AQUIND Limited

AQUIND INTERCONNECTOR

Onshore Outline Construction Environmental Management Plan

The Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 – Regulation 5(2)(q)

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CONTENTS

TABLES

PLATES

APPENDICES

1. INTRODUCTION

1.1. PURPOSE OF THE ONSHORE OUTLINE CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

1.1.1.1. This Onshore Outline Construction Environmental Management Plan ('CEMP') has been prepared on behalf of AQUIND Limited ('The Applicant') to support the application for a Development Consent Order ('DCO'). The application for the DCO is made in respect of the UK elements of AQUIND Interconnector Project which will operate between France and the UK.

1.1.1.2. The DCO Application for the UK elements covers the parts of the Project located onshore in the UK ('Onshore Components'); and in the UK Marine area, defined as all of that part of the Project from the Mean High Water Spring ('MHWS') mark in the UK out to the limit of the UK/France Exclusive Economic Zone ('Marine Components'). Together the Onshore Components and the Marine Components comprise the 'Proposed Development', in respect of which the DCO Application is made. Refences to the Order Limits and the Site in this document, and within any of the appendices or plans enclosed within, are only in relation to the Order Limits and the Site, as applicable, to the Onshore Components of the Proposed Development.

1.1.1.3. This Onshore Outline CEMP covers the Onshore Components:

- Works at the existing National Grid Lovedean substation in Hampshire to facilitate the connection of the Project to the Great Britain electrical transmission network, the National Grid;
- Underground High Voltage Alternating Current ('HVAC') Cables each of which is paired with a smaller diameter fibre optic cables, connecting the National Grid Lovedean substation to the proposed Converter Station;
- The construction of a Converter Station comprising a mix of buildings, outdoor electrical equipment and telecommunications equipment and a Works Compound and Laydown Area; Access Road, associated haul roads, attenuation features and landscaping;
- Up to two Telecommunications Buildings (one for each circuit) to be located outside the main Converter Station security fence;
- Two pairs of underground High Voltage Direct Current ('HVDC') Cables each of which is paired with a smaller diameter fibre optic cables to run from the Converter Station to the Landfall site in Eastney (near Portsmouth); and

- Infrastructure to join the Onshore and Marine HVDC Cables together at the Landfall, and two Optical Regeneration Stations ('ORS') (one for each cable circuit).

1.1.1.4. The purpose of a CEMP is to establish good management practices to ensure that the construction work considers aspects of environmental protection within the context of compliance with local legislation and minimise impacts on both the general public and the environment. The CEMP will set out the overarching principles for environmental management of the onshore construction of the Proposed Development. The Environmental Constraints Plans in Appendix 1 illustrate the relevant environmental constraints for the Proposed Development.

1.1.1.5. Assuming the DCO is granted, the Applicant will appoint a Contractor (or lead contractor for each work package) who will have demonstrated that they are competent in managing the effects of construction on the environment. This is important as it will be the duty of the appointed contractor and its subcontractors to follow the environmental management and mitigation arrangements prescribed in the relevant CEMP, to minimise environmental risks and ensure compliance with relevant requirements of the DCO.

1.1.1.6. This Onshore Outline CEMP reflects environmental requirements, which have been identified for action as part of the DCO Application. CEMPs would be produced in accordance with this Onshore Outline CEMP for each of the relevant parts of the Proposed Development. Each CEMP would explain how the activities of contractors and sub-contractors would comply with its requirements, including where necessary the production of subsidiary plans in relation to specific construction matters.

1.1.1.7. Once a contractor is appointed and during construction for the relevant part of the Proposed Development, CEMPs will be live documents and will be periodically reviewed and updated by the appointed contractor every six months, or as required, to satisfy all contractual and legislative requirements and ensure environmental risks are managed and mitigated throughout. In particular, it will be updated to take account of the following:

- Changes in detailed design;
- Changes in external factors such as regulations and standards;
- Any unforeseen circumstances as they arise such as new protected species or new archaeological finds and provide a mitigation framework for this;
- Good construction practices and ensure these are adopted and maintained throughout;
- The results of audits and inspections; and
- Learning points from environmental near misses and accidents.

1.1.1.8. This Onshore Outline CEMP is solely for the environmental management associated with the Onshore Components, with a separate Outline CEMP provided for the Marine Components in the Marine Outline CEMP (APP-488).

1.1.1.9. The Onshore Outline CEMP outlines mitigation that will be applied in some cases ‘where practicable’. The final routing of the Onshore Cable Route within the order limits will be determined following the grant of the DCO, due to routing constraints associated with environmental constraints, including utilities. For example, in some instances it may prove not possible to avoid certain tree root protection areas. However, measures which are “where practicable” must be applied where they reasonably can be applied.

1.2. LEGAL COMPLIANCE

1.2.1.1. Relevant legislation applies to the works to be undertaken. The expectation is that all relevant legislation, including requirements for licences, permits and/or consents shall be identified and information provided on how compliance is to be achieved, as part of the construction process, through the use of a Project Consents Register.

1.2.1.2. The relevant applicable legislation and regulations will be identified from, but not limited to, the list provided in Appendix 2. The list of relevant legislation and its applicability to the Site and the construction works will be reviewed and updated whenever necessary.

1.3. STRUCTURE OF THE ONSHORE OUTLINE CEMP

1.3.1.1. This Onshore Outline CEMP is based on established good management practice through British Standards and Construction Industry Research and Information Association (‘CIRIA’) guidance, and includes the following information:

- **Site Information and the Proposed Development**: including site and the surrounding area and a summary of the key environmental receptors associated with the construction of the Proposed Development.
- **Roles and Responsibilities**: An outline of the project roles and responsibilities required as part of a CEMP.
- **General Environmental Requirements**: Requirements for audits and inspections, consents and health and safety, competence, training and awareness, internal and external communication including communication with the Client, statutory authorities and other stakeholders, public relations, complaints procedures, method statements and incident response.
- **General Environmental Control Measures**: General methods for managing environmental risks, including mitigation, relevant and current environmental legislation, good practice.
- **Location Specific Environmental Control Measures** – Location specific methods for managing environmental risks, including mitigation, and objectives, targets and commitments outlined in the 2019 Environmental Statement (APP-116 to APP-145) and the ES Addendum (REP1-139).
- **Monitoring**: Framework for monitoring receptors and environmental impacts.

2. SITE INFORMATION AND THE PROPOSED DEVELOPMENT

2.1. SITE AND THE SURROUNDING AREA

2.1.1.1. The Order Limits have been defined as the limits within which the Authorised Development may be carried out.

2.1.1.2. The Onshore Components are described in sections. The sections are broken down further to provide a description of different options, where relevant.

2.1.1.3. The current baseline of the sections of the Site includes:

- Section 1, the Converter Station Area, located to the west of the existing National Grid Lovedean Substation, a rural area and surrounded by agricultural fields. The section is located within the administrative boundaries of Winchester City Council and East Hampshire District Council.
- Section 2 is a predominantly rural area comprising agricultural land. The section is located wholly within the administrative boundary of Winchester City Council.
- Section 3 is a predominantly rural area comprising open land, located to the east of the settlement of Denmead and west of the settlement of Anmore with a number of dispersed rural properties. The majority of the area forms part of the Denmead Gap (a planning policy designation to prevent the coalescence of Denmead and Waterlooville), with the area immediately south of Anmore Road comprising Kings Pond Meadow Site of Importance for Nature Conservation ('SINC'), with the land further south comprising open land known as Denmead Meadows. The section is located wholly within the administrative boundary of Winchester City Council.
- Section 4 is a predominantly urban area encompassing the B2150 Hambledon Road and A3 London Road running southwards. At the southern end, the section includes the junction of the A3 London Road and the B2177 Portsdown Hill Road as well as land between this junction and the northern part of Farlington Avenue, including the Portsdown Hill Road Car Park which also incorporates the northern area of the Meadow West of Farlington Avenue SINC. The section spans the administrative areas of Winchester City, Havant Borough and Portsmouth City Councils.

- Section 5 is located within the urban areas of Drayton and Farlington, suburbs of Portsmouth, and encompasses the highway of Farlington Road, Evelegh Road (south of Solent Infant School), Havant Road, the area of open land known as Scoutlands (between Evelegh Road and Havant Road), and the northernmost section of Eastern Road. The section is located wholly within the administrative boundary of Portsmouth City Council.
- Section 6 is located within the urban area of Portsmouth, and includes the A2030 Eastern Road and the western half of Zetland Field, and western edge of the Sainsburys Car Park to the north of the railway line. The section is located wholly within the administrative boundary of Portsmouth City Council.
- Section 7 is located within the urban area of Portsmouth, and includes a large area of Farlington Playing Fields on the mainland. The Onshore Cable Corridor then extends south-westerly across Langstone Harbour (a SSSI, SPA, SAC and Ramsar site) to the yard south of Kendalls Wharf before extending further south splitting around Baffins Rovers football ground re-joining at the northern edge of the southern football pitch. The section is located wholly within the administrative boundary of Portsmouth City Council.
- Section 8 is within the urban area of Portsmouth and comprises the A2030 Eastern Road running south with Great Salterns Golf Course to the west and Langstone Harbour to the east towards the northern edge of Milton Common. The Corridor then takes multiple route options across Milton Common, a designated SINC and public open space, to Moorings Way encompassing the southern edge of Milton Common to the junction with Furze Lane. The section is located wholly within the administrative boundary of Portsmouth City Council.
- Section 9 continues south around the built edges of the University of Portsmouth Langstone Campus to Locksway Road and the Thatched House Public House (incorporating the western edge of the Milton Locks Conservation Area and the full extent of Milton Locks SINC). The Onshore Cable Corridor then continues southwest encompassing the south-eastern area of Milton Allotments to the Kingsley Road open space, and onwards to Bransbury Park routing south to Henderson Road in Eastney. The section is located wholly within the administrative boundary of Portsmouth City Council.
- Section 10 runs south-westerly along Fort Cumberland Road to the Fort Cumberland Road Car Park, adjacent to the Land West of Fort Cumberland SINC (further east lies Fort Cumberland SINC and Scheduled Ancient Monument). From the Car Park the route runs south to the Marine Section of the Cable Corridor and incorporates a section of Eastney Beach, a designated SINC. The section is located wholly within the administrative boundary of Portsmouth City Council.

2.1.1.4. The current environmental conditions are described in Chapter 3 (Description of the Proposed Development) of the Environmental Statement ('ES') Volume 1 (APP-118). For further details of the baseline description, please see Chapters 6 to 28 of the ES Volume 1 (APP-121 to APP-143).

2.2. SUMMARY OF KEY ENVIRONMENTAL RECEPTORS

2.2.1.1. A summary of the key environmental receptors for the Site are contained within Table 2.1 below, and are shown in Appendix 1 Figure 2.

Table 2.1 – Key Environmental Receptors during Construction

Topic	Key Environmental Receptors
Landscape and Visual Amenity	**Converter Station** • Landscape character, associated landscape features and the setting of the South Downs National Park; and • Visual receptors: residents, recreational and transport within 8 km study area. **Onshore Cable Route** • Landscape character and associated features; and • Visual receptors): residents, recreational, transport, commercial/ retail/ industrial/ education/ church/ religious facilities and public house facilities within the 120 m buffer on either side of the Onshore Cable Route. **Landfall** • Landscape character and associated features of the Landfall; and • Visual amenity of surrounding visual receptors, including from residential properties and recreational users within 300 m study area of the Landfall.

Onshore Ecology	• Chichester and Langstone Harbour SPA; Wintering Intertidal Birds;
	• Solent Waders and Brent Goose Strategy Sites;
	• Crabdens Copse and Crabdens Row SINC;
	• Stoneacre Copse Ancient Woodland;
	• Denmead Meadows comprising;
	  • Kings Pond Meadows SINC;
	  • Soake Farm Meadows SINC;
	  • Unimproved grassland;
	• Milton Common SINC;

Topic	Key Environmental Receptors
	• Broadleaved trees; • Species-rich hedgerows with/without trees; • Species-poor hedgerows with/without trees; • Semi-improved neutral and calcareous grassland; • Unimproved grassland; • Badgers; • Bats; • Reptiles; • Hedgehog; and • Wildlife and Countryside Act Schedule 9 plants.
Soils and Agricultural Land Use	• Agricultural land, including that classed as best and most versatile ('BMV') defined as land classified as Grades 1,2, and 3a of the Agricultural Land Classification ('ALC') system associated with the Converter Station Area and Onshore Cable Corridor Sections 1, 2, 3 and 4; • Farmable land area and farming businesses associated with the Converter Station Area and Onshore Cable Corridor Sections 1, 2, 3 and 4; and • Soil resources associated with non-agricultural land within Sections 6, 7 and 9.
Ground Conditions	• Geology (Mineral Safeguarding Area ('MSAs')); • Human Health (construction and maintenance workers and adjacent land users); • Controlled Waters (Principal, Secondary A and Secondary Undifferentiated Aquifers); and • Below Ground Services (potable water supply pipes and buried services).
Groundwater	• Head Aquifer; • Chalk Aquifer; • Water Users; • Lambeth Group Aquifer; • Portsdown Chalk Formation; • Spetisbury Chalk Member; • Tarrant Chalk Member; • Newhaven Chalk Formation; • Bognor Sand Member; • Wittering Formation; • Lambeth Group; • Head Deposits; • Undifferentiated Chalk;

Topic	Key Environmental Receptors
	• River Terrace Deposits; • Raised Marine Deposits; • Beach and Tidal Flats Deposits; • Portsmouth Sand Member; • Tidal Flat Deposits; • Storm Beach Deposits: • Groundwater Source Protection Zones; • Lovedean Source (Public Water Supply) and; • Havant and Bedhampton Source (Public Water Supply).
Surface Water Resources and Flood Risk	• Surface Water Drainage Patterns; • Public Foul Sewer Networks; • Public Water Supply Network; • Surface Waterbodies; • Surface water drainage patterns; • Public Surface Water and Combined Wastewater Networks; • Surface waterbodies flood plains; • Construction Workers; and • Residents, users and associated infrastructure of the surrounding area.
Heritage and Archaeology	• Prehistoric activity in the form of isolated pits and enclosure ditches with possibility for burials; • Roman settlement activity; • Early Medieval activity; • Cropmark evidence of a later medieval field systems visible as cropmarks or ridge and furrow cultivation; • Prehistoric activity; • Roman activity; • Roman settlement activity and remains of Roman road; • Early medieval burials; • Palaeoenvironmental remains (Raised Marine Deposits); • Roman remains; • Prehistoric activity relating to exploitation of intertidal resources; and • Below ground remains associated with the early 19th century Portsmouth and Arundel Canal. • Above Ground Heritage Assets adjacent or close to the Order Limits, including curtilage of listed buildings (i.e. associated boundary walls)
Traffic and Transport	• Highway network impacted by the Converter Station Construction Traffic;

Topic	Key Environmental Receptors
	• Highway network impacted by the Onshore Cable Corridor; • Highway Network impacted by Traffic Redistribution; • Local Highway Network (Hampshire County Council ('HCC')); • Local Highway Network (Portsmouth City County ('PCC')); • Public Transport Services; and • Pedestrians and Cyclists.
Air Quality	• Human Health receptors up to 250 m from the Onshore Cable Corridor; • Ecological Receptors. • Human Receptors
Noise and Vibration	**Converter Station Area** • The Haven and Old Mill Cottage; • Hillcrest; • Millfield Farm; • Kimberley House; • Little Denmead Farm; • Holme and Highfield Cottages; • Lower Chapters; • The Arrows; • Broadways; • Broadway Farm House; • Broadway Farm Cottages; • Hinton Daubnay; • Ludmore Cottages; • Old Mill House and The Shieling; and • The Ranch. **Onshore Cable Corridor Sections 2 - 10** • Residential properties and other sensitive receptors up to 280 m from the Onshore Cable Corridor (e.g. schools, hospitals etc).
Socio-economics	• Local residents and commercial businesses; • Community facilities; and • Recreation, leisure facilities and open space.
Human Health	• Population within Winchester, East Hampshire, Havant and Portsmouth; • Residents, users of community facilities and greenspace within the population of Winchester, East Hampshire, Havant and Portsmouth; and

Topic	Key Environmental Receptors
	• Site users and adjacent site users within Winchester, East Hampshire, Havant and Portsmouth.
Waste and Material Resources	• Primary materials sources; and • Landfill capacity.
Carbon and Climate Change	• Atmospheric Greenhouse Gas • Components of the Proposed Development

2.3. TIMING OF ACTIVITIES

2.3.1. WORKING HOURS

2.3.1.1. The description of the assumed programme for the construction of the Proposed Development is based on the working hours in Table 2.2.

