The saltmarsh within Pegwell Bay can generally be separated into four habitat types as defined in JNCC report 334 (Boorman 2003). An additional transitional zone is also present between the saltmarsh and modified grasslands alongside sandwich road, northwest of the saltmarsh.

When the definitions of salt marsh zones included with in JNCC report 334 are cross referenced with the NVC saltmarsh survey undertaken by TEP in 2011 (2700.034) the saltmarsh zones within the different zones within the red line boundary can be defined as below (see Drawing 2700.123).

Zone 1 – Upper saltmarsh and transitional zone
Zone 2 – Middle saltmarsh
Zone 3 – Middle saltmarsh
Zone 4 – Upper saltmarsh
Zone 6 – Lower saltmarsh
Zone 7 - Pioneer saltmarsh

The topography of the bay has resulted in a strip of upper saltmarsh (Zone 4) running through the saltmarsh with lower saltmarsh (Zone 6) on the seaward side and middle saltmarsh (Zone 2 and 3 on the shoreward side. This belt of upper saltmarsh is noticeably at a higher ground level than the saltmarsh on either side, and is dominated by sea couch (*Elytrigia sp*) with few other saltmarsh species present.

The presence of middle saltmarsh on the landward side of Zone 4 can be attributed to the presence of a saltmarsh lagoon t the west of Zone 4. South of the red line boundary is a small dip in the topography of Zone 4. This was identified through the presence of a greater diversity of saltmarsh

species during the NVC survey in 2011. Sea water accesses the lagoon and surrounding saltmarsh through this channel. This has resulted in the development of lower and middle saltmarsh habitats landward of Zone 4. Within the red line boundary, only middle saltmarsh habitats are present landward of Zone 4.

The lowered topography that allows the lagoon to be fed with sea water saltmarsh to persist is anticipated to be south of the red line boundary. However, it is recommended that a topographical survey is undertaken to determine the ground levels here. It is important that this channel is maintained to allow the continued feeding of the lagoon and to maintain the saltmarsh areas.

Pioneer saltmarsh at the interface between the saltmarsh and mudflats appears to be stable and during survey it was possible to compare the outline of the saltmarsh with aerial photographs taken prior to installation of the TOWF cable.

Creeks from the seaward edge of the saltmarsh are clearly visible (Drawing 2700.123). The creeks become shallower as they progress into the saltmarsh and become vegetated channels.

A creek which is clearly visible on the overhead photograph is also used as a footpath by people accessing the mudflats. Boot prints and dog footprints were visible at the time of survey.

Birds

Description –
Few birds were identified during the survey. Starling and herring gull were observed flying over the survey area. Shell duck and curlew were observed within the mudflats adjacent to the saltmarsh, within the redline boundary.

At no point during the survey was any nests identified, and no territorial or alarm behaviour was observed by any species of birds.

Invertebrate Potential

No restharrow or sea wormwood was identified at any point during the survey.

Sea aster (*Aster tripolium*) is widespread within Zone 3 and also present within Zones 6 and 7. These were not flowering at the time of survey but have potential to support invertebrates, particularly when in flower.

Bare ground and litter/debris were also present within Zone 3, providing further potential to support invertebrates. The presence of a shrew indicates that this zone rarely floods and also supports species of invertebrates, supporting small predators.

Zone 6 also contains a greater level of litter/debris and vegetation, in distinct lines parallel with the shore, indicating tidal wash. This area has a greater potential to support invertebrate species, due to sheltering opportunities, although regular inundation from the tide is likely to affect the suitability of the habitat.

Zone 7 largely lacks litter/debris, due to regular inundation by tidal waters. It is likely that regular deposition of such features occurs, however is regularly disturbance from the tides moves litter/debris either further into the saltmarsh or back into the mudflats.

