Hornsea Project Three
Offshore Wind Farm

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Appendix 2 to Deadline 4 submission – Outline Code of Construction Practice

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Hornsea 3
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Front cover picture: Kite surfer near a UK offshore wind farm © Ørsted Hornsea Three (UK) Ltd., 2019.

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Glossary

Term	Definition
Aquifer	A subsurface layer or layers of rock or other geological strata of sufficient porosity and permeability to allow either a significant flow of groundwater or the abstraction of significant quantities of groundwater.
Compound	Collective term used to refer to secondary construction compounds along the Hornsea Three onshore cable corridor as well as the landfall construction compound (defined in detail in volume 1, chapter 3: Project Description). Although there is also a main construction compound, this is referred to individually due to its distant location relative to the onshore cable corridor.
Heritage	Historic or cultural associations.
Horizontal Directional Drilling	Method for the installation of pipes, conduits and cables using a surface launched drilling rig. This is used as a proxy for trenchless technology.
Intertidal area	The area between mean low water and mean high water.
Onshore elements of Hornsea Three	Hornsea Three landfall area (above Mean High Water Springs), onshore cable corridor, the onshore HVAC booster station, the onshore HVDC converter/HVAC substation and the interconnection with the Norwich Main National Grid substation.
Principal aquifer	Layers of rock or superficial deposits that have high inter-granular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifers.
Secondary A aquifer	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.
Secondary B aquifer	Predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.
Source Protection Zone	Source Protection Zones are defined by the Environment Agency (for England) for groundwater sources such as wells, boreholes and springs that are used for public drinking water supply. Source Protection Zones show the level of risk of contamination from activities on or in the ground that have the potential to cause groundwater pollution in the area and affect water quality at an abstraction.

Acronyms

Acronyms	Description
BS	British Standard
CCS	Considerate Contractors' Scheme
CLO	Community Liaison Officer
CoCP	Code of Construction Practice
CTMP	Construction Traffic Management Plan
DCO	Development Consent Order
ECoW	Ecological Clerk of Works
EHO	Environment Health Officer
EIA	Environmental Impact Assessment
EMP	Ecological Management Plan
EMS	Environmental Management System
EPS	European Protected Species
HDD	Horizontal Directional Drilling
HGV	Heavy Goods Vehicle
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IDB	Internal Drainage Board
LLFA	Lead Local Flood Authority
MHWS	Mean High Water Springs
MMO	Marine Management Organisation
PINS	Planning Inspectorate
PRoW	Public Right of Way

Units

Unit	Description
km	Kilometre (distance)
m	Metre (distance)

1. Introduction

1.1 General

1.1.1.1 This document is an Outline Code of Construction Practice (Outline CoCP) for the Hornsea Project Three offshore wind farm (hereafter referred to as 'Hornsea Three'). The Outline CoCP accompanies the application to the Secretary of State for a Development Consent Order (DCO).

1.1.1.2 This Outline CoCP extends to all onshore elements of Hornsea Three which are described in full in volume 1, chapter 3: Project Description of the Environmental Statement.

1.1.1.3 The onshore construction works comprise the following elements landward of Mean High Water Springs (MHWS) together with compounds, storage areas and accesses:

- The Hornsea Three landfall area (above MHWS);
- The onshore cable corridor (approximately 55 km in length);
- An onshore High Voltage Alternating Current (HVAC) booster station;
- An onshore High Voltage Direct Current (HVDC) converter/HVAC substation; and
- The interconnection with the Norwich Main National Grid substation.

1.1.1.4 The onshore elements of Hornsea Three will be constructed within the following Local Authorities:

- North Norfolk District Council;
- Broadland District Council;
- South Norfolk District Council; and
- Norfolk County Council.

1.1.1.5 The intertidal construction works will comprise the landing of all export cables in the Hornsea Three intertidal area which is located between MHWS and Mean Low Water Springs.

1.1.1.6 Construction work is currently planned to commence in 2021, however the surveys and enabling works could start as early as 2020. Hornsea Three could be built in a single phase of construction or two phases, with the potential for an overlap or a gap of up to three years between the completion of construction activities in one phase and the start of the same construction activity in the second phase. It is also possible that some activities may be carried out during an earlier phase for the benefit of a later one. In this regard, should the project be delivered in two phases, Hornsea Three will install ducts for the second phase as part of the first phase of works should both phases be awarded a Contract for Difference in the same auction round. However, any works completed for a later phase(s) would be left in a safe state, as agreed with the relevant authorities, to await the appropriate phase for completion.

1.1.1.7 Hornsea Three will install all cables by ducting, rather than direct lay, with ducts installed in the trenches which would then be backfilled and at a later date, the cables will be pulled through the ducts from one joint bay to the next. Any works completed during the trenching and ducting works, would be left in a safe state, as agreed with the relevant authorities, to await the cable installation works.

1.2 Purpose of the Outline CoCP

1.2.1.1 This Outline CoCP sets out the management measures that the Undertaker and its construction contractors will be required to adopt and implement for all construction activities associated with Hornsea Three. These measures have been identified during the design of the onshore and intertidal elements of Hornsea Three as part of the Environmental Impact Assessment (EIA) process. They include strategies, control measures and monitoring procedures for managing the potential environmental impacts of constructing Hornsea Three (as outlined in section 1.1) and limiting disturbance from construction activities as far as reasonably practicable. It focuses on the environmental aspects of the construction phase that may affect the interests of residents, businesses, the public and other sensitive receptors near to construction areas.

1.2.1.2 The term 'construction' in this Outline CoCP includes all site preparation, demolition, HGV deliveries, waste removal, and all related engineering, construction and restoration activities as authorised by the DCO within the Order Limits.

1.2.1.3 This Outline CoCP has been prepared in conjunction with the Environmental Statement with the aim of ensuring that general best practice measures are followed during construction and any likely significant effects that are reported in the Environmental Statement will be avoided where possible or mitigated.

1.2.1.4 This Outline CoCP incorporates legislative requirements, current standards and best practice measures to define the standards of construction practice that contractors will be required to adopt and implement. However, compliance with this Outline CoCP or any detailed CoCPs (see section 1.3.1) will not absolve the Undertaker, principal contractors or subcontractors from compliance with all legislation and byelaws relating to their construction activities.

1.2.1.5 This Outline CoCP is a 'living' document that will be updated as required post submission of the Development Consent Order (DCO) application, during the Examination Period following more detailed engagement with stakeholders, and post examination by way of instruction of the Examining Authority and Secretary of State.

1.3 Implementation of the CoCP

1.3.1 Outline and detailed CoCPs

1.3.1.1 The purpose of this Outline CoCP is to establish the principles that will be implemented during the construction of the onshore and intertidal elements. Following the granting of the Hornsea Three DCO, this Outline CoCP will be updated as required (see paragraph 1.2.1.5). The Outline CoCP as approved by the Secretary of State will be incorporated into the contracts for the principal contractors of all onshore and intertidal works authorised by the DCO. All principal contractors, subcontractors and their suppliers will be required to observe the relevant provisions of the Outline CoCP and provide evidence on how they will ensure its requirements are implemented and monitored.

1.3.1.2 Following the principles established in the Outline CoCP, a detailed CoCP or number of detailed CoCPs (hereafter referred to as detailed CoCPs) will be prepared for specific elements of Hornsea Three. The detailed CoCP(s) will be developed during the detailed design stage (post consent) and will reflect the different construction methodologies and techniques associated with each element of Hornsea Three. The detailed CoCPs will also include site-specific control measures required to mitigate the construction impacts likely to be encountered at these locations. Construction of the element(s) will not commence until the relevant detailed CoCP for the element(s) has been agreed with the Local Planning Authority in consultation with the relevant highways authority and, if applicable, the Marine Management Organisation (MMO), Natural England, and the Environment Agency.

1.3.2 Onshore construction method statements

1.3.2.1 Prior to commencing specific activities, such as the crossing of a watercourse or other infrastructure such as a Strategic Road (e.g. A11) or railway the principal contractor will develop Construction Method Statements which will set out the construction operations to be undertaken (including construction methods and types of plant required) and the associated environmental, and health and safety issues. The activities requiring a method statement will be identified using a risk based approach during detailed design. A generic method statement will be prepared for HDD and open cut crossings of watercourses, with specific crossing method statements for particularly sensitive locations. The method statements will sit below this Outline CoCP or detailed CoCPs.

1.3.2.2 An Outline method statement for open cut and Horizontal Directional Drilling (HDD) crossing techniques for watercourses is included in Appendix B. This method statement and the crossing design will be developed during the detailed design stage.

1.3.3 Training

1.3.3.1 All onshore and intertidal construction staff employed on Hornsea Three will receive training on their responsibilities for minimising the risk to the environment and implementing the measures set out in this outline and any subsequently approved detailed CoCP(s).

1.3.3.2 The principal contractors will ensure that contractors employ an appropriately qualified and experienced workforce. The principal contractors will also be responsible for identifying the training needs of their personnel to enable appropriate training to be provided. The training will include site briefings and toolbox talks to equip the workforce with the necessary knowledge on health, safety and environmental topics, and the relevant environmental control measures pertinent to works to be carried out that day.

1.3.3.3 In addition to meeting the commitments in the Outline CoCP, all principal contractors will be required to sign up to, and implement, the Considerate Contractors' Scheme (CCS). The scheme is a voluntary Code of Considerate Practice which seeks to minimise disturbance caused by construction sites to the immediate neighbourhood and recognises the Undertaker's commitment to raise standards of site management.

1.3.3.4 The CCS Code of Considerate Practice is in five parts, each containing an aspirational supporting statement and four bullet points which represent the basic expectations of registration with the Scheme. These five parts are summarised below and their general principles will be applied during construction works.

- Care about Appearance: Constructors should ensure sites appear professional and well managed;
- Respect the Community: Constructors should consider their impact on neighbours and the public;
- Protect the Environment: Constructors should protect and enhance the environment;
- Secure everyone's Safety: Constructors should attain the highest levels of safety performance; and
- Value their Workforce: Constructors should provide a supportive and caring working environment.

1.4 Structure of the Outline CoCP

1.4.1.1 This Outline CoCP follows the structure below:

- Chapter 2 – Environmental Principles;
- Chapter 3 – Accompanying Plans to the CoCP;
- Chapter 4 – General Requirements;
- Chapter 5 – Roles and Responsibilities;
- Chapter 6 - Management of Onshore Environmental Issues; and
- Chapter 7 – Management of Intertidal Environmental Issues.

2. Environmental Principles

2.1 Construction principles

2.1.1.1 Hornsea Three will be constructed in an environmentally sensitive manner and will meet the requirements of all relevant legislation, codes of practice and standards as identified in the DCO, Environmental Statement and any updates to legislation or standards adopted at the time of construction to limit the adverse impacts on the local community and environment as far as reasonably practicable.

2.2 Environmental management

2.2.1.1 Each principal contractor is to be British Standard (BS) EN ISO 14001 (Environmental Management System (EMS)) certified. The EMS will provide the process for which environmental management is undertaken to ensure that the relevant findings of the Environmental Statement are addressed during the construction phase. The EMS will set out:

- The procedures to be implemented to monitor compliance with environmental legislation and other relevant requirements;
- The key environmental aspects of the construction works and how they will be managed;
- Staff competence and training requirements;
- Record-keeping arrangements; and
- Monitoring compliance and the effectiveness of the measures included within the CoCP, as approved by the relevant Local Planning Authority in consultation with the relevant highways authority and, if applicable, the MMO, Natural England and the Environment Agency.

2.2.1.2 As part of each principal contractor's EMS, the principal contractors will be required to plan their works in advance to ensure that as far as is reasonably practicable, measures to reduce environmental effects and ensure that any commitments documented in the DCO, the principles established in this Outline CoCP, and commitments made in the Environmental Statement and the Examination Process are complied with.

3. Accompanying Plans to the CoCP

3.1.1.1 The outline CoCP will be implemented across all phases of the onshore and intertidal construction programme. To support the principles of this outline CoCP, it will be supported through the preparation of the following:

- Crossing method statements will set out the construction operations to be undertaken (including construction methods and types of plant required) and the associated environmental and health and safety issues for certain crossings where an increased risk is identified. The crossing method statements to include:
  - Details of crossing techniques to be deployed at sensitive environmental crossings (such as main rivers) (see outline watercourse crossing method statement in Appendix B). These will be developed with the relevant asset owner or key stakeholder such as the Environment Agency, and with regard to Blackwater Drain (near Booton Common), Natural England.
- Appendix E to this Outline CoCP documents the definitive locations where the onshore export cable is to be installed by way of crossing method:
  - HDD Only
  - HDD with haul road over; and
  - HDD and ducting laydown.
- Communications Plan (outline included in Appendix A) to include;
  - A framework for engaging stakeholders (i.e. identifying who may be affected by construction impacts, methods of contacting and engaging with affected groups, methods of providing advance notifications);
  - Roles and responsibilities for implementing the communication plan; and
  - Complaints procedure.

  In the event that Norfolk Vanguard and Hornsea Three have concurrent construction works in the vicinity of Oulton and Cawston parishes, the Hornsea Three Communication Plan will set out the following:
    i. Procedures for engaging with Norfolk Vanguard;
    ii. Procedures for Hornsea Three and Norfolk Vanguard to engage with the Local Highway Authority; and
    iii. Measures that Hornsea Three and Norfolk Vanguard will initiate to ensure that if any complaints are made by the local community how these are communicated between the two developers (potentially via the appointed Hornsea Three Community Liaison Officer).)

- A Landscape Management Plan (LMP), developed in an accordance with the principles established in the Outline Landscape Management Plan (document reference A8.7) to include:
    - The design and management objectives of the landscape scheme for existing and proposed vegetation;
    - Planting specification including planting mixes for the onshore HVAC booster station and HVDC converter/HVAC substation; and
    - Post construction monitoring.
- An Ecological Management Plan (EMP) developed in an accordance with the principles established in the Outline EMP (document reference A8.6) to include:
    - Designated sites and habitats and protected species;
    - Mitigation measures to be implemented during pre-construction, construction and post construction;
    - Long term management of habitats and protected species; and
    - Monitoring and reporting requirements.
- A Construction Traffic Management Plan (CTMP), developed in accordance with the principles established in the Outline CTMP (document reference A8.2) to include:
    - Locations of wheel wash facilities, welfare facilities etc,
    - Fixed routes for construction traffic; and
    - Delivery timings and restrictions.
- Written Scheme to deal with any Contamination of Land to include:
    - Procedures if previously unidentified contamination of land or groundwater is discovered during construction.
- Emergency Response and Pollution Control Plan, prepared in consultation with the Environment Agency prior to the commencement of any activities that could trigger a pollution incident (such as HDD activities) to include:
    - Details of the containment of fuels, oils, lubricants and chemicals;
    - Measures to protect surface and groundwater during construction;
    - Emergency procedures in cases of spillages or leaks.
- Further consideration of noise management measures (construction) to include:
    - Best Practicable Means to manage noise levels; and
    - Construction noise management measures.
- Further consideration of archaeology to include:
    - The scope of work to be undertaken to mitigate those direct physical impacts on the historic environment above MHWS such as
        - Procedures if previously unidentified heritage assets are discovered during construction (a “chance find” procedure);
        - Completion of archaeological evaluation (geophysical surveys, trial trenching etc.,) where required; and
        - Archaeological watching brief during topsoil stripping (where required).
- Site Waste Management Plan (see volume 4, annex 3.4: Site Waste Management Plan)
- Construction Programme; and
- Emergency Response Plan.

4. General Requirements

4.1 Onshore

4.1.1 Working Hours

Core working hours

4.1.1.1 Core working hours for the construction of the onshore elements of Hornsea Three are as follows:

- Monday to Friday: 07:00 - 18:00 hours;
- Saturday: 07:00 - 13:00 hours;
- Up to one hour before and after core working hours for mobilisation ("mobilisation period"), i.e. 06:00 to 19:00 weekdays and 06:00 to 14:00 Saturdays; and
- Maintenance period 13:00 to 17:00 Saturdays.

4.1.1.2 During the mobilisation period, the contractor may undertake the following activities:

- Arrival and departure of the workforce at the site and movement to and from areas across the project;
- Site inspections and safety checks; site meetings (briefings and quiet inspections/walkovers);
- Site clean-up (site housekeeping that does not require the use of plant); and
- Low-key maintenance including site maintenance, safety checking of plant and machinery (provided this does not require or cause hammering or banging).

4.1.1.3 Mobilisation does not include heavy good vehicle (HGV) movements into and out of construction areas (i.e. HGV movements should only occur at the construction areas during the core working hours unless otherwise agreed) but suppliers can make use of the wider highway network outside these hours to travel. The use of the mobilisation period will be agreed with the relevant local authority EHO officer in consultation with relevant planning authority on a case by case basis.

Continuous working hours

4.1.1.4 In certain circumstances, specific works may have to be undertaken on a continuous working basis (00:00 to 00:00 Monday to Sunday).

4.1.1.5 During this period, the contractor may undertake the following activities as follows on a continuous cycle (no further consent required):

- Running of support generators or emergency backup supplies;
- Remedial works, for example in the event of severe weather; and
- Security of sites and protection of open assets.

4.1.1.6 During this period, the contractor may also undertake ~~the following~~ certain activities subject to obtaining agreement with the relevant local authority Environment Health Officer (EHO) in consultation with relevant stakeholders as required. Any request to the relevant local authority EHO is to detail how noise is to be managed on-site, predicted noise levels at sensitive receptors (if applicable), total length of period over which continuous works are requested for and the anticipated length of time any noise generating equipment is to be used. Such activities comprise ~~-~~:

- Horizontal Directional Drilling (HDD) operations. These activities may require 24-hour machinery operation, dependent on the ground conditions;
- Substation component installation;
- Oil filling of transformers at the onshore substation; and
- Jointing operations along the onshore cable corridor.

Activities outside of the core working hours

4.1.1.7 It may be beneficial to carry out several activities outside of the standard working hours to utilise periods such as abnormal loads/construction plant delivery, works within the highway/footpaths, or works affecting operational railways.

4.1.1.8 Activities outside of the standard working hours will be agreed with the relevant local authority EHO officer in consultation with relevant stakeholders (e.g. third-party asset owner) as required.

4.1.2 General site layout and good housekeeping

4.1.2.1 Where reasonably practicable, measures will be taken to contain and limit the visual intrusion of the onshore construction sites. The locations of the secondary compounds have been selected to avoid residential properties. The layout of the compounds (e.g. siting of welfare facilities) will be designed to avoid overlooking residential properties. If requested by the Local Planning Authority or Environment Agency, layout plans of the construction compounds will be provided, showing sensitive areas and buffer zones (e.g. ecological habitats or protected species), and areas where storage of potential pollutants (e.g. fuels, oils and other chemicals) will be avoided.

4.1.2.2 A good housekeeping policy will be applied to the construction areas at all times. As far as reasonably practicable the following principles will be applied:

- All working areas will be kept in a clean and tidy condition;
- Adequate welfare facilities will be provided for construction staff;
- Smoking areas at site offices/compounds or work sites will be equipped with containers for smoking wastes – these will not be located at the boundary of working areas or adjacent to neighbouring land;
- Wheel washing facilities will be cleaned frequently;
- Open fires will be prohibited at all times;
- All necessary measures will be taken to minimise the risk of fire and the contractor will comply with the requirements of the local fire authority;

- Waste from the construction areas will be stored securely to prevent wind blow; and
- Waste (particularly food waste) will be removed from the welfare facilities at frequent intervals.

4.1.3 Site security, screening and fencing

4.1.3.1 Construction compounds will be secured to minimise the opportunity for unauthorised entry. Temporary fencing will also be provided along the onshore cable corridor. The type of fencing will be selected to suit the location and purpose.

4.1.3.2 All boundary fences/screens will be maintained in a tidy condition and will be fit for purpose.

4.1.3.3 All temporary screening and fencing will be removed as soon as reasonably practicable after completion of the works.

4.1.3.4 Where possible, access to construction areas will be limited to specified entry points and all personnel entries/exits will be recorded for security and health and safety purposes.

4.1.4 Lighting

4.1.4.1 External lighting of the construction site will be designed and positioned to:

- Provide the necessary levels for safe working;
- Minimise light spillage or pollution; and
- Avoid disturbance to adjoining residents and occupiers of buildings and to wildlife.

4.1.4.2 Lighting during construction will take into account the requirements set out in BS EB 12464-2:2014 (BSI, 21014). Lighting units will be designed to minimise illumination outside the construction works area, e.g., will be directional, task orientated and where possible, fully shielded. Further details regarding lighting during the construction phase will be developed post consent.

4.1.4.3 In respect to the main construction compound in particular, low levels of security lighting will be required, at the entrance to the site and office facilities as well as around the perimeter of the compound. Lighting fixtures would be no greater than 4 m in height to avoid spill towards sensitive receptors including residential properties and Dark Sky Discovery Sites in the local area. Further details of the lighting at the main construction compound will be developed post-consent as part of the final CoCP (Requirement 17 of the dDCO).