Table 2.2 – Onshore working hours

Activity	Working hours per day	Working days per week
Converter Station Area Construction	08:00 - 18:00 (Monday - Friday), 08:00 - 13:00 (Saturday)	6 days*
Marine Cable Installation	24 hour shifts	7 days
Onshore Cable Installation	07:00 - 17:00 (Monday - Friday); 08:00 - 13:00 (Saturday)	6 days*
Landfall Installation *(including HDD-1, TJB and ORS)*	12 hour shifts	7 days
HDD-2, HDD-5 and HDD-6 Installation	07:00 - 19:00	6 days*
HDD-3 and HDD-4 Installation	12 to 24 hour shifts	7 days

**Day 6 is Saturday working which is typically a 5-hour shift 08:00 to 13:00.*

2.3.1.2. No working hours within this table preclude:

(a) start-up and shut down activities up to an hour either side of the core working hours; and
(b) the receipt of oversized deliveries to the site, the arrival and departure of personnel to and from the site, on-site meetings or briefings, and the use of welfare facilities and non-intrusive activities.

2.3.1.3. Start-up and shut-down activities means at the start of the working day the opening up of the site, the arrival of site staff and contractors, changing into appropriate PPE wear, pre-shift briefings, site inductions, tool box talks, and all associated site safety checks and at the end of the working day the cleaning and tidying of work areas, changing out of PPE wear, post-shift debrief, the departure of site staff and contractors, and closing and securing the sites.

2.3.1.4. The following Onshore Cable Installation operations may take place outside the working hours detailed above, subject to agreement with the Local Planning Authority ('LPA'):

Trenched Areas

- Section 4 – a c.90 m section of the A3 London Road in Purbrook near Stakes Road:
  - 08:00 to 18:00, Saturday and Sunday, for eight weekends (four per circuit which could be consecutive or non-consecutive).
- Section 5 – Havant Road near Drayton between Farlington Avenue and Eastern Road:
  - Between Saturday sunrise until Sunday sunset, with the noisiest activities (road cutting/breaking and re-surfacing) avoided at night (22:00-07:00) for one weekend per circuit (two weekends in total which could be consecutive or non-consecutive); or
  - 07:00 to 22:00 for two weekends per circuit (up to four weekends in total which could be consecutive or non-consecutive).
- Section 6 – Sainsbury's Car Park:
  - Night-time working, with the noisiest activities (road cutting/breaking and re-surfacing) avoided at night (22.00 – 07.00).
- Section 8 – Eastern Road between Airport Service Road and the north of Milton Common (c.350 m south of Tangier Road):
  - Up to 24 hour working, seven days per week for up to six weeks per circuit. Noisiest activities (road cutting/breaking and re-surfacing) will be avoided at night (22:00-07:00) outside the Harbourside Caravan Park..

2.3.2. PUBLIC EVENTS

2.3.2.1. Public activities and events that are planned in proximity to the Converter Station site and Onshore Cable Corridor, including but not limited to the following;

- School term time (as required);
- Football season;
- Coastal Waterside Marathon;
- Cowes Week;
- Great South Run; and
- Victorious Festival.

2.3.2.2. These will be taken into consideration by the appointed contractor during the phasing of the of construction works for the Proposed Development.

3. ROLES AND RESPONSIBILITIES

3.1.1.1. Personnel with defined environmental responsibilities are detailed in Table 3.1 below.

3.1.1.2. Each assigned responsible individual will sign to confirm that they understand and accept their designated duties and responsibilities. A signed copy of each CEMP will be retained and made available on request. All personnel will sign a project induction which will confirm the acceptance of their environmental/sustainability responsibilities.

Table 3.1 – Roles and Responsibilities

Role	Responsibilities
Client	• Ensures that the construction project is set up so that it is carried out from start to finish in a way that adequately controls the risks to the health and safety of those who may be affected.
Principal Contractor	• Manages the Construction Stage of a Project. This involves liaising with the Client and Principal Designer throughout the project, including during the pre-Construction Stage.
Project Manager/ Director	• Overall environmental management of the Proposed Development, ensuring that all works are carried out in accordance with the CEMP.
Environmental Advisor/Manager	• Work with programme planners and project managers to ensure consents are embedded within the programme. • Monitor submission of consent applications and ensure their timely delivery. • Provide input to consultation with consent granting bodies, commitment holders and other third parties. • Co-ordinate and manage all required scheduled consents and property notifications. • Ensure environmental consents are obtained in line with the programme. • Maintain and update the consents register in line with requirements and ensure review of individual deliverables by project specialists. • Monitor and report progress on consents and commitments. • Monitoring construction works including the sub-contractors for compliance against Environmental Risk Assessment and method statement control measures. • Co-ordination of all environmental documentation.

Role	Responsibilities
	• Monitoring environmental training, consultation and implementation of sub-contractor procedures. • Attending site Health and Safety Executive ('HSE') committee meetings. • Monitoring of all site environmental incidents and ensuring they are reported and investigated. • Undertaking site inspections. • Accompanying HSE Managers and Environment Agency ('EA') inspections. • Compliance with duty of care, the Site Waste Management Plan ('SWMP') or any permits and/or exemptions. • Monitoring and measurement of waste. • Communicate sustainability good practice, innovation and targets to the project team and supply chain. • Keep a record of key performance indicators ('KPIs'). • Act as the main point of contact on environmental matters relating to the Proposed Development.
Environmental Clerk of Works[1]	• Support the Environmental Manager in delivering the environmental component of the Proposed Development. • Monitor construction activities and performance to ensure control measures are effective. • Maintain full records of the progress of the Environmental Works. • Implement an auditable environment record filing system. • Maintain regular contact and liaison with the Environmental Specialists. • Carry out further monitoring as required by the CEMP.
Ecological Clerk of Works	• Monitoring and management of the ecological-related control measures. • Pre-construction ecological checks for habitats and species. • Implement and maintain exclusion zones. • Oversee provision of ecological mitigation measures. • Provide ecological information for site inductions, tool-box talks and meetings.
Public Relations Officer	• To track complaints from members of the public and respond within reasonable time frames.

[1] The Environmental Clerk of Works role may be covered by a suitably experienced and qualified Landscape Clerk of Works with an arboriculturalist called in to cover specific issues associated with trees and RPAs.

Role	Responsibilities
	• To liaise with members of the public regarding issues such as any specific anticipated nuisance.
Engineering Manager	• Raise innovation at team meetings. • Capture good ideas/innovations/lessons learnt. • Track progress of improvements and support if needed. • Grow the culture of innovation by effective means of communication e.g. presentations, site visits, engagement with our supply chain. • Ensure environmental issues and constraints are included in individual designs, in accordance with environmental design procedures.
Planning Manager	• Plan works to avoid sensitive times of year. • Plan works to avoid working unsociable hours. • Plan into the project consents/surveys required and the time scales in which they take to obtain.
Construction Manager	• Advising appointed contractor representative on the implementation of the EMS. • Monitoring construction works including the sub-contractors for compliance against Environmental Risk Assessment and any method statement control measures. • Monitoring environmental training, consultation and implementation of sub-contractor procedures. • Accompanying site Environment Inspections where required and any environmental authority inspections. • Attending Environmental co-ordination meetings.
Works Supervisors/Site Manager	• Ensuring that all site work is carried out in accordance with method statements, task briefings and activity briefings. • Ensure that staff under their supervision is aware of their environmental responsibilities. • Ensure key risks are identified and brief operatives on environmental topics. • Carry out site inspections to identify any environmental issues.
General Operatives	• Ensuring environmental mitigation measures are carried out during the course of their duties, in line with work package plans, task briefings and activity briefings. • Working considerately with a good working ethic in order to minimise adverse environmental impacts and follow all site rules communicated during briefings and project training sessions.

Role	Responsibilities
	• Informing their line management of any environmental issues they have on site, so that these can be communicated to the project management team for further investigation. • Attending the project induction prior to commencing work where details of the site environmental rules will be provided.
Waste Champion	• The effective communication of the Site Waste Management Plan ('SWMP') to their operatives and ensures enforcement of the SWMP at an operational level e.g. identifying areas for improvement where segregation is not being followed. • For the delivery of relevant toolbox talks where necessary.

4. GENERAL ENVIRONMENTAL REQUIREMENTS

4.1. REQUIREMENTS AND CONSENTS

4.1.1.1. The Proposed Development shall be carried out within the requirements (but not limited to) of the relevant legislation (see Appendix 2).

4.1.2. AUDITS AND INSPECTIONS

4.1.2.1. Regular inspections of the Site shall occur to ensure compliance with each CEMP, check compliance with the legal and contractual requirements and to minimise the risk of damage to the environment. All environmental incidents shall be reported to the Environmental Manager.

4.1.2.2. The Environmental Manager shall carry out weekly inspections and complete an assessment of the works' environmental performance measured against KPIs, environmental standards, relevant legislation and the CEMP objectives.

4.1.2.3. Document control shall be in accordance with a Quality Management System and copies of all environmental audit reports, consents and licences shall be maintained by the appointed contractor's Environmental Advisor/Manager. They will be held on Site for review at any time.

4.1.2.4. The Project Manager shall be responsible for investigating and addressing any non-conformances raised by the inspection within an agreed time frame and ensuring that corrective and preventative actions have been fully implemented and closed out.

4.1.2.5. The Environmental Manager and the Client representative shall be responsible for updating and reviewing each CEMP on a regular basis to ensure continual improvements.

4.1.3. CONSENTS AND HEALTH AND SAFETY

4.1.3.1. All staff employed must have regard to the Health and Safety at Work Act 1974 – that all persons employed will take reasonable care for the health and safety of themselves and other persons who may be affected by their acts or omissions.

Electricity safety

4.1.3.2. National Grid Electricity Safety Rules are mandatory. All staff who works on or near to the transmission system at the Lovedean Substation must understand and be familiar with the detail of the safety rules and appropriate supporting documents (National Grid UK Electricity Transmission Plc , 2018) (Fifth Edition).

4.1.3.3. Works at Section 1 Lovedean (Converter Station Area) will be undertaken in line with the overarching legal framework Electricity Safety, Quality and Continuity Regulations (Health and Safety Executive, 2002), and the *Third-party guidance for working near National Grid Electricity Transmission equipmen*t (National Grid, 2016).

4.1.3.4. Before works are undertaken on site, all relevant site staff will be made aware of and made sure they understand the HSE Guidance Note "*Avoiding danger from underground services*" (HSE, 2014).

4.1.3.5. Works will be planned to avoid underground services. Where this is not possible, plans will be developed to minimise the risk of damage to those services in the work area.

4.1.3.6. When carrying out excavations in the vicinity of electricity assets, the safe system of work will be employed:

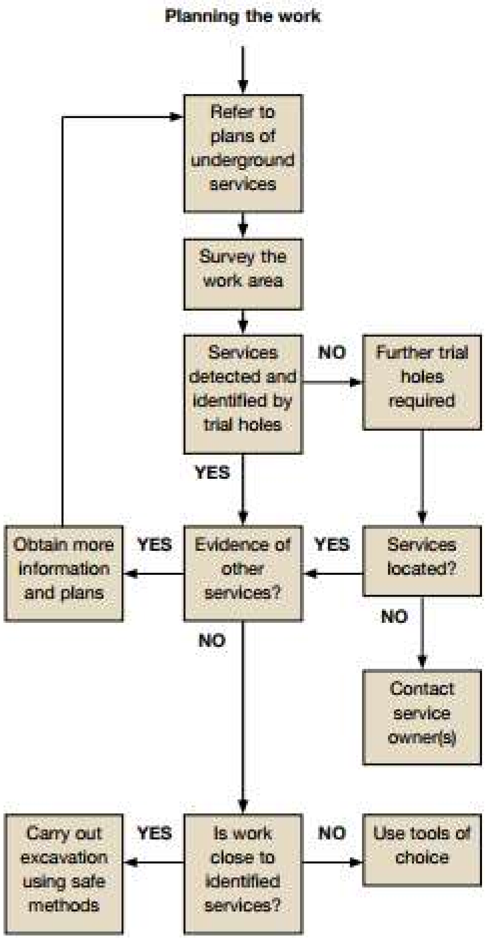

Plate 4.1 – A safe system of work (HSE, 2014)

4.1.3.7. Minimum clearances from the Overhead Line Clearance Technical Specification 43-8 will be adhered to onsite in relation to overhead lines (Energy Networks Association, 2004) (as amended). Plant, machinery, equipment, buildings or scaffolding will not encroach within the minimum clearance specified (dependent on-site conditions) of any high voltage conductors when those conductors are under their worse conditions of maximum “sag” and “swing” and overhead line profile (maximum “sag” and “swing”) drawings should be obtained.

Electric and Magnetic Fields

4.1.3.8. The Onshore Cable Route alignment considered the advice provided by the National Radiological Protection Board on recommending the adoption in the UK of public exposure guidelines published in 1998 by the International Commission on Non-Ionizing Radiation Protection (International Commission on Non-Ionizing Radiation Protection, 1998) in terms of the 1999 EU Recommendation (The Council of the European Union, 1999) when the time of exposure is significant.

4.1.3.9. The relevant electrical infrastructure of the Proposed Development at Operational Stage will comply with the current public exposure guidelines, and in line with Appendix 3.7 (Onshore Electric and Magnetic Field Report) of the ES Volume 3 (APP-361) will include:

- Earthed shielding of the HVAC Cables and HVDC Cables along the Onshore Cable Route;
- Earthed perimeter fencing at the Converter Station compound;
- The Converter Station electrical equipment must be designed to meet the guideline levels; and
- The electrical field within the Converter Station at 1 m above ground level will not exceed 10 kV/m.

4.1.3.10. The assessed components of the Proposed Development produce field strengths which are less than the public exposure limit.

4.1.3.11. The electric and magnetic fields generated by the HVAC and HVDC cables will comply with public exposure guidelines.

4.1.3.12. The Engineering Manager will ensure through design and verification that the Proposed Development complies with guidelines and the Code of Practice (Department of Energy & Climate Change , 2012).

Register of Consents

4.1.3.13. A register of consents covering: planning, highway and environmental has been prepared within Other Consents and Licences (REP1-029) which will be reviewed and the need for any further consents or licenses tracked by the appointed contractor to keep track of any progress. This will enable the project team to plan for consents to be applied for and obtained prior to the relevant works activity commencing.

4.1.3.14. The progress of the preparation, submission and internal approval of the consents identified as being required will be tracked using a consents register.