5.0 CONCLUSIONS

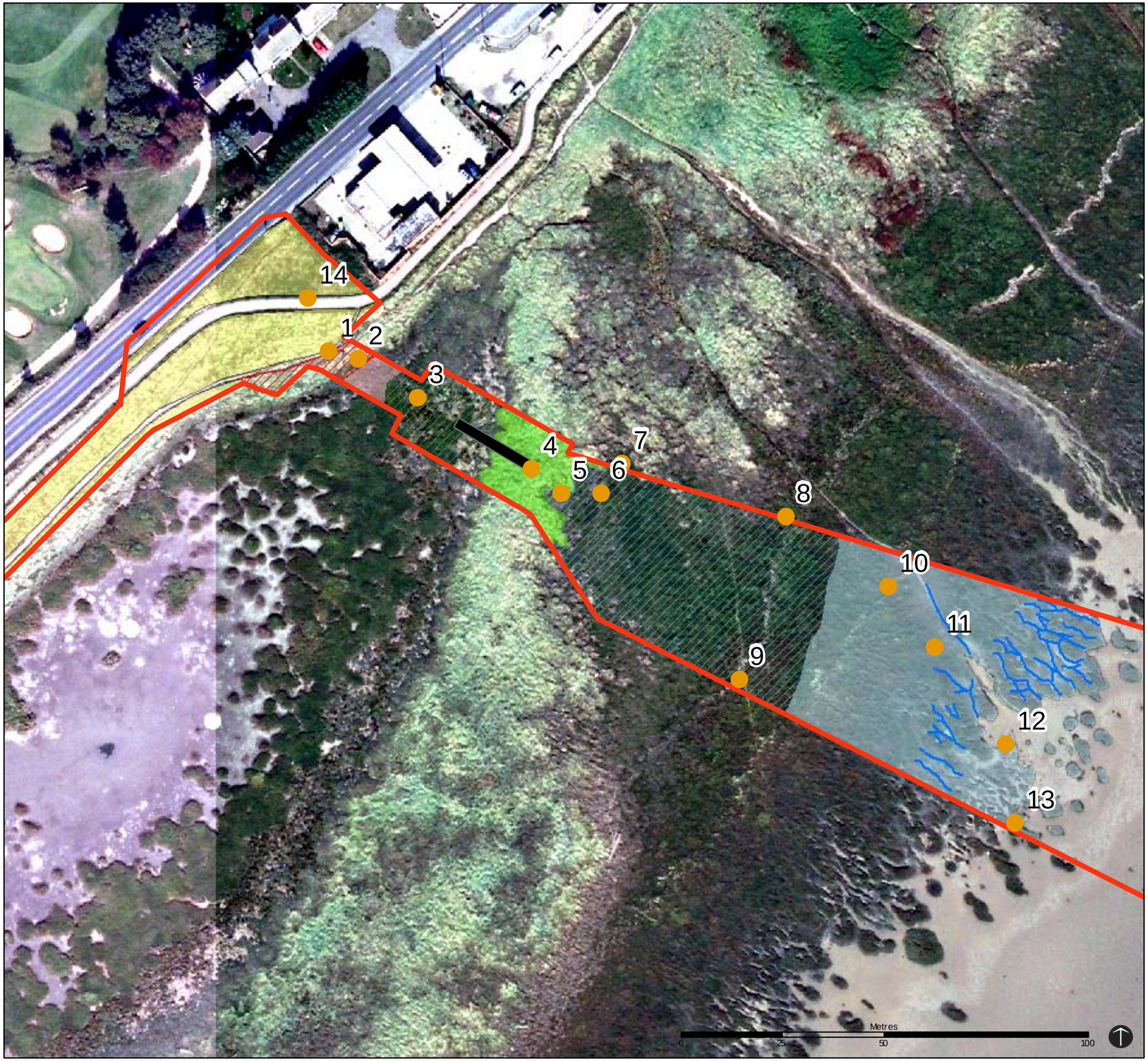
The saltmarsh communities present are typical of such habitats and are common within Pegwell Bay. Currently disturbance to these habitats is limited to the desire line/footpath

running parallel with the cycle track and public access to the mudflats in the north of the survey area.

The NVC survey information from 2011 can be matched against the different saltmarsh zones as described in JNCC Report 334. The topography of the saltmarsh has an important role in the structure of the saltmarsh within Pegwell Bay and in particular the presence of the lagoon in the west of the saltmarsh. The hydrology of the saltmarsh feeding the lagoon should be protected to ensure that the lagoon persists.

Creeks are present within seaward edge of the saltmarsh, confined to Zone 7. A difference in height of 30-40cm between the bottom of the creeks and top of the adjacent creek walls is common. Where possible these creeks should be protected during works.