4.1.5 Pest control

4.1.5.1 The risk of pest/vermin infestation will be reduced by ensuring any putrescible waste is stored appropriately and regularly collected from the construction areas, and effective preventative pest control measures are implemented. Any pest infestation will be dealt with promptly and notified to the relevant local authority as soon as practical.

4.1.6 Clearance of site on completion

4.1.6.1 Temporary construction compounds, storage areas and accesses will be cleared as work progresses and when they are no longer required. On completion of construction work all plant, temporary buildings or vehicles will be removed.

4.1.6.2 If works are delivered in phases, temporary construction compounds and accesses will be removed and the land reinstated on completion of construction work associated with that phase unless otherwise approved by the Local Planning Authority.

4.1.6.3 Following completion of the onshore cable installation, the working area will be reinstated to a state commensurate with condition prior to the commencement of works. If works are delivered in phases, the working area will be reinstated on completion of construction work associated with that phase unless otherwise agreed by the local planning authority. This will include:

- Reinstatement of topsoil and subsoil, including loosening or ripping of compacted soil;
- Reinstatement of land drainage systems, where necessary post construction drains may be installed, typically parallel to the cable corridor;
- Reseeding of any fields of grassland, grass margins and ditch banks;
- Reconstruction of any drains, ditches or roads crossed using an open cut method;
- Replanting of any hedgerows or felled shrubs as detailed in the Landscape Management Plan (approved by the Local Planning Authority in accordance with the principles established in the Outline Landscape Management Plan (REP1-145);
- Restoration or repair of fences, gates, tracks or hard standing; and
- Reinstatement of PRoW where temporary diversions have been put in place during construction.

4.1.7 Construction compounds

4.1.7.1 The application provides for a hierarchy of construction compounds.

Substation construction compounds

4.1.7.2 Construction compounds will be required at the HVDC converter/HVAC substation and HVAC booster station sites to support the construction of the substation sites. The compounds will be located within the footprints of the permanent works or in the areas of temporary land take and their use will be limited to the period required for the installation of the substations.

Main construction compound

4.1.7.3 The main compound will operate as a central base for the onshore construction works and will house the central offices, welfare facilities, and stores, as well as acting as a staging post and secure storage for equipment and component deliveries.

4.1.7.4 The site identified at Oulton airfield already comprises hard standing suitable for the temporary placement of site facilities (such as offices, briefing rooms, catering facilities, storage) and to allow plant and materials to be stored safely and securely. Material and non-static plant will then be transported out to the active cable installation work fronts.

4.1.7.5 The main construction compound will be fenced using bolted and anchored heras fencing or its equivalent and on-site security will be deployed on a continuous basis if deemed necessary by the contractor. The main construction compound may include:

- Portacabin with offices, briefing and welfare facilities;
- Staff car parking;
- Wheel wash facilities (if deemed necessary);
- Indoor and outdoor lock-up storage areas;
- Storage for cables, cable drums, ducting and other construction materials including soil and aggregate;
- Storage for machinery, lifting equipment and specialist equipment such as HDD rigs;
- Storage for fuels and bunded generator (portable generator(s) which could run on a 24-hour basis);
- Waste management (associated with Hornsea Three only);
- Security facilities, lighting and fencing; and
- Other items associated with supporting the onshore construction works.

4.1.7.6 In establishing and operating the compound, the principal contractor will:

- Ensure any crossing points over existing local services will be installed in a manner agreed with the asset owner;
- Ensure surface runoff is managed appropriately;
- Ensure any temporary services necessary to support the main construction compound will be installed in a manner agreed with the landowner and service provider;
- Co-ordinate activities with other users and tenants of the airfield to minimise wider disruption;
- Use external lighting only during periods of poor visibility due to weather conditions or low light levels; and
- Use low levels of security lighting where required, i.e. at the perimeter of the site, at the entrance to the site and office facilities~~; and~~
- ~~Use lighting fixtures which are no greater than 4 m in height to minimise light spill~~.

Secondary construction compounds

4.1.7.7 A series of secondary construction compounds may also be required which have been located strategically along the onshore cable corridor. These will operate as support bases for the onshore construction works as the cable work fronts pass through an area. They may house portable offices, welfare facilities, localised stores, as well as acting as a strategic staging post for localised secure storage for equipment and component deliveries.

4.1.7.8 The sites identified are typically currently in agricultural use. The location of these storage areas has been sited away from watercourses and flood zones where possible. Each secondary construction compound will be constructed by laying a geotextile membrane or similar directly on top of the subsoil which will have stone spread over the top of it to a depth of approximately 400 mm (300 mm of 150 mm stone size fine ballast and 100 mm of Type 1 clean stone) (final depth dependant on ground conditions and topography).

4.1.7.9 When in use, all secondary construction compounds will be fenced using bolted fencing or equivalent depending on the use of the compound and on-site security may be deployed. Each secondary construction compound may include:

- Portable offices, briefing and welfare facilities;
- Some localised staff car parking;
- Wheel wash facilities (if deemed necessary);
- Localised indoor and outdoor lock-up storage areas;
- Storage for cables, cable drums, ducting and other construction materials including soil and aggregate required for that section of the cable corridor;
- Localised storage for machinery, lifting equipment and specialist equipment such as HDD rigs;
- Localised storage for fuels and bunded generator (portable generator(s) which could run on a 24-hour basis);
- Waste management (associated with Hornsea Three only);
- Security facilities, lighting and fencing; and
- Other items associated with supporting the onshore construction works in that locality.

4.1.7.10 In establishing the compounds, the principal contractor will:

- Ensure any crossing points over existing local services will be installed in a manner agreed with the asset owner;
- Ensure any temporary services necessary to support the secondary construction compound will be installed in a manner agreed with the landowner and service provider; and
- The compound will include appropriate sediment control and drainage measures to ensure management of surface runoff.

Storage areas

4.1.7.11 Additional storage areas may be required along the onshore cable route. These will operate as areas where some limited storage may be provided in additional to that land provided for along the 80 m temporary corridor. The areas may also be used to store component deliveries, plant and machinery.

4.1.7.12 The sites identified are typically in agricultural use and located in areas that cannot be used by the farmer because the cable installation works temporarily restrict access. When required, topsoil will be cleared and retained onsite. The location of these storage areas has been sited away from watercourses and flood zones where possible. There are two locations where the boundary of the storage area is located within a flood zone associated with nearby rivers. The use and layout of these storage areas will be carefully managed to minimise the risk of contaminants entering the watercourses.

4.1.7.13 In establishing the storage areas, the principal contractor will:

- Ensure any existing local services are suitably protected in a manner agreed with the asset owner; and
- Appropriate drainage and sediment control measures are implemented.

HDD compounds

4.1.7.14 It is envisaged that only the major HDDs (i.e. typically greater than 200 m in length) will require a compound, which will be used to contain the drilling rig, equipment and the drill entry and exit pit. Any structures at the compounds will be no greater than one storey in height, whilst any portable task lighting or security lighting fixtures (used in times of low natural light) would be no greater than 4 m in height and directional to avoid light spill. These compounds have all been provided for within the onshore cable corridor (i.e. within the Order Limits)_and will where possible, be located in areas which reduce interference with farming operations and minimise impacts to residential properties, ecologically sensitive receptors and landowners use of their land. The size of the HDD compounds is dependent on the amount of equipment that is required to construct the crossing, which in turn is primarily governed by the length of the HDD or its complexity.

4.1.7.15 The HDD compounds will be provided with suitable surfacing, typically this will be constructed from stone in a similar way to the haul roads for the main cable laying activities. The compound will be secured by fencing and provided with lockable gates to control access where necessary. Appropriate drainage and sediment control measures will be implemented to control surface run-off from the compound.

4.1.8 Emergency planning and procedures

4.1.8.1 Emergency procedures will be developed by each principal contractor for the onshore elements of Hornsea Three taking into account the anticipated hazards and the conditions at each work site. The procedures will be documented in an Emergency Response Plan and will include emergency pollution control measures (based on Environment Agency guidelines where appropriate), fire and site evacuation, and spill prevention control procedures and instructions to workforce. The Emergency Response Plans will also contain emergency phone numbers and the method of notifying local authorities and statutory authorities. The procedures will be displayed at the work sites and all site staff will be required to follow them.

4.1.9 Pollution incident control

4.1.9.1 The principal contractor will develop and implement appropriate measures to control the risk of pollution due to construction works, materials and extreme weather events. This will include a Pollution Control Plan, which recognises the risk of pollution from construction activities and presents pro-active management practices to ensure that any pollution that may occur is minimised, controlled, reported to the relevant parties and remediated.

4.1.10 Communication plan

4.1.10.1 The Undertaker or principal contractor will implement a proactive approach in communications. Occupiers of nearby properties and relevant planning authorities will be informed in advance of works taking place, (in particular, those affecting PRoW and local roads) including the duration of the works. The means of notification will be confirmed as the communication plan is developed post consent.

4.1.10.2 A complaints procedure will be implemented during the construction process. Complaints will be investigated and where required, mitigation will be implemented. All calls will be logged and the response will be recorded. A framework of the Communications Plan is provided in Appendix A which will be developed post consent when principal contractors are appointed.

4.2 Intertidal

4.2.1 General site layout and good housekeeping

4.2.1.1 Where reasonably practicable, measures will be taken to contain and limit the visual intrusion of the intertidal construction sites. Layout plans of the construction areas showing sensitive areas and buffer zones will be prepared, showing areas where storage of potential pollutants (e.g. fuels, oils and other chemicals) will be avoided.

4.2.1.2 A good housekeeping policy will be applied and construction areas will be kept tidy at all times and, as far as reasonably practicable, will follow the principles outlined in section 4.1.2.2.

4.2.2 Intertidal construction compound

4.2.2.1 A landfall construction compound will be required at the Hornsea Three intertidal area, on the onshore side of the beach, the specifications for which are outlined in volume 1, chapter 3: Project Description of the Environmental Statement (document reference number A6.1.3). The purpose of this compound will be to support the intertidal works and will house the Transition Joint Bays works as well as any HDD or open-cut works, including supporting equipment and facilities. The compound is typically established by and operated by the principal contractor for intertidal works and are limited to the period required for the installation of the intertidal works.

4.2.3 Emergency planning and procedures

4.2.3.1 Emergency procedures will be developed by each principal contractor for the intertidal elements of Hornsea Three taking into account the anticipated hazards and the conditions at each work site. Documented in an Emergency Response Plan, the emergency response will include emergency pollution control measures (based on Environment Agency guidelines where appropriate), fire, site evacuation, and spill prevention control procedures and instructions to workforce. The Emergency Response Plans are to also contain emergency phone numbers and the method of notifying local authorities and statutory authorities. The procedures will be displayed at the work sites and all site staff will be required to follow them.

4.2.4 Pollution incident control

4.2.4.1 The principal contractor will develop and implement appropriate measures to control the risk of pollution due to construction works, materials and extreme weather events. This will include a Pollution Control Plan, which recognises the risk of pollution from construction activities and presents pro-active management practices to ensure that any pollution that may occur is minimised, controlled, reported to the relevant parties and remediated.

4.2.5 Communication plan

4.2.5.1 The Undertaker or principal contractor will implement a proactive approach in communications. Occupiers of nearby properties and relevant planning authorities will be informed in advance of works taking place, (in particular, those affecting PRoW and local roads) including the duration of the works. The means of notification will be confirmed as the communication plan is developed post consent.

4.2.5.2 A complaints procedure will be implemented during the construction process. Complaints will be investigated and where required, mitigation will be implemented. All calls will be logged and the response will be recorded. A framework of the Communications Plan is provided in Appendix A which will be developed post consent when principal contractors are appointed.

5. Roles and Responsibilities

5.1 Project team

5.1.1.1 Whilst the key roles for the construction project team will not be assigned until post consent, the environmental roles required to implement the Outline CoCP are set out below:

5.1.2 Site Manager

5.1.2.1 The Site Manager will be responsible for maintaining the CoCP document and systems as a working document; ensuring environmental standards are adhered to and monitoring compliance during construction; carrying out regular monitoring and inspections of construction work activities; and undertaking staff induction courses on environmental issues.

5.1.3 Environmental Co-ordinator

5.1.3.1 The Environmental Co-ordinator will be responsible for the interface between the environmental specialists and engineers. They will have the primary responsibility for managing environmental issues through the construction and post-construction monitoring and for obtaining the relevant licences and consents.

5.1.4 Clerk of Works

5.1.4.1 The Clerk of Woks will be the site representative and would be responsible for overseeing construction activities to ensure all environmental commitments are met and compliance with the conditions of all licences and permits.

5.1.5 Ecological Clerk of Works

5.1.5.1 The Ecological Clerk of Works (ECoW) would report on ecological matters and would be responsible for undertaking preconstruction surveys and monitoring.

5.1.6 Agricultural Liaison Officer

5.1.6.1 The Agricultural Liaison Officer (ALO) will be responsible for ongoing engagement with landowners and their agents during the construction process and will be the first point of contact.

6. Management of Onshore Environmental Issues

6.1 Traffic management

Objectives

6.1.1.1 To carry out construction works in such a way that maintains highway safety and avoids or minimises adverse effects on local communities and highway users.

Highway management measures

6.1.1.2 Prior to the commencement of material traffic movements, such as the construction of the haul road or ground movements at the HVAC booster station and HVDC converter/HVAC substation areas, a Construction Traffic Management Plan (CTMP) for the construction of the onshore elements of Hornsea Three will be prepared in consultation with the relevant Local Planning Authority, Local Highway Authority and Highways England. An Outline CTMP (document reference A8.2) and an Outline CoCP (document reference A8.5), which establish the principles that any subsequent CTMPs and CoCPs will follow are submitted with this application. The purpose of the CTMP is to document measures to manage construction traffic in accordance with the wider principles established in this Outline CoCP. Construction traffic management measures may be documented in a single plan for all onshore works or multiple plans for different sections of works as they extend across each local authority area.

6.1.1.3 The CTMP will document the following where relevant:

- HGV routing from the principal 'A' road network to construction accesses off the public highway;
- Route signage (if required), route timing and forecast vehicle movement estimates;
- Localised mitigation measures where necessary (e.g. temporary pedestrian crossings, traffic control measures);
- Details of any localised restrictions in vehicle movements (e.g. localised route restriction locations, localised restricted delivery timings or introduction of temporary speed limits);
- Scope of pre-commencement and post construction surveys of minor links;
- Location of supporting infrastructure (e.g. wheel wash facilities, welfare facilities etc.);
- Traffic management measures associated with temporary construction compounds and associated facilities;
- Pedestrian crossing opportunities where routes have the potential for severance;
- The preferred route, route timing and method of transport for abnormal indivisible loads; and
- Emergency planning.

Accesses for HGV construction traffic

6.1.1.4 The HGV routing will seek to maximise use of the 'A' road network, making use of 'B' roads and minor roads where required. The preferred construction traffic routing may vary depending on the season the works are being carried out, for example, in the summer months the agreed routing may seek to avoid tourist routes.

6.1.1.5 The CTMP will ensure that all construction traffic follows pre-prescribed routing, to avoid impacts on the wider network and conflicts with local users, however some larger vehicles, such as cable drum deliveries may need to follow specially advised routes to avoid low bridges. The CTMP is to ensure that HGVs delivery times are managed in accordance with approved Section 4.1.1 Working Hours.

6.1.1.6 The CTMP(s) will also document any localised traffic management measures including temporary speed restrictions, or the installation of one-way traffic control systems through narrow highways. The Undertaker acknowledges that certain restrictions may be applied by the Local Highway Authority to avoid congested or sensitive locations.

6.1.1.7 All delivery contractors and construction staff will be instructed to use the construction accesses in compliance with the CTMP for all stages of the onshore works by way of a condition of supply contracts.

6.1.1.8 If deemed necessary by the relevant local highway authority, where routine HGV vehicle movements are generated, e.g. haul road aggregate, the supplier will be requested to maintain a log, the purpose of which is demonstrate compliance with following prescribed accesses off the A road network and delivery times in accordance with this Outline CoCP (or any other agreed variances).

6.1.1.9 If deemed necessary by the relevant local highway authority, construction accesses will have temporary signs posted along the confirmed routes. Temporary signs are to be installed prior to the commencement of HGV traffic generating works.

6.1.1.10 The design of HGV accesses, including visibility standards and, where necessary, temporary speed restrictions on the adjacent highway, will be agreed with the relevant highway authority.

6.1.1.11 Where multiple accesses use a common road to site, signage will be clearly distinguishable between accesses. Signage can also be placed at the exit of construction site accesses to instruct construction traffic to follow the designated route.

6.1.1.12 In requesting the installation of temporary route signage, as owner of existing road signage, it is deemed that the relevant highway authority authorise the temporary installation of temporary route signage on their asset.

Highway safety and reduced movements

6.1.1.13 All new HGV accesses will be designed and constructed to meet appropriate visibility and other highway standards, and if appropriate will be implemented alongside temporary traffic management measures such as reduced highway speeds.

6.1.1.14 Localised management of vehicle movements will be considered where there is a risk of vehicles meeting each other on narrow sections.

6.1.1.15 HGV movements, accidents and near misses will be monitored to identify whether there are any safety deficiencies in the highway that could be worsened because of the increased level of HGV traffic associated with the construction works. If localised mitigation measures are required, these will be agreed with the Local Highway Authority and incorporated into the appropriate CTMP.

6.1.1.16 Where possible, overall vehicle movement generation will be minimised through measures to encourage and promote sustainable travel and transport.

6.1.1.17 Monitor load sizes and vehicle usage and, where possible, load consolidation and delivery to construction sites using alternative vehicles. Encourage the re-use of HGVs wherever possible, such as backloading. Where practical, local suppliers will be used to minimise the distance travelled by HGVs.

Highway condition surveys (minor links)

6.1.1.18 Video condition surveys will be undertaken before HGVs make use of a section of road and after the substantial completion of works on minor links used by HGVs to access the Hornsea Three onshore cable corridor. Damage to the highway caused by the passage of construction vehicles will be repaired or an appropriate financial contribution made to the asset owner. The roads to be surveyed will be agreed with the Local Highway Authority as part of the final CTMPs, this agreement will be in accordance with requirements under Section 59 of the Highways Act 1980.

Site access design

6.1.1.19 Prior to making use of each access for material vehicle movements, the contractor must advise the local Highway Authority of the following:

- Any temporary works;
- Assessment of visibility splays at the access and any mitigation required, including any localised traffic control measures such as deployment of banksmen, temporary reductions in speed limit or temporary traffic lights; and
- Details of extent of pruning, coppicing or felling of vegetation to facilitate visibility splays.

6.1.1.20 Each site access will comply with the following general principles:

- Have sufficient areas available at all times for all vehicles to enter and exit in a forward gear;
- To be accepted into the works area directly without waiting on the highway;
- Suitable surface finish;

- Suitable fluming arrangements for any ditches at the side of the road; and
- Provide for road-sweeping activity in vicinity of the access.

Road crossings

6.1.1.21 The onshore cable route crosses public roads at several locations, requiring works in the highway and/or construction traffic movements to cross the public highway.

6.1.1.22 Where works are required in the highway, traffic management measures will be agreed with the Local Highway Authority prior to implementation. The works should minimise delays to existing highway users and maintain highway safety.

6.1.1.23 Where works break out on to the existing highway network, the original highway will be reinstated after construction work is completed.

6.1.1.24 Each crossing point will comply with the following general principles:

- Ensure visibility is suitable; and
- Deploy localised traffic control measures such as deployment of banksmen, temporary reductions in speed limit or temporary traffic lights as required.

Public Rights of Way and pedestrian access

6.1.1.25 The contractor, where reasonably practicable and where safe to do so will maintain access for pedestrians and other non-motorised users along the public highway and along any PRoWs or bridleways. PRoWs are discussed in more detail in section 6.8.

Abnormal loads

6.1.1.26 It is expected that several abnormal indivisible loads comprising large components such as transformers will be transported to the HVAC booster station and HVDC converter/HVAC substation site and potentially (larger cable drums) to the onshore cable corridor. The haulage contractor appointed to undertake this work will be required to comply with statutory regulations in terms of consulting with Highways England, police and Local Highway Authorities. The notification requirements differ depending on the weight, length and width of the abnormal indivisible load.

6.1.1.27 The timing of abnormal indivisible loads will be discussed with the relevant highways authorities to minimise delay for other road users and to minimise risk to highway users. The timing of abnormal indivisible load deliveries to the HVDC converter/HVAC substation will be discussed to ensure that there is no adverse impact on the access road in terms of delays to vehicles using the site.

6.1.1.28 The routeing of abnormal indivisible load deliveries will be agreed with the relevant highway authorities. The delivery of abnormal indivisible loads would typically be undertaken in convoy and under escort. Where abnormal loads require the full width of the carriageway or for unusual manoeuvres at junctions, appropriate temporary road closures and traffic management will be put in place as appropriate to maintain the safety of other road users. Access for emergency vehicles will be maintained at all times during the delivery of abnormal indivisible loads.

6.1.1.29 The following further mitigation measures may be deployed by the principal contractor:

- Removal and reinstatement of street furniture;
- The lopping or pruning of trees and overhanging vegetation; and
- Protection for services as required along the route.