Health and Safety File

4.1.3.15. The Health and Safety File would be prepared by the Client, with information supplied from the Principal Contractor. The Client and Principal Contractor will take responsibility for the Health and Safety File.

4.1.3.16. The Health and Safety File would include information about all the following topics, where they may be relevant to the health and safety of any future construction work. The level of detail to be provided would be proportional to the likely risks involved.

- Details of the project – Brief description of the work carried out;
- Residual hazards and how they have been dealt with including:
    - Details of all areas at risk of flooding, their form and detail of the associated danger;
    - If maintenance activities need to be undertaken in areas at risk of flooding staff should be signed up to flood warnings (rainfall, tidal, fluvial, reservoir) and check the weather forecast to be able to plan ahead and avoid attending site if there is a risk of flooding; or
    - If flooding is identified when out on site: – an appropriate level of training to staff should be in place to ensure staff are aware to stay away from flood water, abandon any work that needs to be undertaken in flooded areas and report the incident or request appropriately trained operatives to work if a maintenance activity needs to be undertaken.
- A detailed management plan for future maintenance and entry to below ground access chambers will be required (e.g., personal gas alarms, emergency recovery hoists, etc.) particularly in locations where there is a risk of the presence of ground gases such as at Milton Common.
- Key structural principles incorporated in the detailed design of the structures;
- Information regarding the removal or dismantling of installed plant and equipment;

- The nature, location and marking of significant services, including firefighting services; and
- Information and as built drawings of the structure, its plant and equipment.

4.2. COMPETENCE, TRAINING AND AWARENESS

4.2.1.1. The Project Manager shall identify the training needs of their employees and subcontractors so that they can implement the requirements of this Onshore Outline CEMP into the induction, start of shift briefings, Toolbox talks, Construction Phase Plan and construction method statements.

4.2.1.2. Specific training needs will be developed for individuals to reflect the work to be carried out on the Proposed Development and the significant risks and opportunities identified.

4.2.1.3. The requirement is for all personnel to be aware of their general environmental management responsibilities, and for those whose work may cause, or have the potential to cause, a significant impact on the environment, to receive specific environmental awareness briefings. Environmental awareness will be reinforced through information, such as poster campaigns, environmental/sustainability performance indicator reports and environmental alerts available onsite notice boards.

4.2.1.4. All contractors are responsible for ensuring the competency of their environmental staff. In the event that environmental training is needed for staff, a contractor is responsible for ensuring this requirement is fulfilled. Any training provided to members of the project team will be logged via a Project Training Matrix and any certification documents will be produced by the relevant members of staff as evidence that they hold the required competencies.

4.3. INTERNAL COMMUNICATION

4.3.1.1. Communication on environmental issues within the project team will take place through face-to-face conversations, e-mails and telephone calls. The project management team will be made aware of all environmental issues at the earliest possible opportunity. Communication on environmental matters will be maintained through construction meetings chaired by the Environmental Advisor/ Manager or a senior manager.

4.3.1.2. Environmental issues identified by any member of the project team will be communicated to the relevant personnel to ensure any required actions are carried out. Dissemination of information will take place in several forms, as appropriate, including meetings to discuss particular project issues, method statements, task/activity briefings, toolbox talks, inductions, environmental notices and environmental alerts. Records that these have been carried out and who received them will be documented via the use of attendance logs or distribution lists. The Environmental Advisor/Manager will notify Works Supervisors of any legislation changes which may affect working practices on Site.

4.3.1.3. Any unexpected finds/occurrences by site staff can be reported to their Works Supervisors, which will then give notification to the relevant member of the Environmental team (described in Section 4) who will advise on the course of action to be taken.

4.4. EXTERNAL COMMUNICATION

4.4.1. COMMUNICATION WITH THE CLIENT

4.4.1.1. The Planning Manager will liaise regularly with the Client and its representatives regarding the programme of works, nature of the operations and methods to be employed to minimise adverse environmental impacts. This will include progress meetings as well as the production and submission of progress reports which will cover environmental/sustainability issues. The Environmental Manger will also supply all relevant supporting information and documentation to the Client for matters concerning consents and the environment in accordance with the appropriate timescales.

4.4.2. STATUTORY AUTHORITIES AND OTHER STAKEHOLDERS

4.4.2.1. In the event of stakeholder liaison being required with local authorities or other stakeholders, the Environmental Manager will identify the requirement and seek authorisation from the Client to undertake the task. Where consultation is required, a representative from the Client will be invited to attend alongside the relevant appointed contractor personnel.

4.4.2.2. Project staff will keep an archive of any e-mail correspondence between themselves and statutory authorities and other stakeholders concerning the activities taking place. In the event that any complaints are received a log of correspondence and complaints will be kept up to date by the Environmental Manager.

4.4.3. PUBLIC RELATIONS

4.4.3.1. It is good practice to inform interested parties when works are due to commence. The Public Liaison Officer will not communicate with residents unless approval has been granted by the Client. A member of the appointed contractor ’s team will be provided with the Public Relations Officer role (see Section 3).

4.4.3.2. Regular stakeholder and traffic management meetings will be held as part of project governance requirements.

4.4.3.3. Any letters issued to interested parties will be drafted and issued by the Client, with inputs from the Public Relations Officer.

Communications Strategy

4.4.3.4. A Communications Strategy will be developed for the Construction Stage of the Proposed Development. The Communications Strategy will provide the framework for engaging and communicating with stakeholders in relation to the associated construction works of the Proposed Development. The strategy would consider both onshore and marine stakeholders, taking into account preferred communication channels depending on the location and stakeholder. Stakeholder engagement will be comprehensively and regularly measured throughout the Construction Stage.

4.4.3.5. The Strategy would identify the key stakeholders and confirm agreed methods for engagement and communication. Key stakeholders include, but are not limited to Local Planning Authorities and Parish Councils, emergency services, residents, businesses, developers, community groups and recreational users where they are potentially affected by the works, and also consultees such as East Solent Coastal Partnership ('ESCP'), EA and Portsmouth Water ('PW'). A 'Register for Updates' service would also be made available for any individual to request that they be informed of works in certain geographical area(s).

4.4.3.6. The purpose of the Communications Strategy is to provide a framework to:

- Be clear, timely, meaningful, open, honest, consistent, and accountable;
- Promote and raise awareness of the construction period (including timings, disruptions and diversions) and the methods for contacting the Applicant;
- Ensure transparency by providing access to technical information related to construction, where required;
- Use plain language;
- Be equally accessible to all;
- Continue to review the strategy against any change in general situation e.g. Covid-19, etc;
- Use best practice engagement methods;
- Engage with the community; and
- Explain how the Applicant plans to respond to stakeholder queries and feedback.

4.4.3.7. In delivering the Communications Strategy, all communications will be accessible and in non-technical language. Where necessary, communications will provide a hotline and email address should anyone wish to provide feedback or raise a query regarding construction works. Communication will be targeted to the specific stakeholders identified, and the appropriate mode of communication would be adopted depending on the specific needs of the particular stakeholder. Wider communication would predominantly consist of:

- Media releases;
- Public notices in local papers;
- Targeted letters to residents (including regular Community Update Newsletter(s) containing relevant information split geographically into Section 1-10 of the Proposed Development, or similar;
- Signposting; and
- Updates on a dedicated 'Construction' section of the website.

4.4.3.8. The Communications Strategy would also include information on the following key matters:

- Concerns over health and wellbeing from electric and magnetic fields (see paragraphs 4.1.3.8 to 4.1.3.12);
- Access to properties (see Section 5.9 Traffic and Transport);
- Open space restoration timescales (see Section 6.2.8 Socio-economics);
- Public Rights of Way ('PRoW') diversions (see Section 6.2.8 Socio-economics); and
- Recreational impacts (see Section 6.2.8 Socio-economics).

4.4.3.9. In order to evaluate the Communications Strategy, the established objectives will be regularly reviewed by the Client against a number of metrics, including:

- Enquiries received via email / freephone / freepost;
- Visits to the 'Construction' section of the Proposed Development website;
- Enrolments through 'Register for updates' website form (and similar requests via email / freephone / freepost); and
- Readership of monthly/bi-monthly Community Update Newsletter(s).

4.4.4. COMPLAINTS PROCEDURE

4.4.4.1. As part of the Site set-up process, site notice boards will be erected, maintained and clearly visible to third parties. A telephone number for environmental complaints will be published local to the Site. The Public Relations Officer will be responsible for liaising with appropriate individuals forming part of the project team to address any complaints and will have the appropriate authority to resolve any issues that may occur. Should it be required, an 'out of hours' telephone number will be available.

4.4.4.2. The Environmental Manager/ Advisor will maintain a close liaison with the relevant LPA Environmental Health Officer ('EHO') at all times and should any complaints regarding environmental nuisance (e.g. dust or noise) be received by the Public Relations Officer the details will be passed to the EHO for verification purposes.

4.4.4.3. Should any unforeseen event occur within the construction site that has the potential to cause off-site pollution then the Environmental Advisor/ Manager will immediately notify the EHO by phone and e-mail. As timely as possible, notice will be issued to the EHO for dealing with any unforeseen activity which may give rise to a particular problem.

4.4.4.4. During any site work, if any complaints are received directly to the appointed contractor or its subcontractors, the Client will be notified as soon as is practicable but within twelve hours of the complaint being received. It will be the responsibility of the Site Manager to brief any staff responsible for unacceptable working conduct in relation to worksite neighbours whilst working on this project.

4.5. METHOD STATEMENTS

4.5.1.1. The implementation of Method Statements for the different activities of the Proposed Development works shall be completed by the Site Manager and General Operatives) and/ or subcontractor by trained staff or other appropriate experienced personnel, in consultation with specialists. Their production shall include a review of the environmental/ health and safety risks and commitments, so that appropriate control measures are developed and included within the construction process.

4.5.1.2. Method Statements will be reviewed and approved by the appointed contractor's Project Manager and, where relevant, by an appropriate environmental specialists. Where appropriate, and if required or necessary, method statements will be submitted to the regulatory authorities (EA, Natural England, the relevant LPA EHOs and Emergency Planning Officer etc.), as required.

4.5.1.3. Method statements must contain as a minimum:

- Location and duration of the activity, and vehicular access/egress arrangements (if applicable);
- Work to be undertaken and methods of construction;
- Plant and materials to be used;

- Labour and supervision requirements;
- Health, safety and environmental considerations (including relevant control measures); and
- Permit or consent requirements.

4.5.1.4. Deviation from approved method statements (where this is a statutory requirement) will be permitted only with prior approval from the LPA, and other relevant parties. This will be facilitated by formal review before any deviation is undertaken.

4.6. ENVIRONMENTAL INCIDENTS

4.6.1.1. The Environmental Manager will respond to any reported incidents within 24 hours, or as soon as reasonably practicable. In the event of working practices being deemed dangerous either by the Council or the HSE, immediate remedial action will be taken.

4.6.1.2. A formal procedure for handling Environmental Incidents will be developed and agreed by the Project Manager, Environmental Advisor and appointed contractor/Construction Manager, which may include a procedure similar to that detailed below:

- Environmental Incidents are to be reported to the Construction Manager;
- The Construction Manager (or nominated representative) will record full details of the Environmental Incident and ensure that they are responded to as soon as reasonably practicable (preferably within one hour but always within 24 hours; and
- The Construction Manager (or nominated representative) will undertake an investigation to assess what corrective and preventative action, or further investigation is necessary to avoid recurrence of the Environmental Incident.

4.6.2. EMERGENCY INCIDENT RESPONSE

4.6.2.1. In the event of a spill or leak, the following process shown in Plate 4.2 will be followed. This will be briefed to the workforce and displayed on site notice boards.

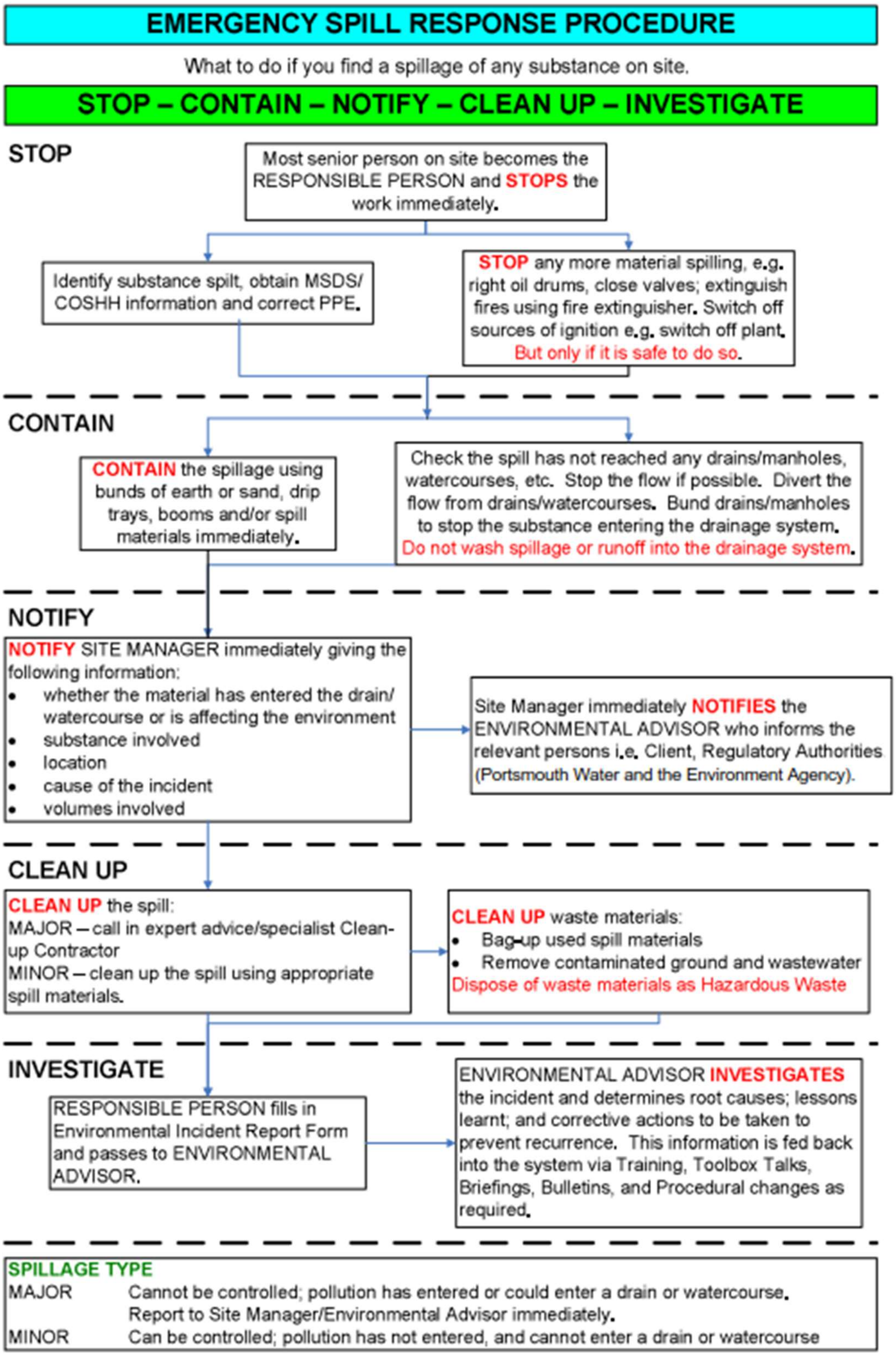

Plate 4.2 - Emergency Spill Response Procedure

5. GENERAL ENVIRONMENTAL CONTROL MEASURES

5.1. INTRODUCTION

5.1.1.1. This section sets out the environmental control measures to be adopted during construction. The appointed contractor will ensure that all sub-contractors adhere to the environmental good practice guidelines for implementation during all site activities.