Restharrow sp and sea wormwood were not identified at any point within or adjacent to the red line boundary. It is therefore unlikely that Red Data Book species that rely on these plants would be present. However, sea aster is present within Zones 3, 6 and 7, which have potential to attract and support invertebrates when in flower. Bare ground within Zone 3, and debris/litter and dead vegetation within Zones 3, and 6 also have potential to support species of invertebrates by providing places of shelter.



Key

- Saltmarsh Survey Photo Points June 2013
- Nemo Link Red Line Boundary
- Joint Transition Pit (JTP)

Saltmarsh Zones

Upper Saltmarsh/Transition Zone
- Saltmarsh NVC Zone 1

Upper Saltmarsh
- Saltmarsh NVC Zone 4

Middle Saltmarsh
- Saltmarsh NVC Zone 2
- Saltmarsh NVC Zone 3

Lower Saltmarsh
- Saltmarsh NVC Zone 6

Pioneer Saltmarsh
- Saltmarsh NVC Zone 7
- Creeks

Other Habitats
- Modified Grassland

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Project:	**Nemo Stage 3**
Title:	**Saltmarsh Zones**
Drawing No:	**G2700.123**
Date: 26-06-13	TEP Ref No: G2700.123 A
Drawn: CDB	Checked: FBH / Approved: FBH

1. Photo 498

2. Photo 499

3. Photo 500

4. Photo 501

5. Photo 502

6. Photo 503

7. Photo 504

8. Photo 505

9. Photo 506

Revision	Description	Amended by	Date

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2700 Nemo Link

Title

Pegwell Bay Saltmarsh Survey
Photo Sheet 4

Drwg No		
2700.151		
Scale: N/A	Date: 30/07/2013	
Drawn by: CDB	Checked by: CDB	Authorised: IG

1. Photo 487

2. Photo 489

3. Photo 490

4. Photo 491

5. Photo 492

6. Photo 493

7. Photo 494

8. Photo 495

9. Photo 497

Revision	Description	Amended by	Date

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Pegwell Bay Saltmarsh Survey
Photo Sheet 3

Drwg No		
2700.150		
Scale: N/A	Date: 30/07/2013	
Drawn by: CDB	Checked by: CDB	Authorised: IG

1. Photo 230

2. Photo 479

3. Photo 480

4. Photo 481

5. Photo 482

6 Photo 483

7. Photo 484

8. Photo 485

9. Photo 486

Revision	Description	Amended by	Date

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Project

2700 Nemo Link

Title

Pegwell Bay Saltmarsh Survey
Photo Sheet 2

Drwg No		
2700.049		
Scale: N/A	Date: 30/07/2013	
Drawn by: CDB	Checked by: CDB	Authorised: IG

1. Photo 470

2. Photo 471

3. Photo 472

4. Photo 473

5. Photo 474

6. Photo 475

7. Photo 476

8. Photo 477

9. Photo 478

Revision	Description	Amended by	Date

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2700 Nemo Link

Title

Pegwell Bay Saltmarsh Survey
Photo Sheet 1

Drwg No: 2700.148

Scale: N/A

Date: 30/07/2013

Drawn by: CDB

Checked by: CDB

Authorised: IG

1.Photo 507

2. Photo 508

3. Photo 509

4. Photo 510

5. Photo 511

6. Photo 512

7. Photo 225

8. Photo 226

9. Photo 231

Revision	Description	Amended by	Date

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2700 Nemo Link

Title

Pegwell Bay Saltmarsh Survey
Photo Sheet 5

Drwg No		
2700.152		
Scale: N/A	Date: 303/07/2013	
Drawn by: CDB	Checked by: CDB	Authorised: IG

Planning Inspectorate

Reference	**APPENDIX 5:** **Natterjack Toad Briefing Note**
Status	**Confidential information - Natterjack Toad**

This document contains confidential information relating to **Natterjack Toad** and is not available to view by the public. If you consider that you have a legitimate need to see this information you may ask the applicant or the party who submitted the document whether they will agree for you to see it. You may also make a request to the Planning Inspectorate. Any request made to the Inspectorate will be treated as a request under the Freedom of Information Act 2000 (FOIA) and/ or the Environmental Information Regulations 2004 (EIR). The Inspectorate will consider the request and provide a written response. The Inspectorate may decide to either: (a) publish the document, (b) publish the document with redactions; or (c) not publish the document.