Localised HDD compound management

6.1.1.30 For trenchless crossings, the drilling/auguring compound is anticipated to receive a greater number of HGV movements than that receiving compound. Wherever practical, the drilling/auguring direction will be set to minimise the number of HGV movements needing to pass any sensitive receptors.

Vehicle breakdowns and emergency events

6.1.1.31 The principal contractor will identify a local recovery service(s) which will be used in the event of a contractor vehicle breakdown.

6.1.1.32 In the event of major incident in the local area that requires good accessibility along the road network, or in the event or road closures following an incident, the emergency services can direct construction vehicles to make use of alternative routes. In certain circumstances the emergency services may wish to restrict the volume of traffic on the road network. Under such circumstances, the construction contractor can be instructed to temporarily delay or cancel deliveries to reduce the burden on the wider highway network.

Coordination with other developments

6.1.1.33 The Undertaker will liaise with the Local Highway Authority and other major projects (such as works associated with A47 duelling or onshore grid connection works associated with Vattenfall projects Vanguard and Boreas).

6.2 Noise and vibration

Objectives

6.2.1.1 To control and limit noise and vibration levels, so far as is reasonably practicable, to minimise disturbance to sensitive receptors.

Management measures

6.2.1.2 This Outline CoCP recognises that construction activity by its very nature can generate adverse noise and vibration impacts on stakeholders located near the development site. Most onshore works are in rural areas where background noise levels are likely to be low. The objective will be to control and limit noise and vibration levels, so far as is reasonably practicable and to minimise disturbance to sensitive receptors.

6.2.1.3 To manage noise generating construction activities, all works will be carried out in accordance with the following principles:

- Construction works will be undertaken in accordance with the best practicable means (as defined in Section 72 of the Control of Pollution Act 1974), to minimise noise and vibration effects. Noise control measures will be consistent with the recommendations of the current version of BS 5228 'Code of Practice for Noise and Vibration Control on Construction and Open Sites' - Part 1: Noise and Part 2: Vibration' (BS 5228-1:2009+A1:2014 and 2009);
- Best Practicable Means (e.g. the use of quieter alternative methods, plant and/or equipment, where reasonably practicable, the use of site hoardings, enclosures, portable screens and/or screening nosier items of plant, where reasonably practicable; maintaining and operating all vehicles, plant and equipment in an appropriate manner, to ensure that extraneous noise from mechanical vibration is kept to a minimum);
- Construction noise management measures for specific construction activities will be agreed with relevant local authorities prior to the start of construction and added to the CoCP.
- Mitigation will be developed during the detailed design stage of the onshore HVDC converter/HVAC substation to achieve a noise rating level not exceeding 34 dB $L_{Ar,Tr}$ at any surrounding residential Noise and Vibration Sensitive Receptor or such other noise limit as is approved in the Noise Management Plan submitted pursuant to Requirement 21 of the DCO.
- Where the use of generators is proposed, mitigation measures would be put in place to minimise noise impacts. Such measures may include:
    - The selection of generators with low noise emissions;
    - The location of generators away from sensitive receptors; and
    - Localised noise screening.

6.3 Air quality and health

Objectives

6.3.1.1 To minimise the generation of dusts near sensitive receptors during construction and to facilitate community engagement and a proactive approach to complaints regarding nuisance dusts.

General measures

6.3.1.2 The principal contractor will:

- Inform site personnel about the need to minimise dust as well as about the health hazards of exposure to excessive dust. Their training will include advice relating to the commitments made in the CoCP.

Preparing and maintaining the site

6.3.1.3 In minimising the generation of nuisance dusts near sensitive receptors during construction the contractor will consider:

- The site layout, seeking to locate machinery and dust generating activities away from sensitive receptors, as far as possible;
- Installation of solid screens or barriers around dust generating activities, with any screens being at least as high as any stockpiles on site;
- Consideration of enclosures where dust generating activities may be undertaken over extended periods;
- Implementing site management measures to provide for dust-generating materials to be removed from site as soon as possible, unless being re-used on site. If they are being re-used on site, the stockpiles will be covered, seeded or fenced to prevent wind whipping;
- Where appropriate, consideration of dust suppression methods for certain activities;
- Bonfires and burning of waste on site will not be permitted;
- Site fencing, barriers and scaffolding will be kept clean; and
- Avoiding site runoff of water or mud.

Construction operations

- Cutting, grinding, sawing and excavation equipment will be fitted with or used in conjunction with suitable dust suppression techniques (such as water sprays or local extraction);
- Adequate water supply will be made available to enable effective dust/particulate matter suppression. Non-potable water will be used where possible and appropriate;
- Enclosed chutes, conveyors and covered skips will be used where practicable;
- Drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment will be minimised and fine water sprays on such equipment where appropriate; and
- Equipment to clean any dry spillages will be readily available. Spillages will be cleaned up as soon as reasonably practicable after the event using wet cleaning methods.

Earthworks

- Earthworks and exposed areas/soil stockpiles will be re-vegetated as soon as practicable. Hessian or mulches will be used where it is not possible to re-vegetate or cover topsoil as soon as practicable. Cover will be removed only in small areas during work and not all at once;
- Sand and other aggregates will be stored in bunded areas and will not be allowed to dry out unless this is required for a particular process, in which case appropriate additional control will be put in place;
- Bulk cement and other fine powder materials will be delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery;
- Roughening up of concrete surfaces (scabbling) will be avoided;
- Where feasible, vehicles entering and leaving the site will be covered to prevent escape of materials during transport;
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as practicable;
- Record all inspections of haul routes and any subsequent action in a site log book;
- Provide for regularly damped down haul road in the event of dust generation;
- Dry sweeping of large areas will be avoided; and
- Where possible, dust generating activities will be programmed to avoid prolonged dry or windy weather conditions.

Operating machinery and site vehicles

- Vehicle engines will be switched off when stationary;
- Where feasible, mains electricity or battery powered equipment will be used instead of diesel or petrol powered equipment/generators;
- Speed limits will be imposed for construction vehicles along haul roads and work areas. Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided);
- Water-assisted dust sweeper(s) will be used on the accesses and adjacent local roads to remove, as soon as practicable, any material tracked out of the site;
- At main construction compounds, wheel washing system (with rumble grids to dislodge accumulated dust and mud) will be implemented. An adequate area of hard standing will be provided between the wheel wash facility and the site exit, wherever site size and layout permits;
- Where surfaced haul routes are installed, regularly damp down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned;
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits; and
- Access gates to be located at least 10 m or more from receptors where possible.

Site management and monitoring

- Record all dust and air quality complaints, identify cause(s), take any appropriate measures to reduce emissions in a timely manner, and record the measures taken. Make the complaints log available to the relevant Local Planning Authority on request;
- Record all inspections of haul routes and any subsequent action in a site log book;
- Exceptional incidents that cause dust and/or air emissions either on- or off-site will be recorded in the log book together with the action taken to resolve the situation. Liaison with any other high-risk construction sites within 500 m of the site boundary to ensure that plans are co-ordinated and that dust/particulate matter emissions are minimised;
- Where dust activities are being undertaken, to undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the Local Planning Authority on request; and
- When activities with a high potential to produce, dust are being carried out and during prolonged dry or windy conditions increase the frequency of inspections.

Communication of air quality management

6.3.1.4 The name and contact details of person(s) accountable for air quality management on the site (typically CoW or site manager) will be posted on an information board at a local site access. The principal contractor should also seek to post contact details of the CoW or site manager details at crossing points with PRoW (when works are occurring in the locality) or other areas where the public may pass the 'front door' of the work front.

6.3.1.5 It is also anticipated that the proposed development will be part of the CCS (see paragraph 1.3.3.3), which includes dust control measures.

6.4 Protection of the surface water environment

Objectives

6.4.1.1 To minimise the risk of surface water flooding during the construction phase, to prevent pollution of surface watercourses and to minimise the impact on local surface water features.

Management measures

Surface water drainage scheme

6.4.1.2 The proposed development of the onshore HVDC converter/HVAC substation and HVAC booster station will result in the construction of low permeability surfacing, increasing the rate of surface water run-off from the site. A surface water drainage scheme is required to ensure the existing run-off rates to the surrounding water environment are maintained at pre-development rates.

6.4.1.3 The detailed design of the surface water drainage scheme would be based on a series of infiltration/soakaway tests carried out on site and the attenuation volumes outlined in supporting Flood Risk Assessments (FRAs) (volume 6, annex 2.1: Onshore Infrastructure FRAs). The tests will be undertaken prior to construction and in accordance with the BRE Digest 365 Guidelines. Measures to avoid or minimise sediment and potential contaminants from entering surface water will be designed to accommodate 1 in 100 year plus climate change worst case storm events.

6.4.1.4 The strategy will ensure that the current mean annual run-off rate at the onshore HVDC converter/HVAC substation and HVAC booster station is maintained at the current 1 in 1 year run-off rate, and is monitored to ensure that the agreed rate of discharge is maintained.

6.4.1.5 Measures to mitigate against water pollution will also apply to the onshore HVDC converter/HVAC substation and HVAC booster station, and will include measures as set out for the Hornsea Three onshore cable corridor route below to minimise the risk of water pollution.

Flood control measures

6.4.1.6 Cable trenching and construction site access widening across surface water courses will require measures to ensure that the water quality and flow rates are unaffected either directly or indirectly.

6.4.1.7 The Hornsea Three onshore cable corridor and the construction site accesses will be designed to minimise land take and to avoid, where possible, impacts on existing drainage networks and features.

6.4.1.8 The onshore construction compounds and construction access and haul roads will comprise permeable gravel overlying a permeable geotextile membrane of an appropriate standard.

6.4.1.9 Where the Hornsea Three onshore cable corridor crosses smaller watercourses and land drainage ditches measures would be discussed and agreed with the relevant stakeholders (e.g. for temporary culvert crossings, appropriately sized flume pipes, equal to or greater than the diameter of the flume upstream and to an agreed length, will be placed on or below the hard bed of the watercourse) taking into consideration any agreements with, or representations made by, the relevant landowner.

6.4.1.10 An outline watercourse crossing method statement for open cut and HDD crossing techniques is contained within Appendix B of this Outline CoCP. These method statements will be developed in consultation with the Environment Agency. The detailed method statement for Blackwater Drain (near Booton Common) will be developed in consultation with the Environment Agency and Natural England.

6.4.1.11 Cable entry and exit points within transition pits, junction bays and link boxes will be sealed with an appropriate water proofing material to mitigate flood risk.

6.4.1.12 Drainage would be installed either side of the Hornsea Three onshore cable corridor to ensure existing land drainage flow is maintained and is not altered and channelled by the cable corridor.

6.4.1.13 Surface water flowing into the trenches during the construction period will be pumped via settling tanks or ponds or using other agreed filtration methodology (e.g. straw bales or filtration sock) to remove sediment and potential contaminants, before being discharged into local ditches or drains via temporary interceptor drains. Where gradients on site are significant, cable trenches will include a hydraulic brake (bentonite or natural clay seals) to reduce flow along trenches and hence reduce local erosion.

6.4.1.14 Any field drainage intercepted during the cable installation will either be reinstated following the installation of the cable or diverted to a secondary channel. Any works undertaken will be in agreement with the appropriate stakeholders taking into consideration any agreements with, or representations made by, the relevant landowner.

Pollution prevention measures

6.4.1.15 To minimise the potential for bentonite break-out to occur, the design of each HDD crossing of a watercourse will follow the principles of the bentonite break-out plan. An outline plan is included in Appendix C of this Outline CoCP and will be updated as required during detailed design in consultation with the Environment Agency.

6.4.1.16 Refuelling of machinery will be undertaken within designated areas where spillages can be easily contained. Machinery will be routinely checked to ensure it is in good working condition. Any tanks and associated pipe work containing oils and fuels will be double skinned and be provided with intermediate leak detection equipment.

6.4.1.17 The following specific mitigation measures for the protection of surface water during construction activities will be implemented:

- Management of construction works to comply with the necessary standards and consent conditions as identified by the Environment Agency;
- A briefing highlighting the importance of water quality, the location of watercourses and pollution prevention included within the site induction;
- Areas with prevalent run-off to be identified and drainage actively managed (e.g. through bunding and/or temporary drainage);
- Vegetated strip to be left adjacent to the watercourse during construction;
- Bankside vegetation will be reinstated following the construction phase:
- Areas at risk of spillage, such as vehicle maintenance areas and hazardous substance stores (including fuel, oils and chemicals) to be bunded and carefully sited to minimise the risk of hazardous substances entering the drainage system or the local watercourses;
- Additionally, the bunded areas will have impermeable bases to limit the potential for migration of contaminants into groundwater following any leakage/spillage. Bunds used to store fuel, oil etc. to have a 110% capacity;
- Disturbance to areas close to watercourses reduced to the minimum necessary for the work;
- Excavated material to be placed in such a way as to avoid any disturbance of areas near to the banks of watercourses and any spillage into the watercourses;

- Construction materials to be handled and stored in such a way as to effectively minimise the risk posed to the aquatic environment;
- Where possible, less toxic alternative materials will be used, particularly for works close to watercourses;
- All plant machinery and vehicles to be maintained in a good condition to reduce the risk of fuel leaks;
- Drainage works to be constructed to relevant statutory guidance and approved via the Lead Local Flood Authority (LLFA) prior to the commencement of construction; and
- Consultation with the Environment Agency and Natural England to be ongoing throughout the construction period to promote best practice and to implement proposed mitigation measures.

6.5 Onshore ecology and nature conservation

Objectives

6.5.1.1 To minimise the impact of construction works on protected species and designated sites and to minimise the loss of nature conservation features such as hedgerows and mature trees.

Management measures

6.5.1.2 An EMP will be submitted to and approved by the relevant Local Planning Authority prior to commencing works in that authority. The Plan will be based on the principles of the Outline EMP (document reference A8.6) as submitted with the DCO Application.

General

6.5.1.3 An ECoW will be appointed by the principal contractor to oversee enabling works and construction where necessary. The ECoW will be a suitably experienced professional ecologist. The ECoW will review results of protected species surveys prior to the commencement of works in different areas and will contribute to the preparation of crossing method statements where they could impact on sensitive environmental features such as a watercourse.

6.5.1.4 To minimise disturbance of various species, including those detailed below, vehicle speeds will be restricted within the working corridor.

6.5.1.5 To minimise impacts on soil structure and ecology, topsoil and subsoil heaps will be located at adequate distances to ensure the protection of the retained soils.

6.5.1.6 Night working will be avoided where practicable. Where night working is unavoidable, light fixtures will be directed away from habitat of value to protected or otherwise notable species including badgers, birds and bats, to minimise likely disturbance effects of light spillage. Lighting will be kept to an absolute practicable minimum where located nearby to any active badger setts. Construction lighting in the vicinity of bat roosts and hedgerows where high or very high levels of bat activity have been recorded will follow best practice guidelines produced by the Bat Conservation Trust (Bat Conservation Trust, 2011).

Biosecurity

6.5.1.7 A biosecurity protocol will be implemented to minimise risk of spreading invasive species (see Appendix D). The main risks are associated with transfer of aquatic plants or animals (including vectors for disease) between watercourses or waterbodies. The majority of watercourse crossings are being undertaken using HDD, and no ponds are directly affected but where working in or near water, control measures will be implemented. These will include:

- Ensuring vehicle tyres and wheel arches are cleared of mud, plants and other organic material before moving from one watercourse to another;
- Leaving removed material on site; and
- Cleaning boots and disinfecting (away from waterbodies to prevent potential pollutant incidents) all equipment that might come into contact with water.

Invasive species

6.5.1.8 Appropriate measures will also be adopted when working in the vicinity of invasive terrestrial plants and injurious weeds. Where necessary, works will be supervised by the ECoW. Known locations of invasive plant species will be marked on site and vehicle movements restricted in the vicinity of these locations. Any spoil containing or likely to contain invasive plant material to be stored separately from non-contaminated spoil, and treated as appropriate, with control measures adopted.

6.5.1.9 Appropriate measures will also be taken against invasive, non-native animal species and the relevant bodies will be notified of their location.

Protective buffer zones

6.5.1.10 Works-free protective buffer zones will be established around retained habitats of ecology and nature conservation concern, namely woodland, mature broadleaved trees and ponds, as well as sections of watercourses that will not be crossed by open-cut trenching. These buffer zones will be maintained throughout the works period.

6.5.1.11 Buffer zones surrounding retained areas of woodland and mature broadleaved trees will be at least approximately 15 m in width, as advised by an appropriately qualified surveyor. Root protection zones around hedgerows will be assessed by the ECoW. Buffer zones surrounding ponds and watercourses will be at least 8 m in width, or 10 m in width for main watercourses; approvals will be obtained as necessary for works closer to channels and main watercourses managed by Drainage Boards (DBs), LLFAs and the Environment Agency.

6.5.1.12 All buffer zones will prohibit the tracking of heavy vehicles, and the storage and refuelling of vehicles, machinery, equipment and soils. All protective buffer zones will be maintained throughout the construction phase. The ECoW will regularly (at least once every two weeks) monitor adherence to the requirements of the buffer zones and will maintain a record of all site checks undertaken and findings.

Trees and hedgerows

6.5.1.13 Where individual mature trees are to be felled, sections of dead or decaying wood will be soft-felled (felled in sections) and, where practicable, will be relocated to suitable locations as near to the source tree as practicable, as instructed by the ECoW (i.e. within areas of similar environmental conditions, particularly regarding shade and ground water-levels, and in locations that will not obstruct the reinstatement of previous land management practices).

6.5.1.14 The length of individual hedgerow sections to be removed will be reduced as far as reasonably practicable. In this regard, where an HDD with a haul road, or HDD with ducting laydown is proposed, the exact location of the haul road/ducting laydown within the Order Limits would be optimised through agreement with a suitably qualified ecologist to further minimise hedgerow and tree removal.

6.5.1.15 All sections of hedgerow removed to enable construction of the onshore cable corridor, will be replanted as soon as practicable after cable installation, regarding appropriate planting months. Replacement planting will comprise native shallow-rooting hedgerow species typical of the area. To prevent future root damage to cables, no hedgerow trees will be planted along the Hornsea Three onshore cable corridor. In addition, enhancement planting to improve connectivity and/or native species diversity will be considered on a case by case basis along the Hornsea Three onshore cable corridor. Enhancement planting will include the planting of native hedgerow trees, typical of the area, at a suitable distance from the cable route.

6.5.1.16 A replanting programme to compensate for habitat lost and provide screening will be considered at the proposed onshore HVAC booster station and HVDC converter/HVAC substation sites in conjunction with mitigation measures considered as part of the landscape and visual impact assessment.

6.5.1.17 Planting and management of any reinstated areas will be undertaken in accordance with an Outline EMP (document reference A8.6). Detailed landscaping proposals will be developed in an accordance with the Outline Landscape Management Plan (document reference A8.7). Planting will be undertaken as soon as practicable and once it could be confirmed that works will not significantly and adversely affect new planting. Where required, newly planted hedgerows will be protected by adequate fencing until the hedgerow has become established.

Amphibians and reptiles

6.5.1.18 To minimise the potential impacts on Great Crested Newts, where it is considered necessary by the ECoW, or required under a European Protected Species (EPS) licence obtained from Natural England, amphibian exclusion and drift fencing will be installed along the outer edges of works areas within proximity of a Great Crested Newt pond. In addition, to take account of the metapopulation dynamics of the species, the exclusion fencing will be extended to segregate any other nearby ponds which are located within 250 m of a Great Crested Newt pond and which also fall within 250 m of the working corridor, provided there are no significant barriers to dispersal between these ponds and the working corridor (e.g. major roads or rivers). The option of securing a licence via provision of localised habitat enhancements, in line with recent additional options within the licensing system, would also be explored.

6.5.1.19 To minimise the potential impacts on reptiles, progressive and careful habitat clearance works such as the gradual strimming of above-ground vegetation such as brambles, rough grass and scrub, will be undertaken in line with section 4.3.3 of the Outline Ecological Management Plan ~~select areas prior to construction, to deter reptiles from the working area where alternative habitat is available to them.~~

6.5.1.20 Uprooting of vegetation or habitat management will involve the clearance of ground cover in order to create unfavourable conditions. If habitat is cleared during the reptile hibernation period (which is typically between November and February inclusive, dependent on local weather conditions and this period will be assessed by the ECoW), trees and scrub will be cut using brushcutters or chainsaws, to a height of approximately 30 cm above ground-level, so as to minimise the potential for disturbance to root balls where hibernating reptiles may be located.

Water voles

6.5.1.21 Considering the mobile nature of water voles, pre-construction surveys will be undertaken to confirm the presence/absence of water voles along all watercourses of potential value to water voles.

6.5.1.22 Where HDD installation is to be undertaken beneath watercourses supporting water voles, consideration will be given to the location of launch pits and their relationship to watercourses. Works-free buffer zones will be established around sections of the watercourses that support water voles. Buffer zones will prohibit the tracking of heavy vehicles and storage of vehicles, machinery, equipment and soils and should be a minimum width of 15 m.