5.2. LANDSCAPE AND VISUAL AMENITY

5.2.1.1. The following measures will be considered during construction works to ensure protection of the existing landscape setting and views to the construction site:

- Temporary screening for sensitive visual receptors through implementation of solid construction hoardings whilst using natural existing screens (topsoil and existing vegetation). Hoardings would be attractive (visually recessive and sensitive in design), used to screen low level "clutter" and reduce noise;
- Appropriate location, organisation and phasing of construction activities;
- Maintenance of a tidy and contained site compound to reduce visual clutter;
- Large plant /equipment would be located away from most sensitive receptors where there are viable alternatives; and
- Measures to control working hours in specific locations to avoid disturbance to residential receptors both in terms of light and noise.

5.2.1.2. The hoarding to be erected around the Converter Station will visually contain many of the construction activities from the surrounding character areas in terms of influencing their visual setting.

5.2.1.3. Hoardings would be well lit in poorly lit walkways and any gates should be positioned to minimise noise transmitted to nearby sensitive receptors.

5.2.2. LIGHTING SCHEME

5.2.2.1. The appointed contractor will develop a Lighting Scheme for the Construction and Operational Stages of the Converter Station Area. This will, after consultation with the South Downs National Park Authority, be submitted for approval to the relevant Local Planning Authority. The Lighting Scheme will be developed in accordance with the SDNPA Technical Advice Note 2018, Dark Skies. The general principles will include, but not be limited to consideration of:

- Angle lights downwards – no unnecessary light above or near the horizontal;
- Lamps above 500 lumens should be installed in dark sky friendly fixtures that prevent unnecessary upward light;
- Point where the light is needed not in a direction that causes a nuisance to neighbours or wildlife;
- Switch off lighting when not needed. Consider the use proximity sensors and avoid dusk-till-dawn sensors;
- Light to the appropriate illuminance;
- Avoid bright white and cooler temperature LED's; and
- Install at the lowest possible height to achieve required lighting levels.

5.2.2.2. For the HDD compounds the Engineering Manager will undertake a lighting assessment to manage light impacts. Temporary site lighting will be restricted to meet on-site safety and security requirements.

5.3. ONSHORE ECOLOGY

5.3.1.1. The following measures will be taken during construction works to ensure ecological disturbance is minimised:

- Where practicable, any mature trees and hedgerows which are within the site boundary will be retained;
- Tree root protection zones will be identified and clearly marked with fencing and signage;
- During the construction period, care should be taken to avoid creation of artificial habitats and temporary resting places within works areas, such as turf, spoil and rubble piles. Stored materials are best located away from areas of vegetation on hardstanding or bare ground. Stored materials can be raised off the ground by using storage bags on pallets;
- Water sprays will be used to manage dust and prevent it drifting from the construction site to surrounding areas where sensitive habitats are present;
- No waste or waste water should be discharged into the watercourses and management procedures to avoid contamination and pollution of waterways should be following and implemented at all times;

- Standard best practice methods that minimise the risk of pollution through accidental spillage of materials or surface runoff during construction works will be implemented. These measures will follow those within measures are described in the “Pollution Prevention for Businesses” guidance published by the UK Government. When working near water, pollution prevention methods will be incorporated into site-specific guidance notes provided to the site operatives as part of a method statement. All vehicles will carry spill kits and all staff be trained in how to use emergency response equipment. A contingency plan in the event of contamination of watercourses will be established and strictly adhered to in such an event. Where appropriate, site compound, HDD compounds and any storage of soil stockpiling or plant must be in accordance with measures outlined in Section 5.7 below. Potentially contaminating materials will be stored appropriately in accordance with current guidelines to minimise pollution risk, including bunding fuel and chemical storage areas and generators. Site procedures will be carefully managed to avoid discharges to watercourses, in particular those involving cement and concrete;
- Restriction of night working – construction work will be restricted to daylight hours between dawn and dusk within areas without public street lighting (e.g. Denmead Meadows, Farlington Playing Fields and the Converter Station Area) during the bat active season (April to October) to avoid disturbance effects of noise and lighting on bats. Surveys have identified and assessed potential impacts and their effects on ecological features. However, the mobile nature of many protected and notable species is acknowledged. The Environmental Clerk of Works will monitor the site and be aware of the possibility of unexpected finds of protected and notable species. With support of appropriately experienced technical specialists, the Clerk of works will monitor the Proposed Development for species including badgers, water voles and otters that are known to be present in the wider area. In the event of an unexpected find of such a species, an ecologist will advise the Clerk of Works on a course of action to offset potential effects and maintain legislative compliance;

- Wildlife and Countryside Act Schedule 9 plants are present close to the Proposed Development, specifically Japanese knotweed that was recorded on the boundary of the Order Limits at allotments at Lock Lake (Section 9). It is an offence to cause Schedule 9 plants to grow in the wild. Prior to vegetation clearance within the Order Limits a survey for Schedule 9 plants will be undertaken to identify their locations, and appropriate control measures to either remove and eradicate them, or localise them (e.g. fencing), will be put in place. Regular checks of the works area by the Ecological Clerk of Works will be undertaken to ensure risks associated with Schedule 9 plants are controlled and works will not cause their spread in the wild. Appendix 16.2 (Preliminary Ecological Appraisal) of the ES Volume 3 (APP-410) notes the location; and
- Any required scrub, hedgerow and/or tree clearance should be timed to avoid the main nesting season for birds between 1 March and 31 August. If scheduled within this period a suitably experienced ornithologist will be present to advise on any necessary protective measures, and confirm that the works are not likely to cause disturbance to nesting birds.

5.3.2. PRECAUTIONARY METHODS TO AVOID EFFECTS ON HEDGEHOGS

- To avoid killing or injury to hedgehogs that may be present hedgehogs, scrub and other dense vegetation within Sections 1-3 where suitable habitat is present will be hand search for hedgehogs prior to its clearance. Piles of cut vegetation such as brash piles will also be searched as the can harbour sheltering hedgehogs.
- Hedgehogs found will be moved to a suitable release site away from the development within scrub, hedgerow or other dense cover.
- In addition, open excavations will be fitted with mammal ladders (planks of wood at either end) to allow animals to climb out if they fall in, and prevent the trapping of animals including hedgehogs.

5.3.3. PRECAUTIONARY METHODS TO AVOID EFFECTS ON REPTILES AND STAG BEETLES

5.3.3.1. To avoid killing or injury to reptiles that may be present, a Precautionary Method of Works (‘PMoW’) will precede vegetation clearance and earthworks in habitats which could support these animals. created which will detail how working methods during the Construction Stage of the Proposed Development can minimise the risk of killing or injury to reptiles.

5.3.3.2. Such working methods likely to feature in a PMoW may include, but are not limited to, the following:

- Two stage vegetation clearance of fields, whereby areas of suitable habitat for reptiles are cut down to a height of 300 mm, left for a period to enable reptiles to disperse, and then cut to ground level under ecological supervision;
- Removal of natural refugia by hand where safe to do so, or otherwise undertaken methodically using plant under ecological supervision;
- Plant and machinery to be kept to defined access routes around the survey area which are unsuitable for reptiles, until suitable habitat in the works area has been removed; and
- Open excavations will be fitted with mammal ladders (planks of wood at either end) to allow animals to climb out if they fall in, and prevent the trapping of animals including reptiles.

5.3.3.3. Stag beetles are primarily a woodland species associated with dead wood namely fallen trees. Whilst not identified within the Order Limits, on a precautionary basis to avoid mortality of this species should they incidentally be found within the Onshore Cable Corridor, the above methodology of removal of natural refugia will apply.

5.3.3.4. The appointed contractor will comply with relevant legislation and should maintain habitats intact and undisturbed, where practicable. If protected species are unexpectedly discovered, work should cease and advice should be sought immediately from a suitably qualified ecologist.

5.3.3.5. Implementation of the measures identified will be monitored by an Environmental Clerk of Works with the power to stop work and change site practices as required.

5.3.4. ARBORICULTURE

5.3.4.1. Adherence to British Standards 5837:2012 Trees in relation to design, demolition and construction – Recommendations (BS 5837) when laying cables shall be adhered to. Root Protection Areas ('RPA's') shall be avoided.

5.3.4.2. Mitigation of impacts can be achieved by avoiding high value features through considering the use of alternative trenching or installation methods where practicable.

5.3.4.3. Where features are to be removed, consideration for replanting with like for like species in the locality is required. Hedgerow trees will require repositioning to at least 5 m away from the Onshore Cable Route within the Order Limits. Mitigation may also be achieved by appropriate compensatory tree planting within the locality.

5.3.4.4. Arboricultural Method Statements with associated RPA plans would be submitted as part of the detailed CEMPs and would accompany the detailed landscaping scheme. These would cover in detail the protection of root areas, protective barriers, precautions in respect of temporary works, sequence of activities, utilities, post construction and emergency remedial works. A Generic Arboricultural Method Statement ('AMS') is provided in Appendix 16.3 (Arboriculture Report, Appendix F) (APP-411).

5.3.4.5. Ground protection shall be used where RPA's are encroached upon. For example, use of a no-dig construction for access routes shall be employed.

Converter Station Area

5.3.4.6. Under no circumstances should any works or storage take place within 15 m of ancient woodland. When storing materials, particularly liquids, slopes and drainage channels must be considered to prevent spillages and flow into the buffer zone.

Onshore Cable Corridor

5.3.4.7. The Onshore Cable Corridor, within the highway, is constrained by buildings, under and over ground services, street furniture and traffic considerations. Therefore, options for avoiding trees will need to be carefully considered.

5.3.4.8. The general design principles for working around trees are as follows:

- Onshore Cable Route will be diverted around or under RPAs, where practicable.
- Onshore Cable Route will avoid higher value trees as indicated in the Arboriculture Report of the Environmental Statement Appendix 16.3 (APP-411). In particular, Category A trees will be avoided.
- Onshore Cable Route will avoid existing soft landscape areas containing RPA of arboricultural features, where practicable. In accordance with the required standoff for overhead and underground cables, the use of soft landscape resources such as grass verges, particularly in highway, will limit any future mitigatory tree planting opportunities and can permanently detrimentally affect the local landscape.
- Tree roots are likely to be infrequent within the carriageway construction due to lack of soil available for root growth. However, roots may persist at greater depths where conditions are favourable. Where practicable, cable routing in the carriageway to avoid tree roots will be undertaken.
- Significant tree roots are likely to be frequent within footway, verge areas and other soft landscape where trees are present. Where present, works in these areas shall be avoided, where practicable.

5.4. SOILS AND AGRICULTURAL LAND USE

5.4.1.1. Development of a Soil Resources Plan ('SRP'). A SRP is prepared prior to the commencement of construction and confirms the different soil types and depths (based on the soil surveys already undertaken); the most appropriate re-use for the different types of soils within the detailed design; and the proposed methods for handling, storing and replacing soils on site. For the Onshore Cable Corridor, the SRP will confirm the different soil types and depths to be disturbed, the proposed methods for handling, storing and replacing soils, and provide specifications for the restored soil profiles to match the original profiles as closely as possible. An Outline SRP has been prepared (see Appendix 5 of this Onshore Outline CEMP).

5.4.1.2. Mitigation to ensure that the temporary requirement for land will not affect the ability to farm other land within the holding that is not affected by construction works will form part of each relevant CEMP. This would include the continuation of farm access to temporarily severed land, as required for normal agricultural activities, the replacement of temporarily severed water supplies, and the installation of temporary stockproof fencing, as required.

5.5. GROUND CONDITIONS

5.5.1.1. The following methods should be implemented during construction to ensure the safety of construction workers, visitors and to avoid any potential pollution of surface and groundwater:

- The Proposed Development will adhere to Environment Agency ('EA') pollution prevention guidance and best practice during the construction works which will be incorporated into and managed through the CEMP.
- All construction personnel would be required to wear appropriate PPE and to only undertake work following a Health and Safety risk assessment and a Health and Safety Induction. Hygiene and welfare facilities would need to be provided for use by construction personnel during the works. A watching brief would be implemented during excavation to ensure that any unexpected contamination within the Made Ground (if present) is rapidly identified, risk assessed and dealt with appropriately.
- A watching brief would be implemented during excavation to ensure that any unexpected contamination within the Made Ground (if present) is rapidly identified, risk assessed and dealt with appropriately.
- Regular monitoring visual inspections during construction.

- If remediation is deemed necessary, requirements will be assessed on a site-specific basis and the works carried out, supervised, validated and verified in accordance with current best practice. All decisions to remediate and validate works will be made under the management of an Environmental Manager and appropriate specialists.
- A site-specific risk register shall be produced prior to works commencing, this shall include geotechnical and ground risks which shall be considered when agreeing methods of working and where necessary suitable control measures/mitigation incorporated.
- Good working practices and housekeeping during construction such as sealing or covering stockpiles of contaminated soils and treating water removed from excavations prior to discharge are considered likely to reduce identified impacts.
- Water/surfactant will be sprayed onto material being worked to damp down any potentially contaminated dust and prevent it from becoming airborne. Chemicals and surfactants will be Centre for Environment Fisheries and Aquaculture Science (CEFAS) rated products and included within the contractor's method statements. Temporary surface water drainage and vehicle wheel washes will further reduce the risk of dust generation. Precautions should also be taken while transporting excavated materials off-site to ensure that any risk of fugitive dust emissions are prevented. Construction Stage dust monitoring will be used to check the effectiveness of the damping down of the dust on site. The monitoring would be agreed with the relevant Environmental Health Officer by the Environmental Manager. This is anticipated to be through deposition pads and directional pads during high risk activities as per Table 5.1 (Row 9 to 12)..
- Vehicle movements will be restricted to an agreed travel plan and construction activities on site will not exceed standard working hours.
- Water removed from any excavations will be disposed of or discharged in accordance with EA requirements.
- The reuse of soil on Site will be governed by the production of a Materials Management Plan ('MMP') in which chemical criteria are specified for the import of soils/fill material from off-site and for the reuse of site won material (see Appendix 4 for the Outline MMP). The stripping, storage and reuse of subsoil should be carried out in accordance with BS 8061:2013.

- Foundations for structures at the Converter Station (Section 1) will require piles that will extend down into the chalk groundwater aquifer. A Piling Works Risk Assessment ('PWRA') has been prepared (Appendix 7 Surface Water Drainage and Aquifer Contamination Mitigation, Appendix 6 Preliminary Piling Risk Assessment), following accepted, best practice EA Guidance 'Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention' (Environment Agency, 2001)). This PWRA will ensure that piling operations do not form a pathway for the migration of contamination at the surface (either existing contaminants, those that form part of the pilling process or those that might be introduced during the operation of the Converter Station) to the aquifer. Pilling for the launch pit of the Kings Pond Horizontal Directional Drilling ('HDD') will not interact with the Chalk and therefore the aquifer is not at risk from these specific piling operations.
- Construction activities should also be undertaken in accordance with appropriate CIRIA guidance. Specifically, this should include:
  - CIRIA C741. Environmental Good Practice on site (4th Edition): (CIRIA C741, 2015); and
  - CIRIA C532. Control of Water Pollution from Construction Sites (CIRIA C532, 2001).

5.6. GROUNDWATER

5.6.1.1. Standard mitigation measures, including a variety of good environmental site practices, will be undertaken at the Proposed Development during the site preparation, earthworks and installation phases to minimise the risk of site runoff transmitting contaminants and sediment into surface water and groundwater bodies water and groundwater bodies via the surface water drainage system.

5.6.1.2. A variety of good environmental site practices will be implemented to avoid or minimise impacts at the source. Such measures include, but are not limited to, the following:

- Working areas shall be clearly defined to ensure the disturbance of soils is minimised as far as practicable;
- Haul routes and accesses shall be clearly defined to minimise the risk of accidents. Construction vehicles will be regularly inspected and maintained to reduce the risk of hydrocarbon contamination associated with leaks and spillage and will only be active when required;
- The cleaning of vehicle wheels prior to leaving site;
- Dust suppression (i.e. damping down);

- Installation of systems such as silt traps and swales designed to trap silty water including adequate maintenance and monitoring of these to ensure effectiveness, particularly after adverse weather conditions;
- Designated areas for the storage of hazardous materials, fuels and chemicals. All designated areas will be appropriately bunded to at least 110% capacity and all filler points/valves will be located within the extent of bund or appropriate drip trays provided;
- On-site availability of oil spill clean-up equipment including absorbent material and inflatable booms for use in the event of an oil spill or leak;
- Use of drip trays under mobile plant;
- Provision of environmental awareness training for site workers;
- Use of inert, uncontaminated material during construction; and
- A watching brief would be implemented during construction within the SPZ 1 to ensure that any unanticipated karst dissolution features are rapidly identified, and that works are temporarily paused so that any risk to groundwater, is minimised as far as possible. Work will continue when the issue is deemed to be sufficiently mitigated. Portsmouth Water to be notified of any instances of karst dissolution features being identified;
- Specific training for drilling contractor/teams on the importance of the Source Protection Zones/Principal Aquifer and protecting them for the duration of the works.

5.6.1.3. The risk of pollution to surface and groundwater can be significantly reduced by the adoption of good working practices and strict adherence to guidance provided by the EA on Gov.uk. The current guidance on gov.uk explains how to:

- Report an environmental incident;
- Get permission to discharge to surface water and groundwater;
- Manage business and commercial waste;
- Store oil and any oil storage regulations;
- Discharge sewage with no mains drainage; and
- Work on or near water and manage water on land

5.6.1.4. Guidance is also available in the following CIRIA publications;

- C532 - Control of Water Pollution from Construction Sites;
- C698 Site handbook for the construction of Sustainable Drainage System (‘SuDS’); and

- C648 - Control of Water Pollution from Linear Construction Projects.

5.6.1.5. Additional guidance regarding the protection of groundwater is provided by the EA in their publication 'Groundwater Protection Position Statements, February 2018, Version 1.2', and will be consulted.

5.6.1.6. Best practice recommendations for the prevention of contamination will be outlined in the relevant CEMP or equivalent, and agreed with relevant statutory consultees prior to commencement of construction works. This will include measures to comply with relevant legislation and guidance (including the EA's Guidance online) and best practice measures in line with the Considerate Contractors Scheme and 'Site handbook for the construction of SUDS' (CIRIA C698). It will include an erosion prevention and sediment control plan to reduce the quantity of sediment entrained in runoff.

5.6.1.7. It is recommended that surface runoff from the various construction areas within the site is managed by the use of temporary bunding and settlement ponds to protect the receiving water environment. Settlement ponds are beneficial in that they allow for isolation and on-site treatment of sediment laden or chemically contaminated surface water runoff prior to discharge, following agreement with the appropriate authority, or use of other appropriate means of disposal.

5.6.1.8. Movement of materials around the site will be managed under an appropriate MMP.

5.6.1.9. A Surface Water Drainage and Aquifer Contamination Mitigation Strategy, which forms Appendix 7 of this Outline CEMP (APP-360 Rev002), will be implemented. This strategy outlines the principles that must be complied with for the Converter Station design and is secured under requirement 6 and 15 of the dDCO (REP3-003).

5.6.1.10. During detailed design, if it is considered the earthwork cutting could expose the Structured Chalk, the platform level may require refinement, which may also require further construction methodologies and sequencing mitigation to manage the risk of exposing the Structured Chalk. Construction methodologies, mitigation and management will be to industry guidance (CIRIA Report C574), with consultation and approval from Portsmouth Water and Environment Agency.

5.7. SURFACE WATER RESOURCES AND FLOOD RISK

5.7.1. GENERAL PRINCIPLES

5.7.1.1. Consents or exemptions are expected to be required for the following consents/ permits, which should be further reviewed and confirmed during detailed design process:

- Temporary dewatering consent;
- Ordinary watercourse consent;
- Flood risk activities permit – environmental permits; and
- Discharges to surface water and groundwater: environmental permits.

5.7.1.2. Activities expected to require the above noted additional permits and consents are summarised below:

- Works within 16m and 8m of tidal and fluvial flood defences;
- Works within the flood plain;
- Works through, under or above a watercourse;
- Works requiring diversions or alterations to Ordinary Watercourses or extreme event surface water overland flow routes; and
- Works requiring temporary dewatering of surface water or groundwater.

5.7.1.3. The overarching principles required to obtain these approvals are summarised below, however specific methodologies are not defined to allow flexibility for the appointed contractor to conduct works in accordance with their preferred practices.

5.7.1.4. Measures to be undertaken include:

- The appointed contractor (and any sub-contractors) must take precautions during the Construction Stage to protect all surface water bodies including watercourses and drainage patterns from erosion, siltation or pollution in accordance with industry best practice. To prevent fine sediment entering the watercourses, construction activities should take place away from the watercourses and extreme event overland flow routes, where practicable. Should vegetation clearance be required, the extent should be limited to the areas necessary to reduce the amount of sediment released during clearance and the potential release of sediment from bare ground following clearance. Further pollution prevention mitigation measures for adoption include:
    - All operatives to be made aware of the need to protect the watercourse from contamination, including EA guidance and legal obligations.

- When construction activities, including stock piling (not permitted within fluvial flood zone 2 or 3 unless otherwise agreed with EA) and plant and vehicle washing, occur in close proximity to a watercourse they should be separated from the watercourse with barriers (e.g. sediment fences) to prevent surface water runoff from these sites entering the watercourse.
- Geotextile-material silt fences should be installed to filter suspended solids from runoff.
- Timing of works should be carefully considered around areas at risk of flooding and adjacent to watercourses. Where practicable, construction should be carried out during periods of low flow and rainfall (typically during summer months) to reduce the risk of pollution and erosion.
- The works should be carried out in accordance with established best practice and environmental permitting requirements.
- Pollution spill kits should be kept on site. In the event of an incident these would be used.
- Any soils contaminated will be removed immediately to a suitable landfill site or appropriately managed/ reinstated in accordance with ground contamination/ remediation requirements.
- Waste facilities to be provided on site for debris away from areas at risk of flooding.
- Cleaning of tools and shuttering will be carried out in water not draining directly to the watercourse.
- In any event of expected heavy rain pouring concrete and other activities which increase the risk of contaminating runoff should not be undertaken.
- The control on invasive non-native species should be managed through best practice guidance and by implementing the Wildlife Law: Control of Invasive Non-native Species HC1039 (Law Com No. 342).

- The appointed contractor (and any sub-contractors) must obtain approval through appropriate consents and permits to undertake any construction activity or appropriate exception prior to commencement of that activity and is responsible for agreeing the construction methodologies in association to these consents and permits based on the principles defined hereafter.

- The appointed contractor (and any sub-contractors) must ensure that existing Main River, Ordinary Watercourses, extreme event surface water overland flow routes are maintained within no increase to flood risk, on or off site, through appropriate temporary works and subject to approval or exemption of relevant environmental permits (flood risk activities permit/ ordinary watercourse consent).
- The appointed contractor (and any sub-contractors) must ensure any works over, under or directly adjacent to watercourses/watercourse structures (culvert/ sewer) and flood defences are subject to approval or exemption of environmental permits (flood risk activities permit/ordinary watercourse consent), where the contractor will need to develop appropriate design and construction methodologies to ensure that flood risk is not increased, the integrity of these features (e.g. flood defence or structure) are not negatively impacted, flow conveyance is not impacted and there is suitable pollution prevention measures in place during construction and operation.
- The appointed contractor (and any sub-contractors) will manage any potential surface water ingress or groundwater emergence that is deemed of a quantity unsafe to work in or that may create a pollution pathway. Any temporary dewatering or discharge of water must be in accordance with an exemption or Environmental Permit and discharged at a controlled discharge rate to an agreed discharge location through an appropriate pollution treatment mechanism. Dewatering quantities for trench construction will be determined at detailed design. The designer must ensure the discharge quantities are accurate or conservative to ensure no flood risk is not increased due to surplus groundwater being encountered during construction.
- Best practice methodology, in accordance with EA, Lead Local Flood Authority ('LLFA') guidance and other recommendations, should be implemented during construction to minimise the potential impacts of the Proposed Development on flood risk and potential contamination of surface waters.
- All construction activities will be undertaken in accordance with legislation and the gov.uk/EA Environmental Permits, Regulatory Position Statements and Guidance and other relevant documentation.
- The appointed contractor (and any sub-contractors) must ensure that works within flood zone 2 or 3 do not introduce significant structures (i.e. temporary site compounds) or spoil storage in the fluvial flood plain.
- The appointed contractor (and any sub-contractors) for works within flood zone 2 or 3, or directly adjacent to, should ensure a flood warning/ evacuation plan will be in place to halt works and make safe if there is an immediate risk of flooding.

- The majority of the cable route throughout Portsea Island/ Farlington is within Flood Zone 2 and 3. The joint bays, link pillars and link boxes to be located along the Onshore Cable Route are watertight when constructed and therefore their position in areas which are identified as being in Flood Zones 2 and 3 is acceptable. Due to the limited scale and size the above ground infrastructure associated with link boxes/link pillars the positioning of these in Flood Zones 2 and 3 is not expected to have any significant impact on the flood risk environment. Nonetheless, where practicable locations for joint bays and link pillars/link boxes are to be located outside of flood zones 2 and 3 or areas at risk of surface water flooding. Where this is not practicable any works in the Flood Zone 2 or 3 will be subject to approval of a flood risk activities permit or an exemption, and works within areas at risk of surface water flooding may be subject to approval of an ordinary watercourse consent or an exemption. No impediments are foreseen to any such approvals or exemptions being obtained, taking into account the nature of the works and infrastructure proposed.
- If the appointed contractor decides to use temporary bunds to protect the trench or construction works, these would be in small localised areas and any impacts on existing drainage regime will need to be managed to ensure the impact of flooding is not increased subject to approval or exemption of relevant environmental permits (flood risk activities permit/ordinary watercourse consent).
- The detailed design of the HDDs is proposed to be developed post application and any specific provisions to protect the HDD construction works from the tidal flood risk will be developed by the contractor prior to works, if required. Any pathways under a flood defence created through the HDD during construction and operation will require appropriate bunding to the same standard of protection (e.g. defence crest level) to ensure a pathway is not created around the flood defence subject to approval or exemption of a flood risk activities permit. HDD alignments should pass below or avoid, with appropriate clearance, any below ground features (e.g. sheet piling, concrete structures) associated to flood defences.
- Any temporary or permanent works over, under or directly adjacent to watercourses/watercourse structures (culvert/sewer) and flood defences will be subject to approval or exemption of environmental permits (flood risk activities permit/ ordinary watercourse consent), where the contractor will need to develop appropriate temporary and permanent design to ensure that the integrity of these features are not negatively impacted, flow conveyance is not impacted and there is suitable pollution prevention measures in place during construction and operation, and any works adjacent to the coastal flood defences should be located off the toe of any flood bunds unless otherwise agreed through an environmental permit.

- During operation, at the transition between the HDD and open cut trenching, a fully sealed transition collar will be used to connect the ducts to the HDD pipe. This will prevent the ingress of water into the ducted system at these locations and limit the risk of the HDD duct providing a route for flood water to enter the protected areas behind the flood defence.
- Site earthworks and site clearance (including vegetation clearance) activities must ensure that impacts to the current drainage regime in relation to surface water drainage, water quality and flood risk are appropriately managed through proportionate temporary and permanent drainage measures in accordance with industry best practice. This may include pre-construction surveys, temporary surface water management, pollution control and post-construction reinstatement works

5.8. HERITAGE AND ARCHAEOLOGY

5.8.1.1. The archaeological and cultural heritage mitigation outlined here comprises high-level general measures to minimise or reduce adverse effects arising from disturbance from the works on the surrounding historical assets. Where impacts have been identified and subject to the nature of the asset and the potential impact, consideration has been given to a range of mitigation measures, these include but are not limited to:

- Archaeological monitoring during construction to ensure appropriate recording of any remains encountered; and
- Proximity to Designated Heritage Assets must be taken into consideration during construction.

5.8.1.2. When undertaking construction works the contractor should take into account nearby Designated Heritage Assets, such as listed buildings, including curtilage structures (i.e. associated assets with the property extent such as boundary walls, which may not be mentioned specifically in the listing description). The types of Designated Assets are identified in Table 2.1 above. Where the Order Limits are in close proximity to those assets, care should be taken to prevent accidental strike damage from plant movement and construction activities. The Onshore Cable Route will be located in the existing highway and not in the pavement adjacent to nearby Designated Heritage Assets where vibration could cause damage.

5.8.1.3. The mitigation strategy proposed to mitigate predicted archaeological construction related impacts identified is set out below. Three strategies are presented:

- Strategy 1: Greenfield areas (i.e. open rural or undeveloped land) – archaeological evaluation and mitigation;
- Strategy 2: Brownfield areas (i.e. Joint Bays ('JB'), Transition Joint Bays ('TJB') and HDD entry/exit points) – archaeological evaluation (where practicable) and mitigation; and
- Strategy 3: Brownfield area (i.e. along existing roads, pavements and hardstanding) – mitigation.

Strategy 1: Greenfield area evaluation and mitigation

5.8.1.4. Within the greenfield areas of the Order Limits (Sections 1-3), proposed ground disturbance would be extensive due to the preliminary topsoil strip. This is assumed to be site-wide for the Converter Station Area and also within the Onshore Cable Corridor working width, along with temporary access routes and temporary compounds (approximately 23 m wide).

5.8.1.5. Within these areas, the presence, nature, date, extent and significance of any archaeological remains present would need to be clarified by trial trench evaluation as the potential for such remains, as assessed by the desk-based and Stage 1 Geophysical Survey, is uncertain. These will be targeted to geophysical anomalies of potential archaeological interest, along with any remains identified by the desk-based research, but will also include sampling of 'blank areas'.

5.8.1.6. The results of the evaluation will enable the Applicant to formulate with the relevant statutory consultees an appropriate mitigation strategy for any significant archaeological remains that could be affected.

5.8.1.7. Mitigation could take the form of a targeted archaeological excavation (preservation by record) well in advance of the commencement of ground works and/or an archaeological watching brief (a programme of 'strip, map and sample) carried out alongside the preliminary topsoil removal. This would ensure that archaeological remains were not removed without record. This would need to be programmed with adequate time for the recording of archaeological remains.

5.8.1.8. There is a very small chance that archaeological remains of very high (national) significance will be encountered. In the unlikely event that they are identified, there may be a requirement, where practicable, for their preservation *in situ*, i.e. through modifications to the design, e.g. modification in design of foundations and formation levels for the Converter Station, or avoidance in the adjustment of the position of the Converter Station and/or the line of the Onshore Cable Route.

5.8.1.9. Any archaeological work would need to be undertaken in consultation with the relevant Archaeological Advisor, in accordance with an approved archaeological

Written Scheme of Investigation ('WSI') outlining the scope and method of investigation, along with the post-excavation reporting and dissemination strategy.