6.5.1.23 Open cut trenching across watercourses known to support water voles (if required) will be undertaken in consultation with Natural England. Where considered necessary by the ECoW, high visibility fencing will be erected between the drains and the works areas to prevent access by workers and heavy machinery, and to prevent storage of equipment or materials within this zone. To prevent water voles from becoming trapped in the HDD installation pits, exclusion fencing will be installed around HDD installation pits where considered necessary by the ECoW.

6.5.1.24 Where water vole activity has been/is recorded along watercourses to be crossed by open cut installation, construction and installation works will be carried out in accordance with a detailed crossing method statement, within which will include measures to protect water voles from significant disturbance.

6.5.1.25 Crossing method statements will include pre-construction measures to deter water voles from the working corridor and an adequate buffer zone (i.e. up to 15 m where favourable habitat is present). Measures could potentially include:

- Removal of vegetation from channel and bank-side vegetative cover (up to a minimum of 1.5 m inland from the top of the bank) between mid-February and early April;
- The potential capture and translocation of water voles from working areas by an appropriately qualified and experienced ecologist;

- A destructive search of water vole burrows within the working corridor under the watching brief of an appropriately qualified and experienced ecologist; and
- Measures to protect adjacent sections of the watercourse, which will not be directly impacted by trenching, such as marking out on the ground the boundary of the Hornsea Three onshore cable corridor, to control the movement of personnel and vehicles.

6.5.1.26 Works will be conducted in accordance with Natural England guidance, which states that "for summer works, vegetation removal should be carried out for a two-week period prior to development. Winter works should either carry out the mitigation in September and maintain unsuitable habitat until the works commence, or in the event of an emergency, trapping and vole proof fencing may have to be employed" (English Nature, 2001). Works will also consider best practice guidelines published in Strachan et al. (2011).

Otters

6.5.1.27 In addition to measures to minimise the potential for pollution incidents, HDD installation pits, other excavations and ducts will be covered overnight to prevent otters entering the areas, or a method of escape (such as a plank to act as a ladder) will be provided where such excavations cannot be covered or filled on a nightly basis.

6.5.1.28 HDD installation launch pits will be located at a minimum distance from known otter holts, and construction compounds and storage areas will be located a minimum distance from any otter holts. Works-free buffer zones will be set up around the holt and any other identified resting place, within which no tracking of heavy machinery, or storage of equipment, machinery or soils will be permitted.

6.5.1.29 If night time works take place, lighting will be focussed on the works areas and away from watercourses of potential value to otters. Lighting will be kept to a minimum where it might affect holts or other identified resting places.

6.5.1.30 Vehicle speeds will be limited whilst on site to minimise the potential for animals to be injured by vehicles.

6.5.1.31 Where considered necessary by the ECoW, high visibility fencing will be erected around works-free zones. No below-ground destructive works, or tracking of heavy machinery will be undertaken within a minimum distance from known otter holts.

6.5.1.32 If pre-construction otter surveys report the presence of a previously unidentified otter holt or resting place within the Hornsea Three onshore cable corridor or works areas, or close enough to result in the potential disturbance of otters and if re-routing or amendments to the location of working areas are not practicable, it may be necessary to remove a holt or resting site or exclude otters from works areas using temporary otter fencing.

6.5.1.33 An EPS licence for otters obtained from Natural England will be required to remove an otter holt or resting place, and may be required if works will result in disturbance and/or displacement. Advice will be sought from an experienced otter ecologist and Natural England as to the requirement for an EPS licence, prior to the commencement of works.

6.5.1.34 Where HDD installation is to be undertaken beneath watercourses supporting otters, consideration will be given to the location of launch pits and their relationship to watercourses. Works-free buffer zones will be established around sections of the watercourses that support otters. Buffer zones will prohibit the tracking of heavy vehicles and storage of vehicles, machinery, equipment and soils.

Badgers

6.5.1.35 In addition to the above-mentioned measures, including those to control vehicle speeds and minimise the likely impacts of light spillage, no construction works will be carried out within minimum distances of an active sett entrance. Works within 30 m of a badger sett entrance may require a Natural England licence for badgers. Protection zones will be marked out on site, such as with high-visibility fencing or coloured tape and areas of high badger activity will be cordoned off to ensure these are kept fully intact and with minimal interference from construction. Excavations more than 0.5 m deep will be fenced or covered overnight where practicable, or if this is not practicable, a method of escape (e.g. a plank to act as a ladder) will be provided. In addition, large diameter pipes will be capped at the end of each working day to reduce the potential for badgers and other animals to enter them and become trapped.

6.5.1.36 If work is undertaken within minimum distances of a sett and therefore, sett closure or disturbance cannot be avoided, this will need to be carried out outside the badger breeding season (defined as 30 November to 1st July) and in accordance with a Natural England approved crossing method statement and where relevant a Natural England licence for badgers.

6.5.1.37 HDD installation launch pits will be located minimum distances from active badger setts, or a Natural England licence for badgers may be required prior to the commencement of works, as considered necessary by an experienced badger ecologist.

6.5.1.38 Toolbox talks on badgers will be provided by the ECoW to all construction staff on site and an emergency procedure protocol will be given to contractors in the event of encountering a badger or discovering a sett. If new setts are identified within minimum distances of the Hornsea Three onshore cable corridor, or in the areas around the HDD installation launch sites, micro siting away from the setts will be undertaken where practicable within the consented boundary of development, or a Natural England licence for badgers may be required before works continue.

Bats

6.5.1.39 In addition to measures described above to minimise the impacts of pollutants, including airborne pollutants and light spillage, additional measures to ensure works do not result in disturbance of bats include:

- The creation of a minimum buffer zone between cable trenches and any bat roosts identified during surveys;
- If the surveys, or subsequent surveys identify the presence of additional bat tree roosts which will require removal to enable installation of the cable, this will be carried out under an EPS licence for bats obtained from Natural England; and
- Use of temporary 'artificial bridges' to provide a link between severed edges of hedgerows and other habitat crossed by the Hornsea Three onshore cable corridor, which have been identified as key commuting/foraging routes, and where a length of 10 m or greater of hedgerow will be removed. The artificial bridges will be retained in situ throughout the construction period and until replacement planting has established and developed sufficiently to create a continuous connecting habitat. The bridges will be put into place at the end of each working day and will be retained in situ during the day when not working in the area.

Wintering birds

~~A.1.1.16~~6.5.1.40 If construction work on functionally linked sugar beet fields is likely to take place between November and January inclusive, a pink-footed goose mitigation (PFG) plan will be formulated, discussed with and submitted to Natural England for approval in the 12 months ~~prior to construction There would be two steps to the plan:~~ preceding the commencement of construction. ~~The final version of this document will have as an appendix the approved Pink-footed Goose mitigation plan.~~ This will include a decision tree process in line with adaptive management principles, which will determine triggers for appropriate levels of mitigation (i.e. ECoW watching brief, toolbox talks for contractors, restricting more intrusive works in certain locations) The final version of the CoCP approved pursuant to Requirement 17 of the dDCO will have as an appendix the approved PFG mitigation plan and will also incorporate any restrictions on works scheduling necessary as a result of the agreed mitigation. The plan would incorporate the following:

- ~~First, p~~Pre-construction surveys and investigations will be undertaken to determine the extent of disturbance likely to occur due to construction activities. This will include a survey of the distribution and abundance of pink-footed geese and the distribution of harvested sugar beet within those sections of the Hornsea Three onshore cable corridor (and a 500 m disturbance buffer) likely to be affected during the winter season within which works will take place; and
- ~~Second, i~~If required, measures to reduce disturbance or provide alternative foraging habitat will be implemented sufficient to reduce the effects of disturbance to an acceptable level. The measures will be proportionate to the predicted impact at the time of construction and will be effective and agreed with Natural England prior to implementation.
- As appropriate, toolbox talks with construction teams operating on the cable corridor between MHWS and Hempsted (approximately 7km south of landfall) in November – January inclusive (undertaking activities including HDD works, cable jointing or cable installation) will be prepared and delivered in order to promote awareness of disturbance pathways to PFG and identify any interactions between geese and construction activity not highlighted through the decision tree process. Construction teams will raise any risks to PFG to a suitably qualified ecological clerk of works in order to advise on how works should proceed at that particular location. This assessment will be based on an expert opinion of the birds' sensitivity to disturbance at a particular location and time, such as during periods of prolonged severe winter weather at a particular location.
- As appropriate, physical measures to remove disturbance i.e. re-scheduling open cut trenching and installation of ducts between MHWS and the village of Hempstead (approximately 7 km south of landfall), between the months of November – January inclusive. Other pre-construction works (e.g. surveys, fencing, etc.) and construction activities associated with HDD, cable installation (pulling cables through ducts) and cable jointing works may still occur in these periods due to their reduced need for personnel and equipment on site at any given time.

~~6.5.1.40~~6.5.1.41 Where outdoor lighting is required, lighting units will be directional, fully shielded if not LED lighting and in all cases directed only on to the construction works area.

~~6.5.1.41~~~~6.5.1.42 Further details of the proposed mitigation strategy are provided in the Report to Inform Appropriate Assessment (document reference A5.2).~~

6.6 Historic environment

Objectives

6.6.1.1 To minimise the impact of construction works on buried archaeology, heritage assets and their setting.

Management measures

6.6.1.2 A programme of archaeological investigation has been undertaken to identify the presence/absence, nature, date and significance of archaeological remains along the onshore cable corridor, which consisted of a site walkover and geophysical survey. A number of assets were discovered and the mitigation ~~-~~for these sites will include that ~~is~~ set out in Table 6.1 below.

Table 6.1: Mitigation measures to record undesignated heritage assets.

Mitigation measures adopted as part of Hornsea Three	Justification
Construction Phase	
Site GS2 - Baconsthorpe: Trenching/soil stripping as appropriate in advance of construction and/or monitoring of soil stripping during construction.	The Hornsea Three onshore cable corridor passes between the two recorded heritage assets just west of Baconsthorpe Castle. Potential that previously unrecorded archaeological remains continue through this area.
Site GS5 - Barningham Green, onshore HVAC booster station: Trenching/soil stripping as appropriate in advance of construction and/or monitoring of soil stripping during construction.	No recorded or known archaeology, including from the geophysical survey (see volume 6, annex 5.6: Onshore Geophysical Survey Report). However, given the impact of the proposed permanent structures a programme of mitigation works is judged to be appropriate.

Mitigation measures adopted as part of Hornsea Three	Justification
Site GS6 - Corpusty: Trenching/soil stripping as appropriate in advance of construction and/or monitoring of soil stripping during construction.	A small number of discrete and linear responses of uncertain origin have been identified through the geophysical survey (see volume 6, annex 5.6: Onshore Geophysical Survey Report). Metal detecting within these fields has produced significant quantities of Roman and early Anglo-Saxon artefacts indicating a high potential for associated buried archaeological remains.
Site GS7 – Saxthorpe: Trenching/soil stripping as appropriate in advance of construction and/or monitoring of soil stripping during construction.	Significant quantities of medieval finds suggest medieval settlement.
Site GS10 - Booton: Trenching/soil stripping as appropriate in advance of construction and/or monitoring of soil stripping during construction.	St Michael and All Angels' Church, medieval coin finds and Roman road.
Site GS 11 – Alderford: Trenching/soil stripping as appropriate in advance of construction and/or monitoring of soil stripping during construction.	Cropmarks of ditches of possible Iron Age to Roman date and finds including tesserae.
Site GS12 - Attlebridge/Morton on the Hill: Trenching/soil stripping as appropriate in advance of construction and/or monitoring of soil stripping during construction.	Cropmarks of Bronze Age round barrow cemetery.
Site GS13 – Ringland: Trenching/soil stripping as appropriate in advance of construction and/or monitoring of soil stripping during construction.	Site of probable Bronze Age barrow.
Site GS14 – Easton: Trenching/soil stripping as appropriate in advance of construction and/or monitoring of soil stripping during construction.	High potential for significant buried archaeological deposits relating to Anglo-Saxon to medieval settlement.
Site GS15 - Broom Farm: Trenching/soil stripping as appropriate in advance of construction and/or monitoring of soil stripping during construction.	The cropmarks of an area of enclosures and fields of probable Roman date.
Site GS16 - Little Melton: Area subject to geophysical survey now outside Hornsea Three project boundary. However, trenching/soil stripping would be undertaken as appropriate within a nearby part of the onshore cable corridor in advance of construction and/or monitoring of soil stripping during construction (and see Site GS23).	High potential for significant buried archaeological deposits relating to Anglo-Saxon to medieval settlement.
Site GS17 – Ketteringham: Area subject to geophysical survey now outside Hornsea Three project boundary. However, trenching/ soil stripping would be undertaken as appropriate within a nearby part of onshore cable corridor in advance of construction and/or monitoring of soil stripping during construction.	Cropmark of Bronze Age ring ditch.
Site GS18 - Mangreen South: Trenching/soil stripping as appropriate in advance of construction and/or monitoring of soil stripping during construction.	Historic Environmental Record (HER) records cropmarks of an undated rectangular enclosure at the proposed onshore HVDC converter/HVAC substation. Permanent structures and relatively large area of high impact.
Site GS19 – Mangreen Hall – geophysical survey as appropriate of areas within the Hornsea Three project boundary in advance of construction.	High potential for significant buried archaeological deposits relating to Anglo-Saxon to medieval settlement.
Site GS24 – Edgefield - – geophysical survey as appropriate of areas within the Hornsea Three project boundary in advance of construction.	Cropmarks of a ring ditch and linear features (possible enclosures).
Reroute Online Map 2 - Bodham (TF 113 395 area): Geophysical survey and/ or trenching/soil stripping as appropriate in advance of construction and/or monitoring of soil stripping during construction.	Presence of an enclosure cropmark of possible Iron Age to Roman date within 50 m of onshore cable corridor. Consequently, there is a high potential for associated buried archaeological remains.
Reroute Online Map 2 - Bodham (TF 115 391 area) Geophysical survey and/ or trenching/soil stripping as appropriate in advance of construction and/or monitoring of soil stripping during construction.	Previously unrecorded cropmarks, including boundary/enclosure ditches and a possible ring ditch, are visible in this field on Google Earth imagery from 1999.
Site GS23 Reroute Online Map 7 - Great Melton/Little Melton (TG 147 070 area): Further geophysical survey and/or trenching/soil stripping as appropriate in advance of construction and/or monitoring of soil stripping during construction (and see Site GS16).	A small number of discrete and linear responses of uncertain origin have been identified through the geophysical survey (see volume 6, annex 5.6: Onshore Geophysical Survey Report). The onshore cable corridor runs along the line of a parish boundary that is also recorded as a cropmark feature. The presence of a parish boundary may increase the potential for an early Anglo-Saxon cemetery to be present and this needs to be considered in the future mitigation works.
Reroute Online Map 8 - Hethersett (TG 167 058 area): Geophysical survey and/ or trenching/soil stripping as appropriate in advance of construction and/or monitoring of soil stripping during construction.	The onshore cable corridor passes through an area of Roman finds and consequently there is potential for buried archaeological remains to be present.

6.6.1.3 A programme of advanced archaeological investigation following consent will include~~focus on~~ identified sites that will be adversely affected by Hornsea Three. ~~Targeted~~ The investigation will include geophysical survey ~~The investigation will include~~, the scope of which will be agreed post-consent and after a decision is made on the choice of transmission system, and selective trial trenching, the scope of which will be agreed post-consent as part of the ~~, will be undertaken in other areas of the onshore cable corridor as appropriate. An~~ (Archaeological) Written Scheme of Investigation to be ~~will be~~ agreed with the ~~relevant authorities~~Norfolk County Council Environmental Services, in consultation with Historic England, prior to commencement of the consented works.

6.6.1.4 Investigation of unexpected archaeological sites encountered during construction will be undertaken in line with procedures (e.g., a chance find procedure) agreed in advance with the relevant authorities.

6.6.1.5 To reduce the long term effect of Hornsea Three on the settings of heritage assets and the historic landscape, cables will be buried rather than above-ground; hedges and hedge banks will be restored and landscape planting schemes have been proposed around the onshore HVAC booster station and HVDC converter/HVAC substation.

6.7 Landscape and visual resources

Objectives

6.7.1.1 Construction works will be carried out in such a way to ensure that disturbance to landscapes and visual receptors (identified in volume 3, chapter 4: Landscape and Visual Resources) is minimised.

Management measures

6.7.1.2 To manage hedgerows and trees impacted as part of the construction of the onshore works, a Landscape Management Plan will be submitted to and approved by the relevant Local Planning Authority prior to the removal any trees or hedgerows. Prepared in accordance with the principles established in the Outline Landscape Management Plan (document reference A8.7), the Landscape Management Plan will document:

- The extent of hedgerows and tress to be removed in that phase;
- The period that the hedgerow or tress will be removed for;
- Any temporary measures that will be installed during the period the hedgerow or tree is removed (such as the provision of fencing);
- The extent of replacement hedgerow which will be planted, including details of plant species to be implemented, installation methods and ongoing monitoring proposed along. In addition to those hedgerows removed by the installation of the cable route (which will be replaced), where appropriate and where the landowner permits, the existing, remaining hedgerow will be gapped up to improve species diversity and connectivity. Species used will include the species already present in the hedgerow;
- Where trees are removed along the cable route, details of the species removed and details of tree species to be planted, installation methods and ongoing monitoring proposed; and
- The CoCP recognises that scope of planting directly over the cable route is limited and excludes deeper rooted species (as these may cause damage to the cables).

6.7.1.3 To mitigate the impact of the permanent works (not covered under this Outline CoCP) the Undertaker will also prepare a Landscape Management Plan (approved by the Local Planning Authority in accordance with the principles established in the Outline Landscape Management Plan (document reference A8.7)).

6.7.1.4 Fences and gates that are removed or damaged during the construction works will be replaced post construction.

6.7.1.5 Good housekeeping will be maintained on all construction areas and secure storage will be provided for materials at risk from wind blow. At the onshore HVDC converter/HVAC substation and HVAC booster station stockpiles will be in defined temporary storage areas.

6.7.1.6 Appropriate lighting will be used to reduce the incidence of visual intrusion to sensitive receptors.

6.8 Land use and recreation

Objectives

6.8.1 To protect the quality and integrity of the soil resources, and to maintain farm accesses and PRoW where possible.

Management measures

Land use

6.8.1.1 The identified types of topsoil and subsoil will be stripped and stored separately to avoid mixing of soil materials, which could reduce the overall quality of the soil. Topsoil and subsoil stockpiles will be maintained appropriately to avoid losses. Heavy machinery will not be tracked over stored soils. Tracked vehicle movements will be limited on waterlogged soils and will be subject to an assessment of ground conditions which will be undertaken on a site by site basis to avoid compaction and damage. Topsoil and subsoil heaps will be maintained to reduce potential losses of soil materials during the length of storages. Appropriate soil handling machinery will be used and where possible, stripping will be programmed to reduce potential soil damage from handling in unsuitable weather conditions. To enable the land to be handed back to the farmer in a suitable condition appropriate soil aftercare following reinstatement will be implemented. These measures are contained within a Soil Management Strategy (Appendix G of the CoCP) and ~~A soil management strategy~~ will be implemented to ensure that recognised good practice is effectively implemented on site. Soil handling operations will be supervised on site. After construction, has been completed on a length of Hornsea Three onshore cable corridor, the associated construction compounds and side accesses will be promptly dismantled and the land reinstated.

6.8.1.2 Appropriate construction practices will be implemented to ensure that the potential risk for the spread of animal and plant diseases is reduced as far as practicable (see the biosecurity protocol in Appendix D).

6.8.1.3 Appropriate fencing of the construction corridor will be provided per the nature of the individual farm holding affected. Where requested to do so by the landowner, markers posts will be placed on the corner of manhole covers associated with link boxes to clearly demarcate their location.

6.8.1.4 Farm accesses will be maintained, wherever reasonably practicable, between fields within a farm holding.

6.8.1.5 Accesses across individual fields will be maintained where reasonably practicable, where these are severed during construction.

6.8.1.6 Existing water supplies and drainage systems will be maintained and reinstated wherever reasonably practicable during the construction process. Details of the irrigation system on each land holding will be gathered during the detailed design stage and irrigation plans will be developed. The Agricultural Liaison Officer will consult with each individual landowner to obtain the relevant information and to be a point of contact to report concerns regarding irrigation systems during construction. The plans will include the following information:

- Location of boreholes and water supplies used by each farmer;
- Irrigation or impoundment licence granted by the EA; and
- System of irrigation applied and the location of irrigation network for each field.

Public Rights of Way management measures

6.8.1.7 Several PRoW and areas of land with informal public access will potentially be affected by the construction of the onshore elements of the Hornsea Three. Prior to the any stopping up or localised diversion of a PRoW, the principal contractor will agree measures, in accordance with the measures established in this Outline CoCP, to manage the interface between the works and PRoW with the relevant PRoW officer at Norfolk County Council. These measures, along with timeframes for reinstatement, will be set out in a PRoW Management Plan to be approved by Norfolk County Council.