Strategy 2: Brownfield area evaluation and mitigation

5.8.1.10. JBs, TJBs and HDD compounds in brownfield areas would entail more than the localised disturbance of the proposed cable trench, with the excavation of larger and deeper trenches, approximately 15 m x 5 m, to a depth of 3 m (JBs) and up to 1.75 mbgl. For such areas, archaeological trial trench evaluation may be appropriate depending on the depth of modern made ground.

5.8.1.11. As with the greenfield evaluation, this would aim to clarify the presence, nature, date, extent and significance of any archaeological remains within the area of excavation and would enable the formulation of an appropriate mitigation strategy.

5.8.1.12. In areas where evaluation trial trenching is not considered feasible, the proposed strategy will revert to Strategy 3 (see below).

Strategy 3: Brownfield area mitigation of the cable trench

5.8.1.13. The majority of the Onshore Cable Corridor passes through urban areas along existing roads, pavement and hardstanding. For these areas, the proposed archaeological impact would be highly localised and restricted to the approximate 1.0 m wide by 1.3 m deep cable trench, with no impacts from a 'working width' (i.e. no topsoil strip). Modern made ground is anticipated to be present, possibly to a depth of 0.5 m or greater. Archaeological remains in such areas are also likely to have been partially or wholly truncated by modern infrastructure development.

5.8.1.14. For this reason, the preliminary surveys proposed for the greenfield parts of the Order Limits would be neither feasible nor appropriate. In order to mitigate the localised impact of the cable trench on any potential archaeological remains, an archaeological watching brief would be required *in areas with potential for significant surviving archaeological remains,* and where the cable corridor would divert away from existing highways (i.e. on adjacent roadside verges/hardstanding). This would ensure that any archaeological assets were not removed without record.

5.8.1.15. The archaeological watching brief would be carried out during the Construction Stage during the excavation of the cable trench, with work halted to allow sufficient time to excavate, sample, and record any archaeological remains exposed.

5.8.1.16. The level of archaeological watching brief attendance is likely to vary depending on the predicted sensitivity along the Onshore Cable Corridor. The future WSI would present the approach, ranging from continuous attendance in sensitive areas to regular attendance for areas with low to moderate potential. For areas where there would be no impact (i.e. landfill zones/modern highways), no attendance would be required.

5.8.1.17. The archaeological watching brief would need to be undertaken in accordance with an approved archaeological WSI outlining the scope and method of investigation, along with the post-excavation reporting and dissemination strategy.

Palaeoenvironmental sampling

5.8.1.18. The archaeological strategies proposed above would require an element of palaeoenvironmental sampling, where the potential for such has been identified. This might include proposed disturbance in coastal alluvial/fluvial zones adjacent to Langstone Harbour and in areas of raised marine deposits, where they would be affected.

5.8.1.19. This would typically entail sampling during the intrusive fieldwork discussed above (and set out in the WSI), and geoarchaeological analysis in order to develop an understanding of past environmental conditions of the local area.

5.8.1.20. In light of the shallow nature of the proposed impact along the Onshore Cable Corridor, deep sampling through the use of purposive geoarchaeological boreholes, along with the creation of a geoarchaeological deposit model, is not considered appropriate.

5.10. TRAFFIC AND TRANSPORT

5.10.1.1. The construction of the Proposed Development will be required to comply with each Traffic Management Strategy ('TMS') and Construction Traffic Management Plan ('CTMP'). A Framework TMS and Framework CTMP are provided as appendices to the Environmental Statement (REP1-068 and REP1-070).

5.10.1.2. The Framework TMS provides details of traffic management measures to be deployed to facilitate construction of the Onshore HVDC Cables. The Framework TMS includes details of temporary traffic signals, lane closure and road closure requirements and a programme that aims to minimise disruptions of the construction works through timing of works at key locations to avoid constraints such as school terms and major events. The Onshore Cable Route Construction Impacts on Access to Properties and Car Parking and Communication Strategy included in Appendix 1 of the FTMS also sets out principles for mitigation, including:

- Access to residences, businesses and community facilities - including access to driveways outside working hours and three-way signals for business premises with their own access onto affected highways; and maintenance of side road access; and
- A communication strategy to allow stakeholders such as residents, businesses, the emergency services and community facilities to keep up to date with construction works.

5.10.1.3. The Framework CTMP provides an overarching plan of how construction traffic and site operations will be managed across the Onshore Components of the Proposed Development. The Framework CTMP sets out the parameters within which contractors will be required to work, including hours of operation, traffic routing, safe vehicular access and requirements to minimise traffic impacts. The Framework CTMP also includes a Framework Construction Worker Travel Plan, which sets out the strategy to be employed by the Contractor to reduce the number of single-occupancy vehicle trips made to the Converter Station Area by construction workers.

5.10.1.4. Prior to commencement of works in the highway, the Project Manager will submit detailed designs for the works and associated traffic management measures and a Travel Plan for approval to the relevant Highway Authority.

5.10.1.5. The Contractor will seek to locate Joint Bays in locations off carriageway, where practicable, to mitigate disruption to traffic, taking into account other environmental constraints and considerations. No Link Pillars will be located within the carriageway.

5.11. AIR QUALITY

5.11.1.1. The following general mitigation measures are to be implemented on site in line with best practice, IAQM guidelines. Table 5.1 should be read in conjunction with Table 5.2 as the mitigation required is commensurate with the assessed level of dust risk for each section. The contractor will implement, where appropriate, those measure 'highly recommended' by the IAQM guidelines as outlined in Table 5.1.

Table 5.1 - IAQM Mitigation resulting from the Construction Dust Assessment

Mitigation Measure	High Risk Site	Medium Risk Site
Communications		
1. Develop and implement a stakeholder communications plan (including a specific plan for the emergency services) that includes community engagement before work commences on site.	Highly Recommended	Highly Recommended
2. Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.	Highly Recommended	Highly Recommended
3. Display the head or regional office contact information.	Highly Recommended	Highly Recommended
4. Develop and implement a Dust Management Plan ('DMP'), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in the IAQM Guidance. The desirable measures should be included as appropriate for the site. In London additional measures may be required to ensure compliance with the Mayor of	Highly Recommended	Highly Recommended

Mitigation Measure	High Risk Site	Medium Risk Site
London's guidance. The DMP may include monitoring of dust deposition, dust flux, real-time PM_{10} continuous monitoring and/or visual inspections.		
Site Management		
5. Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.	Highly Recommended	Highly Recommended
6. Make the complaints log available to the local authority when asked.	Highly Recommended	Highly Recommended
7. Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.	Highly Recommended	Highly Recommended
8. Hold regular liaison meetings with other high-risk construction sites within 500m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.	Highly Recommended	Not required
Monitoring		

Mitigation Measure	High Risk Site	Medium Risk Site
9. 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 authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of site boundary, with cleaning to be provided if necessary.	Highly Recommended	Desirable
10. Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.	Highly Recommended	Highly Recommended
11. Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	Highly Recommended	Highly Recommended
12. Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where practicable, commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.	Highly Recommended	Highly Recommended
Preparing and Maintaining the Site.		

Mitigation Measure	High Risk Site	Medium Risk Site
13. Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is practicable.	Highly Recommended	Highly Recommended
14. Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	Highly Recommended	Highly Recommended
15. Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period.	Highly Recommended	Highly Recommended
16. Avoid site runoff of water or mud.	Highly Recommended	Highly Recommended
17. Keep site fencing, barriers and scaffolding clean using wet methods.	Highly Recommended	Highly Recommended
18. Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.	Highly Recommended	Highly Recommended
19. Cover, seed or fence stockpiles to prevent wind whipping.	Highly Recommended	Highly Recommended
Operating vehicle/machinery and sustainable travel		
20. Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London Non-Road Mobile Machinery ('NRMM') standards, where applicable.	Highly Recommended	Highly Recommended

Mitigation Measure	High Risk Site	Medium Risk Site
21. Ensure all vehicles switch off engines when stationary – no idling vehicles.	Highly Recommended	Highly Recommended
22. Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.	Highly Recommended	Highly Recommended
23. Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).	Highly Recommended	Desirable
24. Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	Highly Recommended	Highly Recommended
25. Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).	Highly Recommended	Desirable
Operations		
26. Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	Highly Recommended	Highly Recommended

Mitigation Measure	High Risk Site	Medium Risk Site
27. Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where practicable and appropriate.	Highly Recommended	Highly Recommended
28. Use enclosed chutes and conveyors and covered skips.	Highly Recommended	Highly Recommended
29. Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	Highly Recommended	Highly Recommended
30. Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.	Highly Recommended	Highly Recommended
Waste management		
31. Avoid bonfires and burning of waste materials.	Highly Recommended	Highly Recommended
Measures Specific to Hard Surface Removal (e.g. asphalt)		
33. Ensure effective water suppression is used during Hard Surface Removal operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.	Highly Recommended	Highly Recommended

Mitigation Measure	High Risk Site	Medium Risk Site
34. Avoid explosive blasting, using appropriate manual or mechanical alternatives.	Highly Recommended	Highly Recommended
35. Bag and remove any biological debris or damp down such material before Hard Surface Removal.	Highly Recommended	Highly Recommended
Measures Specific to Earthworks		
36. Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable	Highly Recommended	Desirable
37. Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as is practicable.	Highly Recommended	Desirable
38. Only remove the cover in small areas during work and not all at once.	Highly Recommended	Desirable
Measures Specific to Construction		
39. Avoid scabbling (roughening of concrete surfaces) if possible.	Highly Recommended	Desirable
40. Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.	Highly Recommended	Highly Recommended
41. Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with	Highly Recommended	Desirable

Mitigation Measure	High Risk Site	Medium Risk Site
suitable emission control systems to prevent escape of material and overfilling during delivery.		
42. For smaller supplies of fine powder materials, ensure bags are sealed after use and stored appropriately to prevent dust.	Desirable	Desirable
Measures Specific to Trackout		
43. Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.	Highly Recommended	Highly Recommended
44. Avoid dry sweeping of large areas.	Highly Recommended	Highly Recommended
45. Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	Highly Recommended	Highly Recommended
46. Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.	Highly Recommended	Highly Recommended
47. Record all inspections of haul routes and any subsequent action in a site log book.	Highly Recommended	Highly Recommended
48. Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.	Highly Recommended	Highly Recommended

Mitigation Measure	High Risk Site	Medium Risk Site
49. Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	Highly Recommended	Highly Recommended
50. 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.	Highly Recommended	Highly Recommended
51. Access gates to be located at least 10 m from receptors where practicable.	Highly Recommended	Highly Recommended

Table 5.2– Summary table of Dust risk results per Onshore Cable Corridor Section

Section	Overall Dust Risk
1 Lovedean (Converter Station Area)	High
2 Anmore	High
3 Denmead/Kings Pond Meadow	High
4 Hambledon Road to Farlington Avenue	High
5 Farlington	High
6 Zetland Field to Sainsbury's Car Park	High
7 Farlington Junction to Airport Service Road	High
8 Eastern Road (adjacent to Great Salterns Golf Course) to Moorings Way	High
9 Moorings Way to Bransbury Road	Medium
10 Eastney (Landfall)	Medium

5.12. NOISE AND VIBRATION

5.12.1. BEST PRACTICABLE MEANS

5.12.1.1. At all stages of the construction, Best Practicable Means ('BPM'), as defined in the Control of Pollution Action 1974 must be followed. This will comprise employing reasonably practicable noise and vibration mitigation measures, with simultaneous regard to local conditions and circumstances (e.g. proximity of sensitive receptors) and current technical knowledge (e.g. utilising quietest equipment available) and to financial implications. Details of specific BPM to be employed during the construction works are included below and in Appendix 24.2 of Chapter 24 (Noise and Vibration).

5.12.1.2. The BPM measures below may be reviewed and supplemented by location or activity specific mitigation measures following the appointment of a contractor and the production of detailed works plans.

5.12.1.3. The following mitigation measures should be adopted at all times during construction activities. These measures will be most important to observe at the following times:

1. Where works are being undertaken close to the extremities of the Order Limits and, therefore, closest to sensitive receptors; and
2. When works are being undertaken during periods when surrounding sensitive receptors are highly sensitive to noise (e.g. at night-time for residential receptors).

5.12.2. BPM MEASURES TO BE EMPLOYED DURING ALL CONSTRUCTION ACTIVITIES

General

5.12.2.1. The contractor will comply with the requirements of the Control of Pollution Act 1974 (with particular reference to Part III), the Health and Safety at Work Act 1974, the Control of Noise at Work Regulations 2005 and the Control of Vibration at Work Regulations 2005.

5.12.2.2. The appointed contractor(s) for construction should consider registering their site(s) under the Considerate Constructors Scheme, which is recognised by industry and the Government for encouraging construction firms to be sensitive to the environment.

5.12.2.3. Site personnel should be instructed on Best Practice Mitigation Measures to reduce noise and vibration as part of their site induction training. See section 4.2 for further information.

5.12.2.4. Shouting and raised voices shall be kept to a minimum. Use of radios is to be limited to where two-way communication is required for safety reasons.

Deviation from approved method statements will only be permitted with prior approval from the appointed contractor and other relevant parties. This will be facilitated by formal review before any deviation is undertaken. See section 4.5 for further information.

Community Liaison

5.12.2.5. Correspondence (e.g. letter drop) should be sent to occupiers of all sensitive receptors likely to be affected by construction activities well in advance of construction activities taking place. The correspondence should contain the following information:

- A brief description of the proposed activities and reasons why the works are required.
- The dates and times of proposed construction activities, and in particular when the loudest activities will take place. This includes the specific timings of road cutting / breaking activities for out-of-hours works in the Onshore Cable Corridor (see paragraph 6.2.7.6).
- Contact details (phone number and emails address) for the Client and contractor undertaking the works, which can be used by the public to ask questions or raise complaints.

5.12.2.6. Should works be delayed or re-programmed, local residents should be informed of the revised programme of works as soon as possible.

5.12.2.7. Further information on public relations and the communications strategy is contained in section 4.4.3.

5.12.2.8. Any noise complaints received by the public relations officer, Environmental Health Officer or Environmental Manager will be reported to the appointed contractor and immediately investigated, including a review of mitigation measures for the activity that caused the complaint. Where necessary, mitigation measures will be revised to ensure BPM is being followed. Further information on the complaints procedure is contained in section 4.4.4.

Equipment

5.12.2.9. Modern, silenced and well-maintained plant will be used at all times, conforming to standards set out in EU Directives.

5.12.2.10. Consideration will be given to avoiding the use of percussive plant where non-percussive methods are available for a given activity.

5.12.2.11. Pneumatic tools will be fitted with silencers or mufflers.

5.12.2.12. Equipment and vehicles should be shut down or turned off when not in use so that plant is not left running unnecessarily.

5.12.2.13. Engine covers will be kept closed when machines are in use.

5.12.2.14. Stationary plant and equipment will be positioned to minimise the noise/vibration impact at sensitive receptors.

5.12.2.15. Plant which is known to emit noise directionally will be orientated, where possible to direct noise away from the nearest sensitive areas.

Deliveries

5.12.2.16. Where practicable, construction plant should access construction areas via arterial roads or main carriageways, in order to minimise noise and vibration at dwellings on the rural or local road network.

5.12.2.17. Unless agreed in advance, all deliveries will be during the agreed construction working hours for each activity and on a "just-in-time" basis to minimise idling vehicles.

5.12.2.18. Loading and unloading of vehicles, dismantling of equipment such as scaffolding or moving equipment or materials around the construction sites will be conducted in such a manner as to minimise noise.

Screening

5.12.2.19. Where necessary, any noise screening around construction compounds would be constructed as early as possible in the construction programme.

5.12.2.20. Semi-static equipment is to be sited and oriented as far away as is reasonably practicable from noise sensitive receptors and will utilise localised screening if feasible and required.

5.12.2.21. Further information on location specific screening is contained in section 6.2.8.

5.13. SOCIO-ECONOMICS

5.13.1. EMPLOYMENT GENERATION

5.13.1.1. Measures would be put in place, where practicable, to maximise the potential for the workforce and Proposed Development's supply chain to be sourced locally. These measures could include:

- Working with local people and local business to ensure that, investment in the South East, stays in the South East.
- Engaging with Jobcentre Plus to ensure local job opportunities are advertised to local unemployed people and identifying opportunities to help people get back into employment through work placements, education and skills training.
- Upskill people working on the Proposed Development that, through experience, training and development programmes.

5.13.2. DISRUPTION TO BUSINESSES AND RESIDENCES

5.13.2.1. Measures will be put in place to reduce disruption to businesses during the construction period. These include:

- Businesses, residents and community facilities who are likely to be impacted during construction will be consulted about access requirements.
- Where construction activities impact on the ability for customers to determine whether or not a business is still open, signage will be erected such as 'Business as Usual signs' to publicise that the business is still open.

5.13.2.2. A Framework CTMP has been produced to reduce effects from construction traffic outlining:

- Construction traffic routing and embargoed routes;
- Types of construction vehicles to be used for different purposes;
- Avoidance of peak commuting hours;
- Site access and designated parking; and
- Management of loading, waste management and abnormal loads.

5.13.2.3. The appointed contractor would need to develop these measures so that communication methods are effective during construction.

5.13.2.4. There will be occasions where vehicular access to residential or commercial properties would be needed at different times and in this situation, road plates can be used to bridge the longitudinal excavations to open the carriageway to provide access with full vehicular access being reinstated overnight. This will be determined by the appointed contractor on a case-by-case basis.

5.13.3. DISRUPTION TO COMMUNITY FACILITIES

5.13.3.1. Similar to the mitigation applied above, Community Facilities would be consulted prior to construction where access arrangements would be directly affected. Traffic management systems and diversion routes would be put in place to maintain accessed to identified community facilities.

5.13.3.2. Vehicular access will be maintained at all times to community facilities which perform emergency service activities. Specific measures are outlined in the Framework Traffic Management Strategy and include road plates.

5.13.3.3. Works adjacent to Solent Infant School on Evelegh Road and Mooring Way Infant School, Moorings Way will be programmed within school holidays, in accordance with the Framework Traffic Management Strategy.

5.13.4. EFFECTS ON USERS OF RECREATIONAL AND OPEN SPACE, LEISURE FACILITIES AND PEDESTRIAN ROUTES

5.13.4.1. To ensure that negative effects on amenity value and disruption are reduced as far as practicable during the Construction Stage of the Proposed Development, the following mitigation measures can be implemented:

- The community groups who utilise the areas of recreational and open space which will be impacted by the construction of the Proposed Development would be informed of the nature, timing and duration of particular articular activities during the Construction Stage;
- If alternative routes or spaces are required to be utilised in and around areas of open and recreational space, directions would be clearly communicated at the appropriate place; and
- Joint Bays will not be located within sports pitches

5.13.4.2. The construction programme will be reviewed by the contractor(s) to see where there are opportunities to reduce effects on open space, for example by reducing construction programme though concurrent working on single or multiple spaces (including car parks) and avoiding key events. This would also apply to where there may be potential for cumulative effects with North Portsea Island Coastal Flood Defence Scheme at Kendall's Wharf if construction is concurrent. Site liaison is required to ensure construction site management minimises disturbance in this area.

5.13.4.3. The areas required for longer- term construction works, such as Trenchless methods, within the Order Limits will also be reviewed by the construction contractors to determine whether there are any opportunities to reduce areas of open space required for long-term works.

5.13.4.4. The Fort Cumberland Road Car Park is currently unsurfaced. As part of reinstatement works following construction, the car park will be improved to be in a better condition in liaison with PCC. Areas of open space will be restored, as far as practicable, to the same condition as they were in prior to construction.

5.13.4.5. Where the Order Limits are crossed by off-road PRoW or cycle routes, there is the potential for the route to be closed temporarily during construction for safety purposes. To mitigate this disruption, an alternative route will be provided along with signage in advance of the temporary closure.

5.13.5. DISRUPTION TO TOURISM

5.13.5.1. Prior to construction, the Contractor will review the events programme to determine where it may be possible for construction on key transport routes and relevant areas of open space to avoid one-off events. Where this is not possible, the Contractor will liaise with event organisers to implement additional traffic management or other measures to minimise disruption and congestion, such as screening of compounds and provision of security. The Framework Traffic Management Strategy and the timings for works included within it has taken into account known annual events in the locality of the works.

5.13.6. EFFECTS ON NON-MOTORISED USERS, RECREATION AND OPEN SPACE

5.13.6.1. The Fort Cumberland Road car park is currently unsurfaced. As part of reinstatement works following construction, the Applicant will resurface the car park. This can encourage better parking and greater capacity use of the remaining car park area.

5.14. WASTE AND MATERIAL RESOURCES

5.14.1.1. All waste will be managed in accordance with the Waste Hierarchy (in order of preference):

- Prevention;
- Minimisation;
- Reuse;
- Recycle;
- Energy recovery; and
- Disposal.

5.14.1.2. The appointed contractor will be responsible for the correct storage and management of the earthworks material excavated for the works. This material will be used where it meets re-use criteria within the Site (as part of the works) to mitigate the environmental effects of the works. The use of recycled materials will be maximised.

5.14.1.3. Monitoring measures to be adopted across the Proposed Development would include, as a minimum, the implementation of a CEMP, incorporating a Materials Management Plan ('MMP') and Site Waste Management Plan ('SWMP') by the contractor, once appointed. Associated data, information and reports will be used to evidence monitoring undertaken.

5.14.1.4. The SWMP will be prepared in accordance with best practice guidance (Waste and Resource Action Programme ('WRAP')) and will be kept up to date and will be delivered. Associated data, information and reports will be used to evidence monitoring undertaken. An Outline SWMP is provided in Appendix 3.

5.14.1.5. The key matters of the SWMP are to:

- Identify the volume of waste streams likely to be produced during the works to establish the potential for reuse and recycling;
- Identify possible options for waste to be 'designed out;
- Identify opportunities for waste minimisation and management;
- Identify the most significant opportunities to increase re-use and recycling rates;
- Identify suitable waste management contractors and record appropriate licences, permits, waste transfer notes and hazardous waste consignment notes;
- Consider appropriate site practices such as how materials will be segregated and the measures that will be used for raising awareness among site operative for waste reduction, reuse and recycling; and
- Set out the method for measuring and auditing Construction, Demolition and Excavation ('CD&E') waste to enable more effective waste management through the setting of performance targets for segregation, recycling and monitoring sub-contractors.

5.14.1.6. The following waste related documentation will be held on-site:

- SWMP;
- Relevant Duty of Care documentation, including waste transfer notes and exemptions;
- A Control of Substances Hazardous to Health ('COSHH') Register; and
- Site compound plan showing potentially contaminative and COSHH substances.

5.14.1.7. The following actions in relation to Material Resources are considered sufficient:

- Completion of ground and local environment inspections and surveys will be undertaken to determine the nature of the ground, to identify its potential to be diverted from landfill.
- Spoil and waste segregation and containment will be provided on temporary laydown areas within the Converter Station Area.
- Sufficient storage space will be allocated by the construction contractor to allow waste to be properly segregated.
- The detailed design and construction aspects will follow British Standard 8895 (Designing for material efficiency in building projects) and other published guidance such as BRE materials resource efficiency in construction.
- Off-site fabrication will be utilised, where practicable.
- The construction contractor will be encouraged, to order material with less or returnable packaging.

5.14.1.8. The following further actions are recommended to ensure good and best practice are achieved:

- Identification and specification of material resources that can be acquired responsibly, in accordance with BES 6001 Responsible Sourcing of Construction Products.
- Design for resource optimisation: simplifying layout and form, using standard sizes, balancing cut and fill, maximising the use of renewable materials, and materials with recycled or secondary content.
- Design for off-site construction: Maximising the use of pre-fabricated structures and components, encouraging a process of assembly rather than construction.
- Identify opportunities to minimise the export and import of material resources.
- Detailed design for recovery and reuse: identifying, securing and using material resources at their highest value, whether they already exist on site, or are sourced from other schemes.
- Ensure arisings are properly characterised before or during design, to maximise the potential for highest value reuse.
- Working to a proximity principle, ensuring arisings generated are handled, stored, managed and re-used or recycled as close as practicable to the point of origin.

5.15. CARBON AND CLIMATE CHANGE

5.15.1.1. General mitigation measures for carbon and climate change include:

5.15.2. GREENHOUSE GAS EMISSIONS

5.15.2.1. The Converter Station design will adopt a sustainable approach which will involve the following measures:

- Reducing, where practicable, material use in construction and minimising the use of high carbon materials.
- Buildings should be energy and resource efficient.

Other Construction Measures

- Minimise energy consumption including fuel usage by, for example, reducing the requirement for earth movements to/from and within the construction site;
- Maximise the local sourcing of materials and local waste management facilities, where practicable;
- Use efficient construction processes, such as design for manufacture and assembly; and

- As far as practicable, incorporating material resource efficiency and waste minimisation best practice into design, in particular improving the cut/fill balance of the Proposed Development.

5.15.3. CLIMATE RESILIENCE

Materials:

- Ensuring site and compound temporary and permanent drainage infrastructure has sufficient capacity for extreme flood events and that silt traps are in use/regularly emptied and maintained.
- Ensure any materials on site are stored safely and covered with waterproof materials.
- Dust control measures would be in place, for example speed limits on site, water available for dampening down, excavated materials to be removed from site as soon as practicable, and backfilling materials installed immediately after delivery.
- Allowing extra time for materials to dry out in the programme of works.
- Using mould inhibiting paint.
- Safe storage of spoil heaps, storage of spoil is not permitted in the fluvial floodplain.

Plant and Equipment and working method:

- Using rainwater recycling to support other facilities (e.g. washing of machinery etc.).
- Reviewing wind speed before commencing work at height.
- Ceasing work at height during storms.
- Switching machinery off when not in use.
- Use of machinery which is likely to get hot during cooler periods.
- Completed sections of the cable ducts are to be sealed at each end against water ingress. Joint bay chambers are only to be excavated immediately before cable pulling and jointing, where practicable. It may be necessary, for programming reasons, to excavate a cable and pull one section of cable, then temporarily backfill. In this case, temporary water seals would be fitted around the pulled cables.

Workforce:

- PPE to be suitable for hot weather conditions, lightweight vests/jackets, two piece rather than coveralls.

- Regular breaks to be taken, additional supply of drinking water and sun cream to be made available.
- Areas of shade to be made available for workforce, where practicable.
- Ensuring welfare facilities are available and sufficiently cool. Ensure rest breaks are taken, particularly during the hottest part of the day (generally, 11am – 3pm) or when temperatures rise above 24oC (TUC, 2019).
- An appropriate level of training to staff should be in place to ensure workforce are aware to stay away from flood water and working near watercourses. Workforce should be signed up to flood warnings (rainfall, tidal, fluvial, reservoir) and check the weather forecast to be able to plan ahead and avoid attending site if there is a risk of flooding.

Site Compound:

- Storing chemicals, hazardous materials and plant on high ground above predicted flood water levels or protecting with appropriate bunds/flood barriers above the predicted flood water level
- Where appropriate, site compound, and any storage of soil stockpiling or plant must be in accordance with measures outlined in Section 5.7 above.
- Using pumps to ensure water levels in excavations do not exceed critical levels, in accordance with an exemption or subject to agreement and approval of a de-watering environmental permit.
- Reducing the area of impermeable surface, where practicable e.g. permeable paving.
- Using vegetation to slow down the movement of surface water e.g. vegetating compound, where practicable, with grass and minimising impermeable area.
- Dust control measures e.g. water spraying, covering spoil heaps.
- Installing lightening protection for site buildings.

Traffic:

- Ensure the access road and roads used during construction are monitored during periods of heavy rainfall and appropriate traffic management put in place to avoid areas of potential flooding.

Operation:

5.15.3.1. The resilience of the Proposed Development during operation will be improved through the following measures:

- Regularly clearing and maintenance of drainage infrastructure to prevent blockage.
- Using vegetation to slow down the movement of surface water.
- Consideration of the projected change in soil moisture when specifying foundation depth – potentially need deeper foundations.
- Specifying appropriate materials (e.g. asphalt, concrete mix) to take account of higher average temperatures.
- Using mould inhibiting paints as part of regular maintenance and updating.
- Using slope stabilisation measures.

Design principles for Climate Resilience:

5.15.3.2. Climate Resilience will be a key consideration in the design of the Converter station and associated infrastructure. The design will be in accordance with the following requirements as outlined in Table 5.3.

Table 5.3 - – Resilience design principles within the design of the Converter Station

Receptor	Design Requirement	Potential impact addressed
Converter Station	Cooling systems will be required to remove heat generated within the Converter Station building. Power electronics equipment is to be housed indoors, within the two converter hall buildings. Auxiliary power supplies will be provided in the event of a power failure at the Converter Station to ensure continuity of operation. Back-up sources such as stand-by diesel generators will be only used if other sources of auxiliary supply are unavailable during construction and operational timescales. A Fire Prevention Procedure will be implemented and developed alongside the final design and implemented for operation.	Overheating of Converter Station buildings and equipment Risk of fire as a result of overheating Flooding of the converter station and supporting infrastructure, resulting in loss of supply

Receptor	Design Requirement	Potential impact addressed
Access Road	Attenuation ponds are to be provided to capture surface water run-off from the Converter Station and Access Road. levels (See Appendix 20.1 (Flood Risk Assessment ('FRA')) of the ES Volume 3 (document reference 6.3.20.1).	Increased surface water runoff Flooding of access road
Drainage	Attenuation ponds are to be provided to capture surface water run-off from the Converter Station and Access Road.	Drainage infrastructure overwhelmed leading to surface water flooding Increased surface runoff leading to surface water flooding and siltation
Structures	Given the topography of the Converter Station Area, bulk earthworks will be required to create a level platform of 84.8 m AOD. The buildings will likely be constructed of steel frame and cladding.	Flooding of the Converter Station site Deterioration of material structure and fabric Damage from high winds and rain-infiltration into surfaces and materials

5.15.3.3. Climate Resilience will also be a key consideration in the design of the Onshore Cable. The design will be in accordance with the following requirements as outlined in Table 5.4.

Table 5.4 - Resilience design principles within the design of the Onshore Cable Corridor

Receptor	Design features	Potential impact addressed
Onshore Cable Corridor	The Onshore Cables will be buried in cable ducts The AC cables may be installed alongside an Earth Continuity Conductor, an insulated metallic conductor to provide a path to earth for any fault currents.	Reduction in the ability of the ground to conduct heat away from underground cables during high temperatures UV degradation of exposed cabling equipment Lightning strike

Receptor	Design features	Potential impact addressed
	Link boxes / HVDC joints / Terminations will be fully sealed to water ingress damage.	Damage due to flooding
Drainage	Soil bunds are to be seeded to prevent surface runoff across the site, which otherwise might erode or impact on exposed soil and stockpiles, to carry suspended solids in the runoff. Silt fencing, dams, cut off ditches, settlement ponds or proprietary settlement equipment (e.g. Silt buster) are to be used to prevent water pollution entering watercourses/ and surface water drains.	Drainage infrastructure overwhelmed Increased surface water runoff
Structures	ORS have been designed to a level above flood levels (See Appendix 20.1 (Flood Risk Assessment ('FRA')) of the ES Volume 3 (document reference 6.3.20.1). The shore landing ducts, installed by Horizontal Directional Drilling ('HDD') will run from 250 m inland to approximately 1000 m offshore, passing below the beach at a depth of 15-20 m, so costal erosion is not expected to affect the Onshore HVDC Cable Corridor.	Reduction of earthwork stability due to sea level rise and flooding Increased rate of deterioration of materials

6. LOCATION SPECIFIC CONSTRUCTION ENVIRONMENTAL CONTROL MEASURES

6.1.1.1. This section of the Onshore Outline CEMP outlines specific environmental management in relation to the construction of the Proposed Development. The structure of this section is broken down into individual route sections.