6.8.1.8 Prior to commencement of works at each PRoW or area of land with informal public access, specific measures will be adopted to mitigate the impacts of construction works. A condition survey of all affected routes will be undertaken during the pre-construction period to inform the reinstatement works.

6.8.1.9 The contractor will install and maintain fencing to ensure clear separation between areas access by the public and works.

6.8.1.10 Where a PRoW crosses the onshore cable corridor the contractor is to either:

- Seek to maintain a pedestrian access. This route will be maintained by fencing and the use of a gating, ensure that the users of the access route have a safe route to cross the onshore cable corridor; or
- Provide a localised diversion.

6.8.1.11 Outside of the agreed site working hours (see section 4.1.1), the construction contractors will make reasonable endeavours to provide for access a route crossing the onshore cable corridor.

6.8.1.12 Signage will be erected to direct pedestrians when the construction traffic requires access over the designated pedestrian route, or of diversions if so implemented.

6.8.1.13 Where an alternative route is reasonably available, with the agreement of the relevant PRoW Officer, a short term permissive diversion will be formed around the active construction area. Advanced warning notices will be provided to users identifying the diversion route.

6.8.1.14 Where practical, the width of the crossing point or diversion will depend on its usage, but is expected to be between 2 m and 4 m, with greater width in place for bridleways and byways.

6.8.1.15 During construction periods where any open trench cannot be reinstated immediately or where the ground surface is uneven, the construction contractors will consider what measures, taking into consideration local constraints, need to be implemented to ensure suitable and safe egress of users of the PRoW.

6.8.1.16 In the case of small tracks, some minor, localised traffic management schemes may be required, such as temporary track closures or diversions. Alternatively, the construction contractors are to consider the use of temporary access plates to maintain public access.

6.8.1.17 Following completion of construction activities for a given phase, all public access within the working area (i.e. PRoWs and other linear features used by non-motorised users) will be returned to their original alignment (if appropriate) and/or reinstated with a standard commensurate to that existing prior to the commencement of construction works unless otherwise agreed with the local planning authority. As noted in paragraph 1.1.1.6 of the Outline CoCP, if construction is to be undertaken in two phases, the works in the first phase will be left in a safe state as agreed with relevant local authorities.

6.8.1.18 PRoW affected during the construction phase of the works would be crossed by either HDD or by open trench. When HDD is utilised, the PRoW would remain open during the duration of construction. Where open trenching is used to cross PRoW, the routes would either be temporarily stopped up/diverted or traffic management measures would be put in place in some locations to maintain access. Where such measures cross a bridleway, all material used would be suitable for use by horses. Temporary stopping up of PRoW would only occur in unexpected events where to maintain access along the existing route, or diversion would present a health and safety concern.

6.8.1.19 Where a PRoW runs along the side of a construction side access traffic management measures would be put in place during construction. These would involve fencing to separate PRoW users from traffic.

6.8.1.20 Any PRoW affected during the construction phase will be reinstated following completion of the works to ensure that no permanent effects remain.

6.8.1.21 A communication plan will be developed as part of the Outline CoCP to ensure local authorities are kept informed of when and where works will be taking place. Appropriate media (signage/leaflets/notices) would be used to inform residents, parish councils and visitors of temporary changes to the PRoW network arising from the onshore construction works for Hornsea Three. Warning notices would be erected at key points where PRoW would be affected by the onshore cable laying works to make users aware of the construction working area and associated construction noise. The local newspaper would also carry such information.

6.8.1.22 The Undertaker recognises the sensitive nature and high usage of the beach and the coastal footpath. In the event that access along the beach is to be restricted or the coastal path needs to be temporarily diverted, the Undertaker or principal contractor for the landfall works will submit details within the PRoW Management Plan to be provided as an appendix to the final CoCP and approved by North Norfolk District Council and Norfolk County Council as the relevant planning authorities.

6.9 Protection of groundwater

Objectives

6.9.1.1 To protect the underlying secondary and principal aquifers in terms of groundwater quality and flow.

Management measures

Construction phase

6.9.1.2 Implement measures to protect groundwater during construction, including good environmental practices based on legal responsibilities and guidance on good environmental management in: guidance in: CIRIA C532 Control of Water Pollution from Construction Sites – Guidance for Consultants and Contractors (2001); and CIRIA C648 Control of Water Pollution from Linear Construction Projects (2006).

6.9.1.3 A written scheme dealing with contamination of any land and groundwater will be submitted and approved by the relevant EHO before any part of the development commences. The scheme will include a preliminary risk assessment where appropriate.

6.9.1.4 Minimise, where practicable, the production of silt and contaminated water by minimising for example:

- Disturbance of river bed and bank;
- Dewatering and pumping of excavations and subsequent disposal of water;
- Runoff from exposed ground and stockpiles;
- Plant and wheel washing;
- Site roads and river crossings;
- Fuel spillages; and
- Waste storage and disposal.

6.9.1.5 Cable trenching across the Source Protection Zones requires measures to ensure that the principal aquifer is unaffected either directly or indirectly. The depth of superficial deposits would be confirmed via a site investigation to ensure works are not undertaken within the chalk aquifer. A hydrogeological risk assessment based on information from the site investigation will be undertaken at each trenchless conduit crossing location within a Source Protection Zone. The site investigation will allow an assessment of the relationship between the aquifer within the superficial deposits and the underlying principal aquifer, to inform the risk assessment which will minimise the potential for works to directly impact the principal aquifer. Where agreed with the Environment Agency, site investigation boreholes within SPZ1 and other sensitive sites will be used to monitor groundwater flows for an agreed period. ~~A hydrogeological risk assessment, will be undertaken at each trenchless conduit crossing location within a Source Protection Zones~~. Direct Current cabling will be thermally insulated.

6.9.1.6 Cable trenching across areas with secondary A or B aquifers will include measures to ensure the groundwater quality is not adversely affected and that groundwater does not use the trenches as a conduit to convey groundwater elsewhere. Direct Current cabling will be thermally insulated.

6.9.1.7 HDD conduits for onshore watercourse cable crossing points will be a minimum 2 m below the hard bed of the watercourse, and a minimum standoff of 2 m above the chalk aquifer, where practicable. The standoff distance will be confirmed during the site investigation, in discussion with the Environment Agency. A hydrogeological risk assessment will be undertaken at each HDD crossing of a sensitive watercourse. This is to minimise the risk of bentonite break out (or "frac-out") and avoid disruption of groundwater flows to surface watercourses.

6.9.1.8 A method statement will be prepared for HDD crossings (following the principles set out in Appendix B) with site-specific method statements for the crossings of main rivers and IDB watercourses as identified in volume 6, annex 2.4: Hydrological Characterisation Report. The method statements will be developed in discussion with the Environment Agency. The method statement will include details of the proposed HDD design, any monitoring to be undertaken and any remedial measures to be put in place. The method statement will also take into account the measures within the bentonite break out plan (see Appendix C).

6.9.1.9 Site investigations will be undertaken at regular intervals along the onshore cable corridor, likely at complex HDDs and/or sensitive HDD locations) during the detailed design phase to confirm local geological conditions. The Environment Agency will be consulted on the methodology of the site investigations.

6.9.1.10 The potential impacts to groundwater resources by deep trenchless excavations and deep excavations for pile foundations will be mitigated by casing off shallow groundwater units during construction works and sealing off once the casing is removed. This approach is based on guidance in: Piling and Penetrative Ground Improvement Methods on land Affected by Contamination: Guidance on Pollution Prevention (Environment Agency, 2001).

6.9.1.11 Measures to prevent and control spillage of oil, chemicals and other potentially harmful liquids will be implemented. Appropriate storage and handling of materials and products will be provided and will include for example:

- Avoidance of oil storage within 50 m of a spring, well or borehole;
- Within 10 m of a watercourse;
- Where oil could run over hard ground into a watercourse;
- Secondary containment system that can hold at least 110% of the oil volume stored; and
- Avoidance of storage of oil in areas at risk of flooding.

6.9.1.12 In accordance with The Control of Pollution (Oil Storage) (England) Regulations 2001, refuelling of machinery will be undertaken within designated areas where spillages can be easily contained. Machinery will be routinely checked to ensure it is in good working condition; and any tanks and associated pipe work containing oils and fuels will be double skinned and be provided with intermediate leak detection equipment.

6.9.1.13 Used oils will be disposed of properly in accordance with Environmental Permitting (England and Wales) Regulations 2016.

7. Management of Intertidal Environmental Issues

7.1 Protection of the surface water environment

Objectives

7.1.1.1 To minimise the risk of surface water flooding during the construction phase, to prevent pollution of surface watercourses and to minimise the impact on local surface water features.

Management measures

Flood control measures

7.1.1.2 At the Hornsea Three intertidal area, construction measures would be adopted to maintain the existing level of flood protection during construction. These measures would be discussed with the Environment Agency during detailed design.

7.2 Intertidal ecology

Objectives

7.2.1.1 To minimise the impact of construction works on intertidal species and habitats.

Management measures

7.2.1.2 Measures will be adopted to ensure that the potential for release of pollutants from construction activities is minimised, which will include planning for accidental spills, responding to all potential contaminant releases and including key emergency contact details (e.g. Environment Agency, Natural England, JNCC, Maritime and Coastguard Agency and Marine Management Organisation). Measures will include:

- Designated areas for refuelling where spillages can be easily contained;
- Only using chemicals included on the approved Centre for Environment, Fisheries and Aquaculture Science (Cefas) list under the Offshore Chemical Regulations 2002;
- Storage of chemicals in secure designated areas in line with appropriate regulations and guidelines;
- Double skinning pipes and tanks containing hazardous substances; and
- Storage of these substances in impenetrable bunds.

7.2.1.3 In this manner, the potential for release of contaminants will be strictly controlled, thus providing protection for marine life across all phases of Hornsea Three.

7.3 Intertidal archaeology

Objectives

7.3.1.1 To minimise the impact of construction on sediments of geoarchaeological/palaeoenvironmental importance and on sites of identified archaeological significance.

Management measures

7.3.1.2 Archaeologists will be consulted in the preparation of specifications for any pre-construction geophysical surveys.

7.3.1.3 Archaeological input will be provided to future geotechnical surveys where deposits of known archaeological potential are likely to be affected. This may include the presence of a geoarchaeologist on board the survey vessel and a provision for sampling, analysis and reporting of recovered cores. Samples recovered during pre-construction geotechnical surveys will be analysed and dated in areas where impacts on deposits of geoarchaeological and/or palaeoenvironmental significance seem likely.

7.3.1.4 Archaeologists to be consulted in the preparation of any pre-construction remote operated vehicle (ROV)/diver surveys and, if appropriate, in monitoring/checking of data. Archaeologists will also be consulted in the preparation of pre-construction cable route clearance or other pre-construction clearance operations and, if appropriate, to carry out watching briefs of such work.

7.3.1.5 Further investigation of those SeaZone/United Kingdom Hydrographic Office records classified as 'dead' (where there has been no evidence of the wreck or obstruction over successive surveys) will be undertaken during the future assessment of higher resolution geophysical survey data, with action taken as appropriate.

7.3.1.6 Archaeological Exclusion Zones will be identified and implemented of around those sites identified as having high and medium archaeological potential.

7.3.1.7 Where no archaeological significance has been interpreted from the archaeological analysis of the results of the geophysical survey, those sites have been identified as having low archaeological potential. There will be maintenance of an operational awareness of the location of those contacts. Reporting through the agreed protocol will be undertaken should material of potential archaeological interest be encountered.

7.3.1.8 The identification and implementation of Temporary Archaeological Exclusion Zones based on all available information including the stated positional accuracy, the recorded size of the target and the potential archaeological significance around those records for wrecks and obstructions outside of the survey data coverage but within the Hornsea Three boundary.

7.3.1.9 The Offshore Renewables Protocol for Archaeological Discoveries (Crown Estate and Wessex Archaeology, 2010) will be implemented for unexpected archaeological discoveries made during construction.

7.3.1.10 Mitigation of unavoidable direct impacts on known sites of archaeological significance: Options include i) preservation by record; ii) stabilisation; iii) detailed analysis and safeguarding of otherwise comparable sites elsewhere.

8. References

Bat Conservation Trust (2011) Statement on the impact and design of artificial light on bats. Bat Conservation Trust, London.

CIRIA (2001) C532 Control of Water Pollution from Construction Sites – Guidance for Consultants and Contractors. London, CIRIA.

CIRIA (2001) C650 Environmental Good Practice on Site. London, CIRIA.

CIRIA (2006) C648 Control of Water Pollution from Linear Construction Projects. London, CIRIA.

Crown Estate and Wessex Archaeology (2010) Protocol for Archaeological Discoveries. Offshore Renewables Projects. The Crown Estate.

English Nature (2001) Great Crested Newt Mitigation Guidelines. York, English Nature. Gilbert, G., Gibbons, D.W. and Evans, J. (1998) Bird Monitoring Methods—a manual of techniques for key UK species. Sandy, Royal Society for the Protection of Birds.

Environment Agency (2001) Piling and Penetrative Ground Improvement Methods on land Affected by Contamination: Guidance on Pollution Prevention. Bristol, Environment Agency.

Strachan, R. and Moorhouse, T. (2011) The Water Vole Conservation Handbook. Third Edition. Oxford, WildCRu.

Environment Agency (2012) Groundwater Protection and Principles in Practice. Bristol, Environment Agency.

Appendix A Communication Plan Framework

A.1 Communication plan framework

A.1.1.1 This annex sets out the key points of how communications will be delivered to local residents, businesses and interested parties during the construction of Hornsea Three. These key points will be developed into a Communications Plan post consent and will be implemented using a phased approach to reflect the various stages of the construction programme.

A.1.1.2 The Communication Plan will be developed, managed and implemented by the Stakeholder Manager for Hornsea Three. During the construction phase, a Community Liaison Officer (CLO) will be appointed by the Undertaker prior to the commencement of onshore works. The CLO will attend public meetings including liaison with community groups and will manage all contacts with local resident groups, schools, emergency services and local businesses with regard to general construction works issues in accordance with the parameters established in the Communications Plan.

A.1.1.3 The key points of the framework are set out below:

- A website has been established for Hornsea Three and will be regularly updated before and during the construction process;
- Newsletters will be published and distributed to promote the overall progress of Hornsea Three and upcoming works, including the likely duration of the works. The newsletters will be distributed to residential and businesses premises in the vicinity of the construction works. Copies will also be placed in local libraries and on the Hornsea Three website. It is anticipated that during core construction periods this newsletter will be produced quarterly;
- Newsletters will be published and distributed to advise of the proposed phasing of the authorised project, ~~the use of HVAC or HVDC transmission system to be used for that phase, land take and period of construction works and the details of the body responsible for carrying out those works. The first newsletter is to be issued at least four months in advance of commencement of works.~~
- The Newsletters (or appropriate alternate form such as a letter) will be issued to landowners to advise of the proposed phasing of ~~the authorised project~~Hornsea Three, the use of HVAC or HVDC transmission system to be used for that phase, land take and period of construction works and the details of the ~~body~~ Undertaker and principal contractor responsible for carrying out those works.
- Advance notice would be given of any construction works ~~in the vicinity of works~~ which could restrict access for residents/local businesses etc and where practicable, ~~if required~~ an alternative access ~~crossing location, if available,~~ would be established prior to works commencing.
- Occupiers of nearby properties will be informed of particularly noisy construction activities and their duration;
- Occupiers of nearby properties will also be informed of any works being undertaken outside of the core working hours (see paragraph 4.1.1.1);
- Local residents (i.e. those that live or have businesses in the locality) will also be informed of any temporary road closures or disruption to any services;
- Notices will be erected in public areas and on PRoW crossed by Hornsea Three and regularly updated with information where a work front is active in the locality and any disruption is anticipated;
- A 24-hour help line will be set up to provide information on Hornsea Three and will also be used to record complaints from the public. Details of the help line will be promoted on site notice boards, newsletters, press releases and on the Hornsea Three website; and
- All complaints will be logged and the action taken to resolve the complaints will be recorded.

A.1.1.4 The appointed CLO (or appropriate representatives from the Undertaker and principal contractor) will also seek to attend/hold public meetings to update local people and other interested parties on progress of the construction works.

Timeframe for the publication of key project communications

A.1.1.5 As soon as practical after Financial Investment Decision or Award of Contract for Difference (or confirmation of other appropriate funding mechanism), which ever is the latter*.

A.1.1.6 For the purposes of communicating the approach to onshore construction:-

- If to be delivered in a single phase (and therefore could include all works required to support a second phases which may come on line at a later date), including the use of HVAC or HVDC transmission system to be used;
- Two phases – with the first phase including ducting for the second phase (but with a requirement to return to the land at a later date to pull through the export transmission cables); including the use of HVAC or HVDC transmission system to be used for the first phase, and second phase if known or
- Two distinct separate phases (but continuing to advise of the use of HVAC or HVDC transmission system to be used for the first phase. Advice as to the timing expectations for any second phase.

A.1.1.7 (*At this consenting stage – when any programme post consent is not fixed, it is anticipated that these decision points would be in the order of one year prior to commencement of works onshore)

First newsletter (issued at least four months prior to the commencement of onshore works)

A.1.1.8 Clarify project assumptions, including but not limited to:-

- expected land take;
- period of construction works; and
- details of the body responsible for carrying out those works.

Prior to commencement on each parcel of land

A.1.1.9 Clarify project assumptions, including but not limited to:-

- expected land take;

- construction programme (as applied to each landowner);
- proposed location of link boxes and joint bays; and
- construction access points.

Appendix B Outline Method Statement for Crossing Techniques

B.1 Outline watercourse crossing method statement

B.1.1 Introduction

B.1.1.1 This document comprises an Outline Watercourse Crossing Method Statement for the techniques to cross watercourses along the Hornsea Three onshore cable corridor. If required by the Environment Agency (or IDB if maintained by the IDB) a detailed Watercourse Crossing Method Statement will be prepared by the principal contractor and approved by the EA or IDB (as requested) prior to the commencement of the crossing of the watercourse. The method statement may be supported by results from intrusive surveys where appropriate.

B.1.1.2 This Outline Watercourse Crossing Method Statement has been prepared in line with guidance (e.g. CIRIA) and to meet relevant legislation obligations. It has regard to the mitigation commitments made in the Environmental Statements and the Outline CoCP. The mitigation measures from the Outline CoCP are not repeated in this method statement but it can be assumed that they would be applied.

B.1.1.3 The detailed Watercourse Crossing Method Statement for Blackwater Drain (near Booton Common) will be developed in consultation with Natural England, in addition to the Environment Agency.

B.2 Watercourse crossing options

B.2.1.1 The Hornsea Three onshore cable corridor crosses a number of watercourses including Environment Agency main rivers, watercourses maintained by the IDB and field drains or varying width and depth. A crossing schedule showing the location of these crossings and the type of crossing method accompanies the DCO application.

B.2.1.2 There are two main crossing methods for installing the cables across watercourses. These are HDD and open-cut trenching. In addition, to provide a continuous access route along the length of the onshore cable corridor, it will be necessary to install temporary vehicle bridges at some locations, where the cable corridor intersects ditches and small watercourses.

B.2.2 Open cut trenching

B.2.2.1 The likely methodology for crossing minor watercourses, field drains etc using open-trench installation is described below. The details are indicative to provide an overview of the works required.

- Stage 1 – Setting out of the works and preparation of working area:
  - Prior to commencing works, the section of the cable corridor will be fenced off to segregate the construction activities from adjacent parcels of land and to clearly identify the extent of the works.
  - The type of fencing that will be installed will be subject to the land use of the adjacent land (e.g. arable or pasture for livestock) and consultation with the landowner.
- Stage 2 – Construction of dam and culvert or pump installation:
  - The flow of the existing watercourse will be cut off using one of a range of options (as taken from CIRIA C6648). These options include a clay bund, sand bags, stop planks, cofferdams, caissons or specialist dams.
  - The cofferdam (or equivalent method) will be installed for the duration of the trenching works. This will ensure that, where flow is present in the watercourse, it is pumped around the working area and be returned to the watercourse/ditch downstream of the works.
  - Once the cofferdam (or equivalent) is in place, a diesel-powered pump will be used to pump water round and bypass the dam. Subject to the depth of the watercourse, pumping may be required before the dam is competed. Containment will be provided around the pump to minimise the risk of diesel leaks.
  - The diversion will be started at a suitable point upstream to minimise effects. In accordance with CIRIA guidance, the discharge pipe will be placed well-downstream of the works with protection in place to avoid the scouring of the bed or banks at the outfall. The discharge hose will be directed through a filtering medium before the pumped water is returned to the watercourse.
- Stage 3 – Trench excavation:
  - The cable trenches will then be excavated according to engineering specifications. The excavation of trenches will be supervised by a banksman.
  - Turf, topsoil and subsoil from the excavation will be segregated and stored in separate stockpiles. The stockpiles will be located away from the watercourse crossings with measures in place to ensure any runoff from the stockpiles does not enter watercourses or drainage ditches.
  - In the event that the trenches need dewatering, water from the dewatering activities will be released under agreement with the Environment Agency to a local drainage ditch, watercourse and/or spread over ground. Water from dewatering activities will pass through a silt interceptor (or equivalent) prior to discharging to drainage ditches or watercourses.
  - Depending on soil properties, a layer of Cement Bound Sand (CBS) or subsoil will be used to line the bottom of the trench.
- Stage 4 – Cable installation:
  - The cabling will be installed within the trench across the watercourses from adjacent joint bay positions.

- Once the cables are in place, the trench will be backfilled with CBS or subsoil (subject to soil properties)). Once the backfill is levelled, protective cable tiles and warning marker tape will be put in place. Excavated subsoil and topsoil will be used to further backfill and reinstate the cable trench.

- Stage 5 - Reinstatement
  - Once the cable is laid and the trench reinstated, the base of the watercourse bed will be consolidated. The cofferdam (or equivalent method) will be removed in a reverse procedure to that used for construction.
  - Any works to ensure the integrity of the banks on either side of the watercourse will be undertaken. This may include geotextiles, reseeding/reinstatement of vegetation and placing of locally sourced stones.
  - The water flow will be reinstated and the pumps removed.

B.2.3 Temporary vehicle bridges

B.2.3.1 Temporary haul road bridges over watercourses will be constructed across some small watercourses to retain access either side of the water body for construction workers.

- At watercourse crossings, the working width will be reduced to minimise the area disturbed.
- To establish the crossing points on narrow streams, culvert pipes will be laid to carry the water, and at either end the culvert will be surrounded by a clay bund.
- The culvert pipe will be laid at winter water level to ensure that water flow is unimpeded along the stream.
- Straw bales will also be positioned at either end to prevent suspended solids moving along the watercourse. Water between the clay bunds will be pumped out on to the land if necessary.
- The temporary road surface will then be installed over the culverts. Geotextile membrane, straw bales and splash boards may be used to prevent sediments from entering the water courses.
- On reinstatement, the temporary road surface and culverts will be removed and any bank stabilising work will be undertaken.

B.2.4 Horizontal directional drilling

B.2.4.1 HDD is trenchless method for installing underground ducts and cables in a shallow arc along a prescribed bore path by using a surface launched drilling rig.

B.2.4.2 The typical activities required by a HDD operation are summarised below:

- Site survey and bore planning:
  - Prior to the commencement of HDD operations, a site survey will be conducted. Intrusive surveys will be undertaken to establish the geological and geotechnical conditions at each HDD location. The survey team will create an accurate plan of the drill path and elevations of the proposed duct. This will include a hydrogeological assessment to confirm the depth of the drill and to establish an appropriate standoff between the drill path and hard bed of watercourses and the bedrock geology. During the survey, any buried services which are in close proximity to the route will be clearly marked and documented on the survey drawings and on the site (where possible).
  - A bore plan and profile will be created from the results of the survey. The plan will provide final information on the proposed bore arc including entrance and exit points, radius of curvature and the bore diameter required to accommodate the cables.

- Preparation of site for HDD operation:
  - For larger HDD crossings, one stoned compound will be required at the HDD entry point for equipment, drilling fluid management system, laydown area, launch and reception pits. These areas will be cleared of vegetation and topsoil. Hardcore will then be laid to provide a firm work area. A description of these compounds is provided in section 4.1.7.
  - Access to the HDD sites will be via an access designed to accommodate heavily loaded vehicles and plant. Generally, this will be the haul road installed within the cable corridor, and will include watercourse crossings via temporary bridges or similar.
  - A regular supply of water will be required at the HDD sites during the HDD operations for the mixing of drill fluid. Storage tanks may be required if alternative supplies of water cannot be provided.
  - The HDD process requires the use of bentonite and grout: bentonite is used as a lubricant and grout is used as a sealant. Both substances can cause harm to the water environment as they are highly alkaline. The use of the material will be carefully controlled to avoid a breakout in the riverbed and/or spillage and runoff from tanks and plant at the drive shaft. A bentonite breakout plan has been included in the Outline CoCP (see Appendix C). Bentonite will be recycled during the HDD process and would be disposed of as a controlled waste following the completion of construction.
  - A lagoon/settling pond may be required at the launch site to contain the bentonite slurry arisings from the HDD bore. The lagoon/settling pond will have a sufficient capacity to accommodate the drill arisings/slurry from the HDD operation. Tankers may be required to control the levels of slurry where necessary.
  - A slurry pit/settling pond will also be required in the HDD reception site to collect any slurry discharged from the drill hole.

- HDD drilling operation:
  - Volume 1 chapter 3: Project Description of the Hornsea Three Environmental Statement provides a summary of the HDD drilling operation at landfall. Similar principles will apply to the HDD crossings along the onshore cable corridor.

- HDD demobilisation:

- On completion of the HDD operation, all the HDD working platforms including the launch and reception sites will be reinstated to their original use.

Appendix C Bentonite Break Out Plan

C.1 Bentonite break-out plan

C.1.1 Risks

C.1.1.1 During HDD operations, the drill head is lubricated with a mixture of water and bentonite clay that is injected under high pressure. If there is a fracture in the location of the drill path, the pressure could cause the bentonite slurry to travel along the 'path of least resistance' to the surface. This is more likely to occur at each end of the HDD where the drill path is closest to the surface. This process is referred to as a bentonite break out or "frac-out" i.e. the unintentional return of drilling fluid to the surface.

C.1.1.2 Bentonite is a fine clay material which is non-toxic and is commonly used in farming practices. However, it is also alkaline and when discharged into the water environment, it can affect water quality and also water habitats by smothering plants and river gravels. The Hornsea Three onshore cable corridor crosses a number of highly sensitive watercourses (including the River Wensum Special Area of Conservation) where HDD is the proposed crossing method, therefore the potential for bentonite break-out must be managed.

C.1.2 Purpose of a bentonite break-out plan

C.1.2.1 The purpose of a bentonite break-out plan is:

- Minimise the potential for a bentonite break-out associated with the HDD crossings;
- Provide for the timely detection of bentonite break outs;
- Identify how ecologically sensitive areas will be protected;
- Identify how groundwater resources will be protected;
- Ensure an organised, timely and minimum impact incident response; and
- Establishes procedures to ensure that the Environment Agency and any other relevant authority is notified and that the incident is documented.

C.1.3 Geotechnical evaluation

C.1.3.1 A site investigation comprising geophysical and geotechnical borehole surveys will be undertaken at sensitive proposed HDD locations to characterise the local ground conditions and to evaluate the geotechnical suitability of the underlying geology formations to be drilled using HDD techniques. The investigation and evaluation will be undertaken by an appropriately qualified and experienced geotechnical engineer. The evaluation will be used to design the HDD crossing, including confirmation of the location and depth of the watercourse channel and the properties of the superficial geology. This information will be used to minimise the potential for the HDD crossing to fail and bentonite break out to occur.

C.1.4 Location of drill entry and exit points

C.1.4.1 The primary areas of concern for inadvertent returns of drilling fluid are near the drill entry and exit pits where the drilling equipment is at its shallowest: the likelihood of bentonite break out occurring decreases as the depth of the pipe increases. To minimise the risk to riparian habitats, the drill entry and exit points will be located at an appropriate distance from the banks of the watercourse (for example, the Environment Agency recommends that the stand-off distance from watercourses less than 5 m wide would be a minimum of 1.5 times the stream width. For larger watercourses (i.e. larger than 5 m wide) the stand-off distance would be 1.0 times the width of the watercourse).

C.1.4.2 The drill entry and exit pits will be surrounded by construction fencing and silt fencing to minimise the potential for migration of bentonite. Barriers such as straw bales or sedimentation fences will be placed between the pits and nearby sensitive resources prior to drilling to intercept any runoff.

C.1.4.3 A lagoon/settling pond may be required at the drill entry to contain the bentonite slurry arisings from the HDD bore. It is anticipated that settlement lagoons would only potentially be required at major HDD crossings (i.e. typically greater than 200 m) at either or both the entry and exit point locations. Such settlement lagoons, if required, ~~The lagoon/settling pond~~ will have a sufficient capacity to accommodate the drill arisings/slurry from the HDD operation with sufficient freeboard to accommodate rainfall events. Tankers will be used to remove materials from the lagoons for disposal in order to minimise the potential for any spillages and ~~may be required~~ to control the levels of slurry where necessary, in particular when extreme rainfall is forecast., ~~considering weather conditions. A slurry pit/settling pond will also be required at the drill exit location to collect any slurry discharged from the drill hole.~~

C.1.5 Monitoring

C.1.5.1 During drilling, real time down hole pressure monitoring will be used to identify ~~-~~bentonite break out conditions. Field personnel will monitor the surface for observable break out conditions. Monitoring will be undertaken at an appropriate distance from the drill location as it is acknowledged that bentonite break outs may occur some distance from the drill site.

C.1.6 Emergency response

C.1.6.1 Where a bentonite break-out is detected, an emergency response procedure will be implemented. The procedure will be developed as part of the Pollution Control Plan, prepared in consultation with the Environment Agency prior to the commencement of any HDD activities.

Appendix D Biosecurity Protocol

D.1 Biosecurity protocol

D.1.1.1 The following measures will be adhered to by all relevant staff and will be incorporated into the method statements for pre-construction surveys and construction works. The measures may be updated during detailed design if further information on construction practices becomes available.

D.1.1.2 General good practice to be followed at all times:

- Arrive at the site with clean footwear, equipment and vehicle(s);
- Before leaving the site and before moving from one farm to another, **remove mud, plants and other materials** from boots, vehicles and equipment using a stiff brush where necessary;
- Keep accesses to a minimum and whenever practicable, follow existing tracks;
- Whenever practicable, park on areas of hard-standing;
- Restrict the amount of equipment you take onto site to the minimum required;
- Whenever practicable, **AVOID**:
    - Driving through wooded areas;
    - Areas with known plant disease;
    - Livestock areas;
    - **Contact with potentially infectious material** e.g. *Rhododendron*, a primary host plant of *Phytophthora* diseases, especially when wilted/dying (i.e. showing signs of infection); and
    - Areas of known *Chytridiomycosis* infection, known crayfish plague and other diseases or pathogens.
- Schedule multiple site visits so that sites of greatest risk with regard to invasive species, diseases or pathogens are visited at the end of the day; and
- If you do come into contact with potentially infectious material (e.g. dead amphibians, crayfish, dying *Rhododendron*) you must:
    - **Make a note of findings and the location** of material (take photographic records of plant material);
    - **Notify the ECoW** of findings as soon as practicable;
    - **Dispose of or thoroughly disinfect with an appropriate disinfectant* all external clothing and footwear** (e.g. Virkon ® broad spectrum disinfectant (1% solution or 10g/l)*[1], or Propeller™ disinfectant if addressing a *Phytophthora* infection); and
    - Dispose of powder-free disposable gloves appropriately.

D.1.1.3 When working in a waterbody:

- Clean boots (using a hard bristle brush if necessary) and disinfect (away from waterbodies to prevent potential pollutant incidents) all equipment that might come into contact with water using Virkon ® suitable for wetland habitat (1% solution or 10g/l) prior to and at the end of each site visit;
- Appropriately dispose of powder-free disposable gloves between site visits; and
- Ensure vehicle tyres and wheel arches are cleared of mud, plants and other organic material before leaving site and before moving from one farm to another. Leave removed material on site.

[1] * Virkon ® broad spectrum disinfectant (1% solution or 10g/l)* or, for Phytophthora infections, Propeller™ disinfectant. All disinfectants should be used and disposed of in accordance with manufacturer and product label instructions and should not be disposed of in waterbodies. Take care to ensure all soil is removed prior to treatment and disinfectant has dried/evaporated before leaving or entering site. Take care so as to ensure no disinfectant enters a waterbody.

Appendix E Onshore Export Cable Prescribed Crossing Method

Appendix F Outline Pink-Footed Goose Management Plan

F.1 Pink-footed Goose Mitigation Plan

F.1.1 Introduction

F.1.1.1 This outline Pink-footed Goose Management Plan (PFGMP) has been appended to the CoCP to provide a framework for the Applicant's approach to Pink-footed Goose (PFG) mitigation, as described in paragraph 6.5.1.40 of the outline CoCP.

F.1.2 Background

F.1.2.1 Hornsea Three's Ecology and Nature Conservation chapter (APP-075)), when considering the potential for open cut trenching and installation of the export cables, identified the potential for habitat loss and disturbance to wintering pink-footed goose as a designated feature of the North Norfolk Coast Special Protection Area (SPA)/Ramsar. The Environmental Statement predicted that the sensitivity of pink-footed goose was high with an impact magnitude that was deemed to be minor. It was therefore concluded that the effect would be of moderate adverse significance, which is significant in EIA terms.

F.1.2.2 If construction works take place outside November and January inclusive, the Report to Inform Appropriate Assessment (RIAA: APP-051) concluded there would be no disturbance impact pathway on pink-footed goose as a designated feature of the North Norfolk Coast SPA/Ramsar and there would be no adverse effect on pink-footed goose.

F.1.2.3 Should construction works take place between November and January inclusive, the RIAA (APP-051) concluded no adverse effect on the site would occur from direct habitat loss (permanent or temporary) with respect to the population and distribution of pink-footed goose because of the known mobility of this species in response to changes in food availability.

F.1.2.4 However, the RIAA concluded that an increased frequency of disturbance from the onshore construction works which may reduce the fitness of a significant group of birds at the time of construction could not be excluded. Therefore, if construction works were carried out on sugar beet fields functionally linked to the SPA (i.e. at the time of post-harvest) between November and January inclusive, a pink-footed goose mitigation plan would be formulated for the construction phase and submitted to Natural England for approval.

F.1.2.5 This appendix provides a draft outline pink-footed goose management plan with the Applicant's strategy presented in the form of a decision tree pathway. To clarify the reasoning behind this strategy, this document initially provides a summary of the potential disturbance impact pathway on pink-footed goose as a designated feature of the North Norfolk Coast SPA/Ramsar. This background information comprises:

- The origin and phenology of pink-footed geese in Norfolk;
- The importance of sugar beet to pink-footed geese in Norfolk;
- Seasonal and daily movements of pink-footed geese; and

F.1.3 Origin and Phenology

F.1.3.1 The Greenland/Iceland pink-footed goose *Anser brachyrhynchus* population winters almost exclusively in Britain. This population breeds primarily in central Iceland with smaller numbers also occurring along the east coast of Greenland. Migration begins in early autumn to the wintering grounds.

F.1.3.2 Peak numbers of pink-footed geese occur in the autumn (and again in spring) in northern Scotland, but peak numbers in England occur later in winter including at sites in Norfolk, after the birds have moved further south. Few geese are present in October in the coastal area of north Norfolk, including Weybourne that encompasses the Hornsea Three onshore cable corridor [APP-137]. In the wider region of north Norfolk peak numbers occur in November to January. Departure north from Norfolk starts from mid-January with few wintering pink-footed geese remaining by mid-February, and especially at the roosts at Scolt Head to the west of the North Norfolk Coast SPA in February.

F.1.3.3 This section will be updated in the final PFGMP to reflect the latest scientific evidence including the results of monitoring surveys carried out in the winter prior to commencement of construction.

F.1.4 Importance of sugar beet

F.1.4.1 In Norfolk, pink-footed geese spend most of their time foraging on harvested sugar beet *Beta vulgaris* fields, although between 10 and 20% of their time can be spent on winter-sown cereals. Sugar beet is a high-quality food from which the geese are not initially disturbed by farmers whilst feeding because of its limited commercial value.

F.1.4.2 The harvesting period for sugar beet, known as the campaign, takes place between September and February when the amount of sugar in the beet is at its highest. The crop is harvested and delivered according to factory demands and is spread evenly through the delivery period. Sugar beet is mechanically harvested, with the crown chopped off and root fragments left behind, on which the geese forage.

F.1.4.3 Post-harvest, the field may either be ploughed immediately if the field is harvested early (up and into November), so that a winter cereal crop can be sown, or left until the spring before ploughing. It is on these latter fields that the geese overwinter, eating the roots chopped into fragments by the harvester and unharvested roots.

F.1.4.4 Such sugar beet fields are generally used for several consecutive days, with the flock then moving to a new field once the available sugar beet is much reduced or exhausted. During mid-winter, when the population of pink-footed geese is at its peak in north Norfolk, two or three fields may be used simultaneously by a flock (APP-137). Geese have been recorded using sugar beet fields in Norfolk up to two months after they had been harvested.

F.1.4.5 The major features determining the use of sugar beet fields are the distance of the fields from the roost site and the risk of disturbance associated with the fields. During surveys for Hornsea Three [APP-137] which took place within 10.4 km of the nearest known roost at Cley Marshes, pink-footed geese were never recorded on more than 36% of the available post-harvest sugar beet in winter 2016/2017 & 2017/2018.

F.1.4.6 This section will be updated in the final PFGMP to reflect the latest scientific evidence including the results of further monitoring surveys carried out in the winter prior to commencement of construction.

F.1.5 Seasonal and daily movement of PFG in Norfolk

F.1.5.1 Pink-footed goose have a complex functional unit system i.e. those habitats which provide the overall ecological or behavioural requirements of a population, or part of it .The population of wintering pink-footed geese associated with the North Norfolk Coast SPA/Ramsar is known from observations and GPS telemetry studies (e.g. Orsted/WWT (2018)) to comprise of individuals using multiple roosts, resting, feeding and bathing areas. The nocturnal roosts in North Norfolk have traditionally been situated in intertidal areas with geese floating over high tide before settling later on saltmarshes, mud and sandbanks, with recent use of freshwater marshes e.g. Cley Marshes. The geese start arriving at feeding sites at dawn and may stay on one sugar beet field for the entire day, but after a few hours some may start moving onto e.g. nearby cereal fields.

F.1.5.2 The initial findings of Orsted/WWT (2018) for individuals in north Norfolk show seasonal ranges attaining 100 km² and greater (see Figure 1 of one bird's locations every 12 hours or multiples of in November 2017). In the early 1990s, visual observations of birds from the roost on Scolt Head, Norfolk, found that the birds fed on farmland between 3 and 15 km immediately in land. The initial findings of the Orsted/WWT (2018) study suggest daily movements from the roost may now be greater in north Norfolk (i.e. 5-10 km), with this likely to be a response to the increase in population which has also led to new roosts being formed in the region. One such roost is Cley Marshes, the nearest regularly nocturnal roost to the Hornsea Three onshore cable corridor, from which the bird shown in **Error! Reference source not found.** is shown to have flown the 7-9 km to forage in the latter.

F.1.5.3 In north Norfolk individual birds are found to utilise several different roosts and associated feeding areas within each range, using a number of different ranges over the winter period and making considerable movements between them (Orsted/WWT 2018).

F.1.5.4 The seasonal and daily foraging range from roosts of wintering pink-footed geese in Norfolk is 15-20 km (i.e. foraging distance from night roost during winter season), the maximum extent of which is shown in Figure 2.

Figure 1: The movement of one GPS tagged Pink-footed Goose in November 2017 (Orsted/WWT, 2018)

F.1.5.5 The pink-footed geese flocks in north Norfolk have been observed to use certain fields as day-time resting areas. In north Norfolk, typical day-time resting areas are arable fields of young cereal crops. They are distinct from the nocturnal roosts and always close to the feeding fields with their primary function to act as a refuge from temporary disturbance. At such times, the geese would immediately move to the resting area and remain there, generally without attempting to feed, before gradually filtering back to the feeding field after the disturbance had passed.

F.1.5.6 The southernmost record of pink-footed goose from the Hornsea Three 2016-2018 winter surveys (APP-137) was the village of Hempstead (approximately 7 km south of landfall, 10.4 km from the nearest known nocturnal roost, Cley Marshes).

F.2 Zone of influence

F.2.1.1 For the purposes of this outline plan, the Zone of Influence (ZoI) is considered to be the area where the cable corridor plus a 500m buffer interacts with the 10.4km foraging range of PFG from their roost at Cley Marshes, as shown in Figure 2. With respect to the onshore cable corridor this would effectively be between landfall and the village of Hempsted, which is approximately 7km south of the landfall.

F.2.1.2 Where the ZoI is referred to elsewhere in the outline plan it is intended to refer to the seasonal as well as spatial extent of PFG foraging, which is November-January inclusive.

F.2.1.3 The ZoI used in the final plan will be based on scientific evidence, the monitoring described in the Environmental Statement, and any additional monitoring commissioned by Hornsea Three.

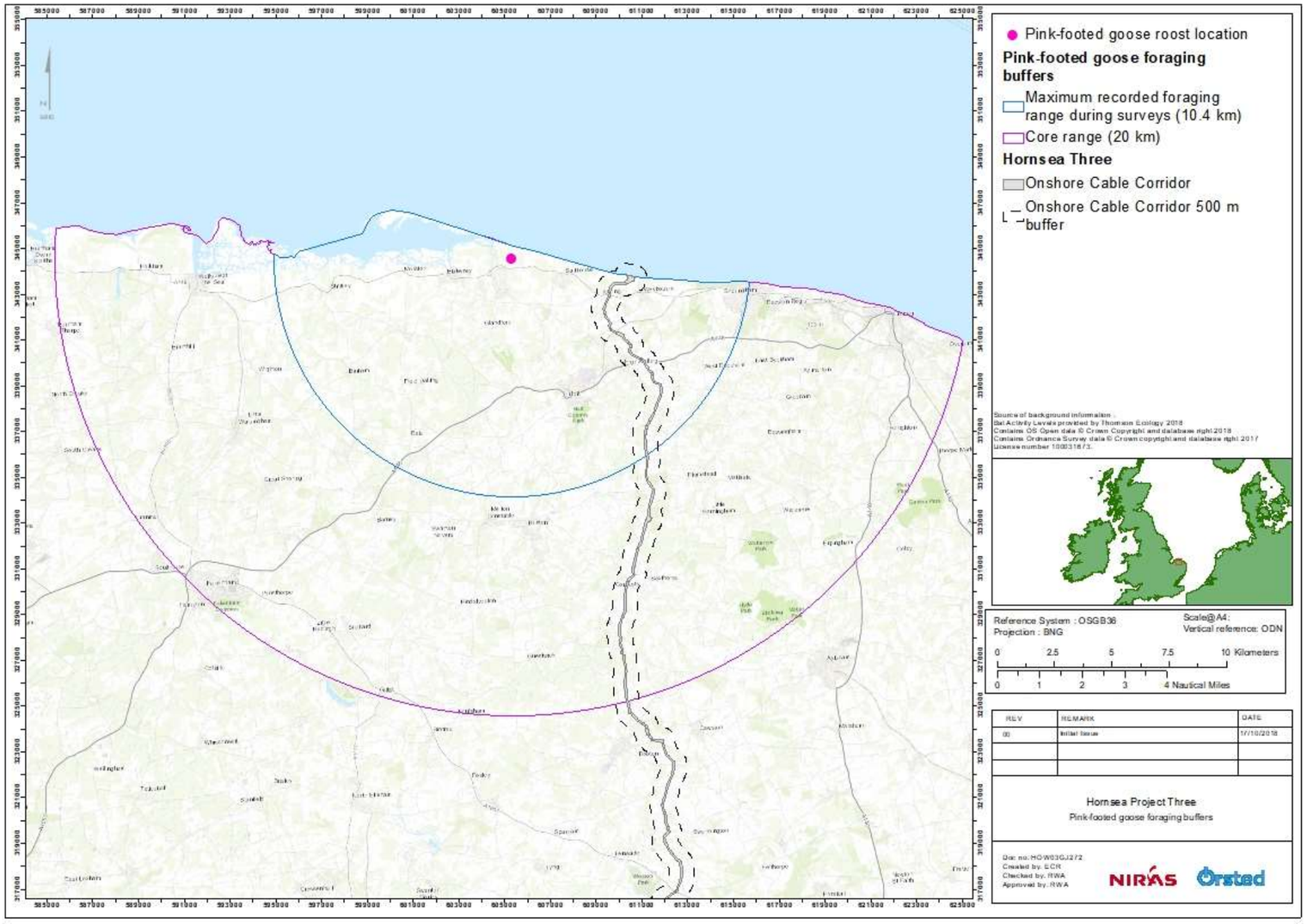

Figure 2: Pink-footed goose roost location

F.3 Decision tree process to inform mitigation

F.3.1.1 As seasonal, spatial and economic (beet harvesting schedules) aspects affect the existence of useable foraging habitat within the onshore cable corridor, there is considerable uncertainty about whether an impact as a result of cable installation will occur, and then the scale of such an impact on pink-footed geese. Therefore, a decision tree process is presented in this document. The process is designed to incorporate all relevant variables and milestones to inform mitigation that is both targeted and proportional.

F.3.1.2 A key aspect of potential mitigation is the requirement to consult with relevant farmers and landowners as to planting programme or undertake crop coverage survey from public rights of way in late summer, if feasible. Such information is often not available until months before potential interaction between harvested sugar beet and pink-footed geese and as it is a core component of determining whether an impact will occur at all, this further supports the process applied here.

Table 3-1 Decision tree process for mitigation/management

Timeline (indicative and to be confirmed in the final plan)	Process		Additional notes
TBC	Are any works proposed in the ZoI in November to January inclusive?		
Decision 1	No – there will be no disturbance impact pathway and therefore no mitigation required	Yes – go to next step	
TBC	Are 'intrusive' works, as defined in F.5.2, proposed in the ZoI in November to January inclusive?		
Decision 2	No – there will be no significant effect on the PFG population as a result of Hornsea Three works. The management described in F.5.3 will apply to the remaining works if the following steps are answered 'yes'.	Yes – go to next step	
April-September	Has sugar beet been planted in the ZoI?		Landowner input required – skip this step if not available
Decision 3	No – there will be no disturbance impact pathway and therefore no adverse effect on PFG.	Yes – go to next step	
June-September	Exclude from further consideration sugar beet fields to be (1) harvested and ploughed before November, or (2) lifted after January[2]. Are there any fields of sugar beet remaining in the ZoI?		Landowner input required – skip this step if not available
Decision 4	No – there will be no disturbance impact pathway and therefore no adverse effect on PFG.	Yes – go to next step	
TBC	Exclude from further consideration sugar beet fields of a size of 6 ha3 or less i.e. not favourable to foraging pink-footed geese. Are there any fields of sugar beet remaining in the ZoI?		
Decision 5	No – there will be no disturbance impact pathway and therefore no adverse effect on PFG.	Yes – go to next step	
TBC	At any one time within Nov-Jan, is it predicted that the area of post-harvest sugar beet within the ZoI of the pre-construction works and construction activities will represent more than half of the available area of post-harvest sugar beet within the ZoI i.e. onshore cable corridor plus 500 m buffer within 20 km of the nearest known nocturnal roost		
Decision 6	No – there is a lack of evidence to suggest indirect habitat loss within the ZoI that equates to no more than 50% of the available post-harvest sugar beet, will reduce the fitness of a significant group of pink-footed goose regardless of population scale.	Yes – mitigation is considered likely to be required. The exact mitigation will be in line with the principles described in this document and developed in discussion with Natural England.	

F.3.1.3 If there is not sufficient information available at the time of finalisation of the PFGMP to conclude that there would not be a significant effect on PFG as a result of Hornsea Three, intrusive works will be excluded from construction schedules within the ZoI as a precaution (see 39F.5.2).

F.3.1.4 This exclusion may be re-considered after commencement, if necessary, if sufficient evidence is available (in line with the factors listed in Table 3-1) with approval from Natural England.

[2] The fields that are not harvested before late February, are unlikely to become available subsequently as a food resource to wintering pink-footed geese as few remain at the roosts at Scolt Head to the west in North Norfolk Coast SPA in February (Mitchell and Hearn 2004, Acheson 2016)
[3] Applying findings from Gill (1996).

F.4 Required monitoring

F.4.1.1 The monitoring and engagement with landowners required to inform the decision tree process is listed in Table 4.1.

Table 4.1 Work required to ascertain planting and harvesting programme

Timeline	Actions
October - February	Monitoring surveys will be initiated the winter before construction to refine data on goose distribution and abundance. Surveys are expected to follow the methodology followed in 2017/18 [APP-137] in that areas 10.4 km from the nearest known roost within the construction corridor and 500m buffer will be included. In parallel to the decision tree process described below it is also considered appropriate to monitor pink-footed goose abundance and distribution during the onshore construction period of Hornsea Three.
April	Contact landowners to establish whether sugar beet has/is to be planted within the zone of influence.
August – September	Should contacting landowners not be successful in fully assessing the planting programme, a crop coverage survey of the zone of influence will be undertaken from public rights of way.
April – September	Contact landowners to establish whether sugar beet fields are planned to be (1) harvested and ploughed before November, or (2) lifted after January[4].

F.5 Mitigation

F.5.1.1 If the process in Table 3.1 suggests that mitigation is likely to be needed, Hornsea Three's ornithologists will consult with Natural England, addressing the actual rather than the maximum construction scenario assessed in the Environmental Statement. This consultation process will be based on, among other relevant inputs, robust scientific evidence and site-specific evidence. The goal of the discussions will be to establish whether the increased frequency of disturbance from the planned onshore construction works is likely to reduce the fitness of a significant group of PFG.

F.5.2 Exclusion of intrusive works

F.5.2.1 Any decision to exclude more intrusive works in the ZoI will be taken in sufficient time to be incorporated into the final construction schedule and be based on information available at the time of finalisation of the PFGMP.

F.5.2.2 Works which would be excluded from the ZoI in this scenario include:

- Fencing;
- Topsoil stripping;
- Cable trench excavation; and
- Duct installation.

F.5.2.3 Other pre-construction works (e.g. surveys) and construction activities associated with HDD and cable installation and cable jointing works may still occur in these periods due to their reduced need for personnel and equipment on site at any given time. The latter activities will be focused at specific points along the onshore cable corridor, between 750m and 2,500m apart depending on cable lengths, with work to take between 18 days and 18 weeks at any one locality.

F.5.3 Measures to limit disturbance during works

F.5.3.1 If any works are due to be carried out in the ZoI and the responses to Decisions 3 to 6 have been answered 'Yes', the following measures will be adhered to by all Hornsea Three personnel and contractors. The measures may be updated during detailed design if further relevant information becomes available:

- Toolbox talks/HSE briefings will be carried out with all Hornsea Three personnel operating on the cable corridor in the ZoI in November – January inclusive to make them aware of the potential presence and disturbance impact pathways for PFG, and identify any interactions between geese and construction activity not highlighted through the decision tree process;
- Construction teams will raise any risks to PFG to a suitably qualified ECoW, who will advise on how works should proceed at that location. This assessment will be based on an expert opinion of the birds' sensitivity to disturbance at a particular location and time, such as during periods of prolonged severe weather at a particular location.
- The ECoW will be responsible for ensuring any lessons learnt through one winter of construction are passed to and incorporated into any subsequent phase.

F.6 References

Acheson, N. (2016) Great bird reserves: Cley Marshes. British Birds 109, 706-723.
Gill, J.A. (1996) Habitat Choice in Pink-Footed Geese: Quantifying the Constraints Determining Winter Site Use. Journal of Applied Ecology, 33, 884-892.
Mitchell, C. and Hearn, R.D. (2004) Pink-footed Goose Anser brachyrhynchus (Greenland/Iceland population) in Britain and Ireland 1960/61 – 1999/2000. Waterbird Review Series, The Wildfowl and Wetlands Trust/Joint Nature Conservation Committee, Slimbridge.
Orsted/Wildfowl and Wetlands Trust (WWT) (2018) Orsted funded GPS telemetry study by the WWT over winters of 2016/2017 and 2017/2018. Accessed at: https://sites.google.com/view/telemetry/home, Jan 2019

[4] Fields that are not harvested before late February are unlikely to become available subsequently as a food resource to wintering pink-footed geese as few remain at the roosts at Scolt Head to the west in North Norfolk Coast SPA in February (Mitchell and Hearn 2004, Acheson 2016)

Appendix G Soil Management Strategy

G.1 Soil Management Strategy

G.1.1 Introduction and Overview

G.1.1.1 This document comprises the draft soil management strategy for the Hornsea Project Three Offshore Wind Farm (hereafter referred to as Hornsea Three) and is part of the Outline Code of Construction Practice. It sets out the measures that Orsted Hornsea Project Three (UK) Ltd (the Applicant) will take to ensure that land will be restored to a condition suitable to be returned to its former use and was listed as a mitigation measure in Volume 3, Chapter 6: Land Use and Recreation of the Environmental Statement (APP-078).

G.1.1.2 This strategy sets out the measures proposed to manage the soil resources associated with agricultural land impacted by the temporary and permanent onshore elements of Hornsea Three (landward of Mean High Water Springs (MHWS)). The onshore elements of Hornsea Three include:

- Permanent onshore HVAC booster station;
- Permanent onshore HVDC converter/HVAC substation;
- Temporary construction compounds (including the compounds for the onshore HVAC booster station and HVDC converter/HVAC substation);
- Temporary storage areas;
- Temporary access roads; and
- Temporary works associated with the construction of the onshore cable corridor and the installation of the onshore export cable.

G.1.1.3 This strategy includes the consideration of the soil resources that are available within the areas affected by the permanent infrastructure for the onshore HVAC booster station area and HVDC converter/HVAC substation area, but does not include a methodology for the stripping, storage and reuse of these materials as the land will be permanently lost from agriculture. An assessment of permanent land take has been undertaken in Volume 3, Chapter 6: Land Use and Recreation of the Environmental Statement (APP-078). If the onshore HVAC booster station and HVDC converter/HVAC substation areas were to be restored to agriculture at the end of the operational and maintenance phase, the soil resource information would be available to guide the decommissioning plan. The main construction compound is also excluded from the scope of this strategy as it does not comprise agricultural land.

G.1.1.4 The draft soil management strategy is based on recognised best practice guidance provided in the Department for Environment, Food and Rural Affairs (Defra) Code for the Sustainable Use of Soils on Construction Site (Defra, 2011) and the Ministry of Agriculture, Fisheries and Food (MAFF) MAFF Soil Handling Guide (MAFF, 2000). The MAFF guide is currently being updated and the latest guidance will be incorporated into the final strategy.

G.1.1.5 The principle objectives of the strategy are to:

- Conserve soil resources;
- Avoid damage to soil structure;
- Maintain soil drainage; and
- Identify principles for the reinstatement of the soil profile.

G.1.1.6 The structure of the strategy is as follows:

- Section 2 – proposals for the management of the soil handling process;
- Section 3 - provides a summary of the soil survey work that has been undertaken in the preparation of the Environmental Statement and outlines the further work required to implement the soil management strategy and proposals for the management of the soil during the construction period;
- Section 4 - proposals for soil stripping;
- Section 5 - proposals for soil storage;
- Section 6 - proposals for ground preparation and soil replacement;
- Section 7 - soil handling conditions and consistency tests; and
- Section 8– cultivation and initial aftercare.

G.1.1.7 This soil management strategy will be a living document. During the detailed design stage, the strategy will be developed to include seeding arrangements and the results of further soil surveys. As it forms part of the Code of Construction Practice, the final soil management strategy will be agreed with the relevant planning authority and will be implemented prior to the commencement of works relating to the onshore elements of Hornsea Three on agricultural land.

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G.2 Management of Soil Handling Process

G.2.1 Supervision

G.2.1.1 The Defra Code for the Sustainable Use of Soils on Construction Sites (Defra, 2011) includes in its recommendations for Soil Planning and Management (Toolbox Talk 2) that there should be a person responsible for supervising soil management on site. In accordance with the guidance in the Defra Code, Hornsea Three will provide appropriate resources to supervise soil management throughout the construction period.

G.2.1.2 Hornsea Three have liaised with landowners and their agents during the preparation of the DCO application. This engagement will continue throughout the construction period (via an Agricultural Liaison Officer (ALO)) to maintain consistent dialogue with those affected by Hornsea Three.

G.2.1.3 In addition to, or as part of the ALO role, a soils specialist will be appointed to monitor soil handling during the construction period. Guidance from Defra (Defra, 2011) and previously in earlier work carried out in connection with Wye College on behalf of the DoE (reclamation of mineral working to agriculture) identified that on-site supervision at key times during the soil handling, movement and replacement process benefited the restoration process.

G.2.1.4 There will be regular monitoring and reporting on soil handling operations during construction with additional visits during critical phases of soil handling, in particular during the initial strip and store of soil materials. An effective programme of monitoring will also be implemented to ensure the soil handling processes are being appropriately implemented.

G.2.1.5 The implementation of other environmental management measures will be supervised by the Clerk of Works and the Ecological Clerk of Works as set out in the Outline Code of Construction Practice.

G.2.2 Biosecurity

G.2.2.1 The Outline Code of Construction Practice outlines biosecurity measures to be incorporated as part of Hornsea Three. These measures will be developed in consultation with the statutory authorities and individual landowners prior to the commencement of construction.

G.2.2.2 Defra's Animal and Plant Health Agency (APHA) will be contacted to identify any known recorded problems within the Hornsea Three land use and recreation study area (as defined in Volume 3, Chapter 6: Land Use and Recreation of the Environmental Statement (APP-078)), prior to commencement of the construction of the onshore elements of Hornsea Three.

G.3 Baseline Conditions – Soil Resources

G.3.1 Published soils information

G.3.1.1 At this stage, the draft soil management strategy is based on the baseline information collated as part of the Environmental Impact Assessment (EIA) process (see Volume 3, Chapter 6: Land Use and Recreation of the Environmental Statement (APP-078)).

G.3.1.2 The distribution of the main soil types taken from the published soils information has been identified in Volume 6, Annex 6.3: Agricultural Land Classification and Farm Holdings Figures of the Environmental Statement (APP-158). The descriptions of the main soil types that are located within Hornsea Three land use and recreation study area in relation to the four landscape regions (i.e. Coastal Plain, Cromer Ridge, Sand-Loam Uplands (or the Sand and Gravel Platform) and the Boulder Clay Plateau) are set out in Annex A. The descriptions identify the properties and characteristics of the main soil types and their potential limitations.

G.3.2 Surveys for the Environmental Statement

G.3.2.1 As part of the work undertaken during the EIA process (as reported in Volume 3, Chapter 6: Land Use and Recreation of the Environmental Statement (APP-078)), Agricultural Land Classification (ALC) surveys were carried out in areas of agricultural land temporarily and permanently affected by Hornsea Three. The survey comprised two parts:

- A reconnaissance survey of the soils to identify the nature and ALC of the soil types identified from the review of the published information. This included the use of hand auger borings and soil pits where necessary to confirm the characteristics of soil profiles within each of the soil types; and
- A detailed ALC survey of the areas where there will be permanent loss of agricultural land (i.e. the onshore HVAC booster station area and HVDC converter/HVAC substation area) comprising hand auger borings taken at approximately 100 m intervals across the area and soil pits as necessary.

G.3.2.2 The results of the soil survey (including descriptions of the auger borings) are reported in Volume 6, Annex 6.2: Soil Survey Data of the Environmental Statement (APP-157) and illustrated in Volume 6, Annex 6.3: Agriculture Classification and Farm Holdings Figures of the Environmental Statement (APP-158).

G.3.3 Pre-construction survey work

G.3.3.1 Pre-construction detailed soil survey work will be undertaken by a competent person (e.g. a soil scientist) in order to produce specific soil resource topsoil and subsoil unit plans and restoration specifications for areas of agricultural land within individual land holdings that will be occupied by Hornsea Three. These surveys will form the basis of the pre-construction condition assessments of the land prior to soil stripping operations and will be used to monitor the progress of soil handling and restoration operations.

G.3.3.2 The survey work will include the identification of the physical characteristics of profiles at a standard density of 100 m intervals (with additional profiles examined where the 100 m grid sampling does not enable a suitable density of sampling in an agricultural enclosure that will otherwise be missed.). Soil pits will also be examined at appropriate locations to provide additional detail on soil structure and stoniness. The survey will provide information on the following soil physical characteristics:

- Soil horizon depths for topsoil and subsoil horizons;
- Soil textures of all horizons;
- Soil colour;
- Stone contents, estimated from augering, confirmed by soil pit excavation/ and or sample analysis;
- Presence and characteristics of mottling, a soil wetness indicator;
- Presence of manganese concretions, a soil wetness indicator;
- Identification of gleyed horizons;
- Identification of slowly permeable layers; and
- Identification of impenetrable rock layers.

G.3.3.3 The characteristics listed above are standard parameters to be recorded in an ALC survey and were applied in the surveys used to inform the Environmental Statement.

G.4 Soil Stripping

G.4.1.1 Soil stripping will be required in areas that will be temporarily used to support the construction of the onshore elements of Hornsea Three. The areas where soil stripping will be required are:

- Temporary construction compounds (including the compounds for the onshore HVAC booster station and HVDC converter/HVAC substation);
- Temporary storage areas;
- Temporary access roads; and
- Temporary works associated with the construction of the onshore cable corridor and the installation of the onshore export cables.

G.4.2 Temporary construction compounds and storage areas

G.4.2.1 For each of the construction compound and storage areas, the depths of different topsoil units will be identified within the area, based on the survey of soil resources as described in section 3.

G.4.2.2 Where soil types and topographic conditions are suitable, compounds and storage areas may be established without soil stripping with geotextile and stone laid directly over the in-situ topsoils. In compound areas where topsoils need to be stripped the following methods are proposed.

G.4.2.3 In areas designated for topsoil storage only, underlying in-situ topsoils will not need to be stripped from the footprint of the topsoil stores. In other locations, the topsoils will then be stripped applying the appropriate method from the MAFF Soil Handling Guide (MAFF, 2000) (Appendix B). This will follow one of the following best practice methods:

- Sheet 1 – Excavators and Dump Trucks; or
- Sheet 13 – Bulldozers and Dump Trucks.

G.4.2.4 The initial strip of the construction compounds will be subject to monitoring to ensure that the Handling Method (see Appendix B) is implemented correctly. Routes that machinery can use to move to and from the stripping zones will be clearly identified to reduce excessive trafficking of subsoils, as far as possible.

G.4.3 Temporary access roads

G.4.3.1 For the lengths of temporary access roads, the depths of different topsoil units will be identified based on the survey of soil resources as described in section 3.

G.4.3.2 The topsoils will then be stripped applying the appropriate method from the MAFF Soil Handling Guide 1, using excavators to remove topsoil from the footprint of the proposed access road to create bunds alongside the access road alignment.

G.4.3.3 The initial strip of temporary access roads will be subject to monitoring to ensure that the Handling Method (MAFF, 2000) is implemented correctly. Once the soil has been stripped from these areas, geotextile matting and aggregate will be laid to create the temporary access roads.

G.4.4 Onshore cable corridor

Topsoil strip

G.4.4.1 For the length of the onshore cable corridor, the depths of different topsoil units will be identified based on the survey of soil resources as described in section 3.

G.4.4.2 The topsoils will then be stripped and stored within the temporary area either side of the onshore cable corridor, applying the appropriate method from the MAFF Soil Handling Guide (MAFF, 2000). In some locations along the onshore cable corridor, the width of the corridor narrows (e.g. to avoid sensitive receptors). Where this results in there being insufficient room to store the soil within the corridor, soil may be stored in the storage areas adjacent to the onshore cable corridor.

G.4.4.3 Soil stripping and storage will follow one of the following best practice methods:

- Sheet 1 – Excavators and Dump Trucks; or
- Sheet 13 – Bulldozers and Dump Trucks

G.4.4.4 The initial strip of the onshore cable corridor will be subject to monitoring to ensure that the Handling Method (MAFF, 2000) is implemented correctly. In particular, it is important that haul routes to and from the stripping zones are clear and established in advance, to ensure that excessive trafficking of subsoils is reduced, as far as possible.

Subsoil strip

G.4.4.5 For the length of the onshore cable corridor, the depths of subsoil units will be identified based on the survey of soil resources as described in section 3. Stripping of subsoil resources along the length of the onshore cable corridor will be limited to the construction of the cable trenches (up to six trenches), HDD entry/exit pits at crossing locations, joint bays and link boxes.

G.4.4.6 The requirement to strip more than one subsoil horizon in some sections is dependent on the requirement for the ALC grading to be maintained within the restored soil profile. The detailed survey work that has already been carried out indicates that key determinants in the requirement to strip upper and lower subsoil horizons for soils affected by a droughtiness and wetness limitations will be dependent upon:

- The climatic variability in moisture deficits along the onshore cable corridor in relation to the droughtiness limitation;
- The distribution of sandy textured materials within profiles, to determine the available water capacity of the profile in the assessment of soil droughtiness. In particular, the presence of a medium sandy loam topsoil in some areas means that the distribution of variable depths of loamy medium sands and sands within subsoil horizons does not affect the ALC Grade according to droughtiness;
- The distribution of stony horizons, that reduce the available water capacity of the profile, particularly in the assessment of moisture deficits for potatoes in the ALC system; and
- The presence and depth of a slowly permeable layer in the assessment of soil wetness. Where the location of this is at a shallow depth within the profile, with only a thin upper subsoil, there may be no change in grading if the subsoil materials are stripped as a single layer.

G.4.4.7 Where subsoil horizons can be stripped together, with no reduction in ALC when restored, these will be stripped in a single operation, applying best practice guidance in MAFF Soil Handling Sheet 1 (MAFF, 2000).

G.4.4.8 Where the thicknesses and characteristics of upper and lower subsoil horizons determine the quality of the land, these will be stripped and stored separately alongside the cable trench in order to reduce the potential for the loss of land quality, as far as possible.

G.5 Soil Storage

G.5.1 Construction compounds and storage areas

G.5.1.1 For the construction compounds and storage areas, soils will be moved directly from the area being stripped to areas that have been identified as topsoil and subsoil (where required) storage locations within the construction compounds and storage areas. It is essential that the locations of soil storage mounds are planned in advance to ensure that the potential for damage to the soil storage mounds and/or contamination of the mounds with foreign construction materials is limited, as far as possible. Soil storage mounds will be located away from surface watercourses and measures to control runoff will be implemented as set out in the final CoCP. All storage mounds intended to remain in situ for more than three months or over the winter period will be seeded with weed control and other necessary maintenance (e.g. mowing and re-seeding) carried out as discussed and agreed with landowners and agents.

G.5.1.2 The height of the topsoil and subsoil mounds will be controlled: topsoil storage mounds will not exceed 4 m in height (Defra Code 2011) and subsoils 5 m in height.

G.5.1.3 Materials from individual topsoil and subsoil units and within individual land holdings will be stored separately, as identified in the site-specific soil resource plans, described in paragraph G.3.3.1 of this strategy.

G.5.1.4 The method of storage mound construction will be in accordance with that described for a single tier mound in Sheet 2 (Building Soil Storage Mounds with Excavators and Dump Trucks) of the Good Practice Guide for Handling Soils (MAFF, 2000).

G.5.1.5 During the restoration of the construction compounds and storage areas, soil will be excavated (removed) from the mounds by the method described in Sheet 3 Excavation of Soil Storage Mounds with Excavators and Dump Trucks of the Guide (MAFF, 2000).

G.5.2 Onshore cable corridor

G.5.2.1 For the storage of topsoils alongside the edge of the onshore cable corridor, or in nearby designated storage areas, the same principles will be applied as for the construction compounds as described above.

G.5.2.2 With regards to the temporary removal of subsoils within the cable trenches, the stripped subsoil horizons will be stored separately alongside the cable trench.

G.5.3 Temporary access roads

G.5.3.1 As described in section 4 above, topsoil mounds (not exceeding 4 m in height) will be created by direct placing by the excavator alongside the edge of the access roads. All storage mounds intended to remain in situ for more than three months or over the winter period will be seeded with weed control and other necessary maintenance carried out as discussed and agreed with landowners and agents.

G.6 Ground Preparation and Soil Replacement

G.6.1 Loosening operations

G.6.1.1 Following the removal of all construction materials (including temporary access road surface material e.g. aggregate and geotextile matting) and prior to the replacement of stripped soil materials, loosening of the underlying soil will be undertaken. Loosening will be focused on those areas that have been stripped and where the underling subsoils may have become compacted. Soil loosening will be undertaken using a wing tined cultivator to ensure the compaction is broken up prior to the replacement of topsoil horizons.

G.6.1.2 The depth to which the loosening will be required will depend on the nature of soil type and the extent of any compaction that may have occurred. The depth and location of any underdrainage will also be taken into account. The depth of the loosening will be assessed on site, prior to the works being undertaken.

G.6.2 Soil replacement

Construction compounds

G.6.2.1 Following loosening operations, the topsoils will then be replaced on the construction compounds and storage areas in accordance with the appropriate method from the MAFF Soil Handling Guide (MAFF, 2000). This will follow one of the subsequent best practice methods:

- Sheet 4 – Excavators and Dump Trucks; or
- Sheet 15– Bulldozers and Dump Trucks

G.6.2.2 The replacement of the topsoils across the construction compounds and storage areas will be subject to on site monitoring to ensure that the Handling Method is implemented correctly.

G.6.2.3 These methods enable the topsoils to be replaced without trafficking over the newly loosened subsoil material, as far as possible. Haul routes to and from the soil storage mounds to the replacement areas will be clearly identified to reduce excessive trafficking of subsoils, as far as possible.

Onshore cable corridor

G.6.2.4 The methods for the replacement of topsoil materials along the onshore cable corridor will be similar to those described for the construction compounds.

G.6.2.5 For the subsoil horizon(s) stored alongside the cable trenches (and HDD entry/exit pits, joint bays and link boxes) for a short period of time, where more than one subsoil horizon has been stripped, the subsoil materials will be replaced (loose tipped) by excavator in sequence, with lower subsoils replaced first and then overlain by upper subsoils.

G.7 Soil Handling and Consistency Test

G.7.1.1 Hornsea Three lies in a climatically dry part of the country. Traditionally, soil handling between the months of November – March is limited, with careful consideration of soil movements outside of this period. However, in this instance it may be more appropriate to consider a Plastic Limit based field assessment method for specific soil units to assess the suitability of soil handling conditions. This will apply to the light textured sandy topsoils that dominate much of the onshore cable corridor which remain dry and friable for most of the year.

G.7.1.2 The consistency test of whether or not a soil is dry and friable can be carried out as follows:

- As assessment may be made by attempting to roll a ball of soils into a thread on a plate or hard surface using light pressure from the flat of the hand. If a long thread of less than 3 mm diameter can be formed, the soil is wetter than the lower plastic limit and soil handling should not take place until the soils have dried out. If the soil crumbles before a long thread of 3mm diameter can be formed, then the soil is dry enough to handle.

G.7.1.3 Soil handling will, irrespective of Plastic Limit assessments, cease if the ground is covered in snow or there is ponding of water on the surface. Soil handling operations will be curtailed or suspended under the following conditions:

- In light rain or drizzle soil handling may continue for up to four hours unless the soils are already in too moist a state; or
- In sustained heavy rain, soil handling should cease and not restart until soil consistency criteria can be met.

G.8 Aftercare – Cultivations

G.8.1.1 The reinstated soils will be cultivated to enable the initial aftercare crop to be established. The cultivations required will vary according to soil type, site and weather conditions at the time but could include the use of plough, power harrow and roll. In addition, stone picking may also be required where excessive stone volumes have become incorporated in reinstated topsoil areas.

G.8.1.2 The specified cultivations will be subject to discussion with the landowner prior to implementation.

G.8.1.3 During the aftercare period, there will be annual monitoring of physical soil characteristics and soil nutrient levels to set aftercare management requirements for the following year. The land will be handed back to the owner at the earliest opportunity once the restored land is in a suitable condition to be returned to its former use.

G.9 References

Department of Food and Rural Affairs (2011) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites. London, Defra.

Ministry of Agriculture, Fisheries and Food (2000) MAFF Soil Handling Guide. Available online: http://webarchive.nationalarchives.gov.uk/20090317221756/http://www.defra.gov.uk/farm/environment/land-use/soilguid/index.htm [Accessed: 25 July 2018].

Ministry of Agriculture, Fisheries and Food (199-) Agricultural Land Classification detailed Post 1988 ALC survey. Available online: http://publications.naturalengland.org.uk/category/6249382855835648 [Accessed: 25 July 2018].

Annex A: Published Soils Information

GA.1 In the north, there is a relatively narrow strip on the Coastal Plain where the soils are developed mainly in Marly Drift and are placed in Association 343g Newmarket 2 (see description below).

GA.2 In the **Newmarket 2** Association the drift is overlain by or mixed with a variable thickness of sandy material. This Association is therefore described as a collection of "*Shallow well drained calcareous coarse loamy and sandy soils over chalk rubble associated with well drained deeper coarse loamy and sandy soils often in an intricate pattern. Slight risk of water erosion*".

GA.3 The main limitation of the soils in Association 343g Newmarket 2 is droughtiness because of the relatively limited rooting depth, though typical profiles would be more moisture retentive than very shallow soils developed directly over chalk.

GA.4 The Hornsea Three onshore cable corridor then rises onto the Cromer Ridge which is followed to the south by the so-called Sand-Loam Uplands or the Sand and Gravel Platform. This region extends south as far as Norwich. In both regions, the main parent materials consist of glaciofluvial sands and gravels.

GA.5 Where the soils are formed mainly in these sands and gravels, for example on the Cromer Ridge itself, Associations 551f Newport 3 and 551g Newport 4 are found.

GA.6 The **Newport 3** Association (551f) is developed in glaciofluvial drift with little or no superficial aeolian drift. It is described as a collection of "*Deep, well drained sandy and coarse loamy soils. Some coarse and fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging. Risk of wind erosion*". In this description "*fine loamy*" and "*coarse loamy*" mean medium textures, the former tending to heavier, more clayey textures, the latter to lighter, more sandy textures.

GA.7 The well drained sandy and coarse loamy soils are the Newport (formerly Freckenham) and Wick (formerly Hall) series respectively, as described above. The soils with slowly permeable subsoils are found where the superficial covering of sand and gravel is relatively thin and/or partly incorporated with heavier glacial till material and most belong to the coarse loamy Wighill (formerly Attlebridge) series. The glacial till derived horizons in the lower parts of the profiles are responsible for the impeded drainage, the result of which is colour mottling and/or greyish colours in these horizons and immediately above them.

GA.8 The main limitation is droughtiness which is more pronounced in these sandy soils than in the more loamy soils of the Wick Associations.

GA.9 The **Newport 4** Association (551g) is developed in glaciofluvial drift with effectively no superficial aeolian drift and so it is probably the sandiest of the Newport Associations. It is described as a collection of "*Deep well drained sandy soils. Some very acid soils with bleached subsurface horizon especially under heath or in woodland. Risk of wind erosion*". The well drained sandy soils are those of the Newport (formerly Freckenham) series. A typical profile of the well-drained sandy soils (i.e. a typical Newport (formerly Freckenham) series) would have a moderately thin, often stony, sandy loam or loamy sand topsoil, overlying loamy sand or sand, becoming pure sand within 40 cm from the surface.

GA.10 The main limitation of the soils is soil droughtiness which is particularly pronounced in these very sandy soils.

GA.11 Where the sands and gravels are themselves covered by aeolian drift, often referred to as the Norwich Brickearth there is an increase in the occurrence of deeper, more loamy and more moisture-retentive soils, especially in valley bottoms where hill-wash has increased the thickness of the loamy material. These are placed in Associations 541s Wick 2 and 541t Wick 3.

GA.12 The **Wick 2** Association (541s) is the less prevalent of the two Wick Associations found within the Hornsea Three land use and recreation study area. It is found where the geological map indicates sand and gravel, brickearth (i.e. aeolian drift) and patches of glacial till. It is thus described as being developed in "*glaciofluvial and aeolian drift and till*". It differs from Association 541t Wick 3 in having both a generally greater thickness of loamy surface material and having, in places, soils which are influenced by underlying glacial till (absent in areas of Association 541t Wick 3). Association 541s Wick 2 is described as a collection of "*Deep well drained coarse loamy soils often stoneless. Some similar soils with slowly permeable subsoils and slight seasonal waterlogging. Slight risk of water erosion*". In this description, the term "*coarse loamy*" indicates textures in the sandy loam to sandy silt loam range.

GA.13 The more detailed 1:25,000 scale soil map for the Barningham/Sheringham area shows an assortment of soils of which the well-drained, coarse loamy Wick (formerly Hall) series appears to be the most common. It is, however, variously accompanied by the sandier Newport (formerly Freckenham) series, including some notably stony ones; the deeper Sheringham series; as well as two series showing signs of poor drainage at depth, the Aylsham and Wickmere series, which are both influenced by the presence of slowly permeable glacial till material at depth.

GA.14 The quality of the land is likely to vary from Grade 2 on the deep Sheringham soils, to Subgrade 3a on typical Wick (formerly Hall) series, to 3b on the sandier Newport (formerly Freckenham) series. The poor drainage at depth of the Aylsham and Wickmere series can readily be rectified and in this relatively dry climatic area is not a major limitation. They too suffer mainly from summer droughtiness in this climatic area, but probably would qualify for Grade 2.

GA.15 The **Wick 3 Association** (541t) is found on sand and gravel but where this is covered, at least in places, by aeolian drift and is dominated by Wick series soils. Association 541t Wick 3's main difference from Association 541s Wick 2 is that it is found where the aeolian drift is thinner and the soils are accordingly more sandy at depth. The generalised description of Association 541t Wick 3 is accordingly that it is a collection of "*Deep well drained coarse loamy often stoneless soils. Some similar sandy soils. Complex soil pattern locally. Risk of water erosion*". In this description, the term "*coarse loamy*" indicates textures in the sandy loam to sandy silt loam range and the term "*sandy*" indicates loamy sand and sand textures.

GA.16 The main limitation of the three main soils from the Wick 3 Association, Wick (formerly Hall), Newport (formerly Freckenham) and Sheringham, is droughtiness and the degree of limitation depends on the thickness of loamy material above the sandy and/or stony substrate. The sandiest and most drought prone Newport Series are most susceptible to droughtiness and are likely to be graded 3b, whilst the Wick (formerly Hall) series has a greater thickness, between 40 and 70 cm, of surface loamy material which would typically give Grade 3a while the Sheringham series with more than 70 cm of loamy material would be in Grade 2.

GA.17 Two nearby areas of this Association south of Holt have been mapped in more detail by MAFF using the revised ALC system and show a mixture of Grade 2, 3a and 3b land.

GA.18 Just north of Salle, the Hornsea Three land use and recreation study area passes southwards onto the Boulder Clay Plateau. These soils are formed in or greatly influenced by the underlying slowly permeable glacial till (boulder clay) and many show signs of impeded drainage. They are categorised as belonging to Associations **572n Burlingham 1 and 572p Burlingham 3**. Land quality, as elsewhere on the Hornsea Three onshore cable corridor, is variable with both winter wetness and summer droughtiness having to be taken into account. Detailed surveys of land in these Associations indicate the likelihood of substantial areas of Grade 2 and Subgrade 3a with only minor amounts of Subgrade 3b.

GA.19 The soils of the Burlingham 1 Association are formed in clayey or fine loamy chalky till and Head (a locally derived superficial drift) which partly covers glaciofluvial sands and gravels. This gives a considerable range of soils and the Association is described as a collection of "*Deep coarse and fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging. Some deep well drained coarse loamy and sandy soils*". In this description "*fine loamy*" and "*coarse loamy*" mean medium textures, the former tending to heavier, more clayey textures, the latter to lighter, more sandy textures.

GA.20 The soils with the fine loamy textures and slowly permeable subsoils are the Burlingham series *per se*, found in areas dominated by glacial till together with the more clayey Ashley and Hanslope series all of which become chalky at depth. These soils make up between a third and half of the land within the Association. A typical Burlingham series profile has a sandy loam or sandy clay loam topsoil and subsoil, mottled at depth due to the slowly permeable underlying chalky clay (glacial till) which is usually encountered at about 80 cm from the surface. After appropriate drainage, such profiles would be classed as moderately well drained (Wetness Class II).

GA.21 The corresponding coarse loamy soils with slowly permeable subsoils are in the Wighill (formerly Attlebridge) series, and together with the better drained coarse loamy Wick (formerly Hall) series are found on the Head deposits. The deep well drained sandy soils are the Newport (formerly Freckenham) series similar to those already described above.

GA.22 Areas shown as this Association have been the subject of more detailed surveys by MAFF in the 1990s. Although they do not specifically refer to soil series, descriptions of typical soils indicate that there are substantial areas of sandy Newport (formerly Freckenham) series but only relatively small areas of heavier textured soils, possibly Wighill (formerly Attlebridge) series. There is no mention of any soils directly on chalky till or other chalky drift (Ashley and Swaffham Prior series).

GA.23 Within Association **Burlingham 3** (572p), typical soils of this Association are formed in clayey or fine loamy chalky till and Head (a locally derived superficial drift). These tend to have impeded drainage, but the Association also includes better drained soils formed in sandy glaciofluvial sands and gravels. Thus, Association 572p Burlingham 3 is described as a collection of "*Deep fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging. Some similar fine or coarse loamy over clayey soils. Some deep well drained coarse loamy over clayey, fine loamy and sandy soils*". In this description "*fine loamy*" and "*coarse loamy*" mean medium textures, the former tending to heavier, more clayey textures, the latter to lighter, more sandy textures.

GA.24 Significant areas of the land in this Association within the Hornsea Three land use and recreation study area have been the subject of detailed surveys carried out by MAFF in the 1990s. Although they do not use series names it would seem that, in general, only two main soil types are considered to be present. The first consists of soils which have developed over underlying chalky boulder clay drift. Typical profiles have a slightly stony sandy loam or sandy clay topsoil overlying similar or sometime stonier upper subsoils which in turn overlie clayey lower subsoils below 40-75 cm depth. In many locations, the clay overlies a friable chalky drift below approximately 80 cm. These profiles are typically non-calcareous in the upper horizons and become calcareous as the underlying chalky drift is approached. Soil drainage is assessed predominantly as wetness class II with smaller areas of wetness class III and I. Such soils are similar to those described in other publications as the Burlingham series *per se* (i.e. the "*deep fine loamy soils with slowly permeable subsoils*" of the generalised description of the Association).

GA.25 The second main soil type occurs where the parent material is glacial sand and gravel. The well drained soils typically comprise variably stony, sandy loam, or less frequently loamy sand topsoils over similar or lighter, slightly or moderately stony subsoils which may extend to depth or overlie gravel below 40 - 60 cm from the surface. These are the "*deep well drained coarse loamy and sandy soils*" of the Newport (formerly Freckenham) series found frequently elsewhere along the entire Hornsea Three land use and recreation study area.

GA.26 Where the Hornsea Three land use and recreation study area crosses the valleys of the Glaven, Bure, Wensum and Yare and their main tributaries the soils are poorly or very poorly drained and often peaty. Three Associations, **861b Isleham 2, 871c HANWORTH and 1024b ADVENTURERS 2.**