6.2. GENERAL

6.2.1. ONSHORE ECOLOGY

Winter Restriction of Works Adjacent to Chichester and Langstone Harbour SPA

6.2.1.1. A winter working restriction applies to the following elements where appropriate:

- Chichester and Langstone Harbour SPA; and
- Solent Waders and Brent Goose Strategy (SWBGS) Sites.

6.2.1.2. Effects of the Construction Stage on Chichester and Langstone Harbour SPA and SWBGS sites with their associated wintering intertidal bird community will be avoided by restricting works within the winter season, defined as October to March (the period when SPA birds such as brent goose arrive from their breeding grounds; Snow and Perrins, 1998). Details of the working restriction are provided in the ES Addendum (REP1-139) and ES Addendum Appendix 18 Construction Noise Impacts on SWBGS Sites (REP1-149). The restrictions are informed by six principles (that updated those previously provided in Appendix 16.14 (APP-422)) that will be incorporated into working methods:

- **Principle 1:** Construction works cannot take place in SWBGS (those categorised as either core, primary support, secondary support, low use or candidate) sites that overlap with the Proposed Developments Order Limits during October – March. An exception is the gravel car park within site P11 that is already disturbed by movements of cars, lorries and plant, and offers no functional habitat for brent geese or other waterbirds associated with Chichester and Langstone Harbour SPA.
- **Principle 2**: Where HDD works are to take place underneath the SWBGS site (e.g. at Eastney Landfall) no direct impacts are considered to occur and the restriction does not apply.

- **Principle 3:** Elements of the Onshore Cable Route that are over 400 m from the SPA are not subject to any restriction.
- **Principle 4:** Construction noise events of <55 dB can occur unrestricted.
- **Principle 5:** Construction works of 55 – 72 dB LAFmax immediately adjacent to a major road and/or adjacent to industrial sites with notable levels (>60 dB) of existing noise can be undertaken unrestricted. It is considered that noise levels from the Proposed Development would be masked (i.e. indistinguishable from the baseline) in these instances.
- **Principle 6:** Percussive piling or works with heavy machinery (i.e. plant resulting in a noise level in excess of 69 dB LAFmax – measured at the sensitive receptor) should be avoided during the bird overwintering period (i.e. October to March inclusive. The sensitive receptor is the nearest point of the SPA or any SPA supporting habitat (e.g. high tide roosting site). P54 and P29 are excluded from this principle. Buildings that are situated between them and the construction works will buffer noise such that it will not be in excess of 69 dB LAFmax within either site.

6.2.1.3. Adoption of these principles will offset direct effects on SWBGS sites (as these sites will not be subject to works in the winter period when they are used by SPA birds), and effects of noise on birds within the SPA itself.

Restoration of SWBGS Sites

6.2.1.4. SWBGS sites affected by the Proposed Development will be restored to their original condition. The restoration of SWBGS sites is needed to be complete and grass established to provide a suitable food resource by October when birds such as dark-bellied brent Geese, which feed on the grasses, return to the Solent to winter.

6.2.1.5. The following two approaches are considered for restoration of SWBGS sites:

- **Re-seeding**. Reinstate areas within SWBGS with grass seed before the end of May where practicable. This is the easiest and most cost-effective option;
- **Re-turfing**. Where not practicable to re-seed, turf will be laid and established. This is a more costly option but allows re-establishment and good sward growth in a shorter timescale.

6.2.1.6. The choice of restoration approach is primarily dependent on the time available within the summer growing season for implementation. Re-seeding is not likely to be the optimal technique after May so that for any restoration works after this month, re-turfing would be implemented.

6.2.1.7. The restoration measures proposed will comprise the following:

- **Site preparation** - the seedbed will be prepared in accordance with best practice guidance and the detailed landscaping scheme. Depending on site conditions this may include ripping, rotovating, weed control and rolling.
- **Establishment** - Sowing; spread seed on a properly prepared seedbed at suppliers suggested rate. In the first year of establishment sown grassland areas will be cut repeatedly up until October to maintain at 35mm to promote vigorous sward development and reduce weed germination. Irrigation will be used as required to aid establishment.
- **Establishment** – Turfing; turves to be laid on a properly prepared seedbed to suppliers' specification. Top dressing with washed sand or other appropriate material will be considered. In the first year of establishment sown grassland areas will be cut repeatedly up until October to maintain at 35mm to maintain sward development and reduce weed germination. Irrigation will be used as required to aid establishment.
- **Aftercare** - The desired sward condition in October is that these areas have a close cropped 30-60mm tight sward of green grass, so the last cut of the season should be timed to ensure enough time to green up before the arrival of brent geese. Irrigation will be used as required to aid establishment and particularly in dry periods. The grassland is to be inspected every three months during the first two years. Where grass areas have become worn areas should be re-seeded with the prescribed seed mix or turf.

6.2.1.8. SWBGS sites P11, P23A, P23B and P23R will be restored before October applying the above measures.

6.2.1.9. In SWBGS P08A, Farlington Playing Fields, it is unlikely that the CCT1 & CCT2 HVDC trench route and cabling works (See Appendix 1) would be fully reinstated for the commencement of the non-breeding season on 1st October. It is anticipated that the remainder of the works will allow appropriate time for restoration of habitat. re-turfing will likely only be possible at the start of October and is estimated that a minimum of 2-3 weeks would be required for re-establishment of the grass sward required for geese grazing.

Avoidance and Mitigation for Habitats

6.2.1.10. To avoid loss of important habitats within the Order Limits, HDD is proposed to avoid the need for open trenching and to preserve habitats. Key locations where HDD will be used are at Denmead Meadows (Soake Farm Meadows SINC) (HDD-5), between Farlington and Kendall's Wharf (Langstone Harbour) (HDD-3) and at Milton Common (HDD-6). HDD requires entrance and exit sites and associated construction compounds but for the duration of the drill has no impact on habitats or species above ground.

6.2.1.11. Following construction hedgerow planting will be undertaken to repair gaps where the corridor required their removal. Replanting will use native plant species of local provenance and will provide a diverse range of woody species to maintain the species-rich nature of hedgerows.

Bats and Lighting

Lighting design for works at Farlington Playing Fields:

6.2.1.12. Lighting of construction work will be designed with reference to recommendations issued by The Bat Conservation Trust (2014) and Institute of Lighting Engineers (2009), and be cowled/hooded to avoid extraneous light spill, and focussed onto works areas only to maintain dark corridors on the edge of the playing fields and avoid disturbance of commuting and foraging bats. Farlington Playing Fields is unlit and construction lighting could result in disturbance of bat commuting routes and foraging areas located around the site's edge where scrub and woodland are located. These habitats are used by bats to navigate and find food; open areas are avoided as no physical features are present to reflect echolocation calls. Thus, to avoid effects on bats trenching areas and compounds for HDD work will be set back from the edge of the playing field by at least 10 m to maintain habitats there and preserve bat flight lines

Soil Horizon Preservation

6.2.1.13. Mitigation for temporary loss of grassland will be to maintain soil horizons and preserve grassland turf. Mitigation will be put in place at Kings Pond Meadow SINC, Denmead Meadows, Milton Common SINC and unimproved and semi-improved grasslands along the Onshore Cable Corridor.

6.2.1.14. Although growing vegetation would be lost to trenching work and the installation of construction compounds/access points, removal and preservation of turves so that they can be replaced when work is finished will retain the seed bank within them allowing regrowth. Maintaining soil conditions by maintaining soils structure (turf, top soil, subsoil) will maintain soil conditions for re-growth of meadow vegetation.

6.2.1.15. The following measures will be put in place:

- Separate turves, top soil and sub soil. Each will be stored separately with no mixing during works;
- Replace soil structure following completion of work with turves on top;
- Use low ground pressure machinery also to avoid compaction;
- Works areas will be securely fenced and procedures put in place to prevent damage to grassland habitats adjacent to them (e.g. by the use of herras fencing); and
- Works to be monitored by an Ecological Clerk of Works who will provide toolbox talks to contractors and staff working at the site.

6.2.1.16. At Kings Pond Meadow SINC and Denmead Meadows, where vegetation has a wet meadow character, work will avoid the plant growing season and winter wet season as both these are important for maintaining the conditions within the habitat. Work in this area will be undertaken in late summer/autumn to facilitate this.

Ground Protection

6.2.1.17. Use of bog matting, temporary membranes with Type 1 aggregate or similar ground protection solutions will be used to prevent compaction of grassland soils at:

- Kings Pond Meadow SINC;
- Denmead Meadows;
- Milton Common SINC;
- Unimproved neutral grassland; and
- Semi-improved neutral and calcareous grassland.

6.2.1.18. This mitigation measure will promote regrowth of vegetation to its original state.

6.2.1.19. Ground protection measures apply to the Construction Stage of the Proposed Development. Maintenance will be infrequent and use light vehicles that would not lead to effects above those of regular use and management of the land as farmland.

6.2.2. ARBORICULTURE

6.2.2.1. The general design principles for working around trees are as follows:

- Where practicable the works shall be organised to avoid the root protection areas (RPA) of trees and hedges to be retained, including those along the Works Order boundaries.
- All excavations shall follow an arboricultural method statement included within the relevant CEMP to minimise risk to root protection areas[1].
- Works affecting high value trees shall be carried out under the direct supervision of a suitably experienced Clerk of Works.
- Ground protection shall be used where RPAs are encroached upon and it is practicable to retain the relevant feature. For example, use of a no-dig construction for access routes must be employed.
- Where works need to be undertaken near retained trees, such works shall be in accordance with best practice:
  - British Standard ('BS') 5837:2012 trees in relation to design, demolition and construction – recommendations.
- Arboricultural Method Statements with associated RPA plans shall be submitted as part of the relevant CEMP. These shall cover in detail the protection of root areas, protective barriers, precautions in respect of temporary works, sequence of activities, utilities, post construction and emergency remedial works.
- Pruning outside of the Order Limits to allow abnormal loads shall be designed to comply with The Highways Act 1980 section 154 requirements. This is a statutory obligation for the person who owns / is responsible for the trees to prune trees to remove an obstruction to the safe use of the highway. Where the abnormal load requires additional clearance, this shall be targeted pruning at specific points to be agreed with the haulier, landowner, project team and where appropriate, the local planning authority prior to the works being carried out. All tree works are to be carried out in accordance with British Standard 3998:2010 "Tree Work - Recommendations".
- Within the Order limits lopping and felling of trees may only be carried out where absolutely necessary and will be prescribed in accordance with British Standard 3998: 2010 "Tree Works – Recommendations" and industry best practice. All pruning and felling works shall be specified by a suitably trained and experienced Arboriculture consultant and shall be carried out by a suitably trained and experienced arboriculture contractor

6.2.4. LANDSCAPE AND VISUAL AMENITY

6.2.4.1. Measures which form an important part of efforts to control Construction Stage impacts on landscape character and visual amenity (Section 1 to 10) are outlined below. These include general mitigation measures for all of the Proposed Development and more specific measures which apply to the Onshore Cable Corridor including those sections of the Onshore Cable Route that lie within Sections 1 and 10.

- Appropriate location, organisation and phasing of construction activities.
- Maintenance of a tidy and contained site compound to reduce visual clutter.
- Design and layout of site construction areas to reduce adverse impacts arising from temporary security fencing and lighting.
- Measures to control working hours in specific locations to avoid disturbance to residential receptors both in terms of light and noise.
- Agreed site access points to limit impacts on existing vegetation both above and below ground.
- Retention and protection of existing vegetation considering temporary fencing to demarcate the construction footprint in accordance with Section 6.2 of BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations, (BSI Standards Publication, 2012 British Standards Limited).
- Careful siting of temporary topsoil storage areas considering use as a physical buffer between the construction works and more sensitive receptors, where practicable.
- Careful management and storage of topsoil and subsoil in accordance with Construction Code of Practice for the Sustainable Use of Soil on Construction Sites (Department for Environment, Food and Rural Affairs, 2009).
- Where construction works obstruct a footway an absolute minimum unobstructed width of 1 m shall be provided alongside the construction corridor and where this is not possible a safe alternative route shall be provided. This shall include provision of suitable crossing facilities where required, including the temporary replacement of existing pedestrian crossings that may need to be closed to facilitate construction see the Transport Assessment.
- During construction of the Onshore Cable Route reasonable access shall be made for pedestrians going to or from premises abutting a street

- In some locations, a footway closure may be required without a suitable alternative route being available nearby or on the opposite side of the carriageway. In these instances, a pedestrian route shall be provided within the carriageway.
- Some temporary footway closures may be required to facilitate delivery and collection of materials. Where necessary this shall be mitigated through alternative footway links being available or other measures stipulated in the Traffic Management Strategy
- Temporary screening for sensitive visual receptors shall be provided through implementation of solid construction hoardings whilst using natural existing screens (topsoil and existing vegetation) where practicable. Hoardings shall be attractive, used to screen low level "clutter" and reduce noise.
- Hoardings shall be well lit in poorly lit walkways and any gates should be positioned to minimise noise transmitted to nearby sensitive receptors.
- Large plant /equipment shall be located away from most sensitive receptors where there are viable alternatives. Temporary structures and stockpiles shall be removed when no longer required.
- Prompt reinstatement of temporary construction areas (including trenches, laydown and construction (including haul road) corridor and all other land impacted through the installation of the Onshore Cable Route as soon as practicable after sections of work are complete. Reinstatement shall involve the careful handling of soils and a return to the existing habitat type.
- Implementation of mitigation planting alongside the construction programme where works would not affect planting and during winter (November – February) as per Appendix 15.7 (Landscape Schedules, Planting Heights and Image Board) of the ES Volume 3 (APP-405).
- Mitigation planting to replace hedgerows and trees lost following completion of the construction works. All planting lost shall be replaced with like for like species of a similar size and in agreement with the relevant discharging authority.
- New tree planting shall be offset at least 5 m away from the Onshore Cable Route, and more specifically the cable trench, within the Order Limits.
- Where hedgerows are lost these shall be replanted with like for like species; on the basis that a concrete duct block will be provided underground to protect the cables from roots and the drying out of the duct surround.
- The micrositing of embedded landscape mitigation measures will be subject to the results of archaeological trial trenching.

- Cable routing shall be developed to avoid affecting hedgerows and hedgerow trees on the boundaries of the Order Limits.
- All PRoW / footpaths / car parks affected by the Proposed Development shall be reinstated to at least the condition and quality prior to works being carried out.
- Any street furniture removed or damaged during the installation of the Onshore Cable Route shall be replaced with street furniture of the same quality.
- Any landscaping associated with Portsmouth City Council's Coastal Defence Scheme (considered in cumulative effects) and referred to in paragraph 15.5.4.8 of Chapter 15 of the ES (APP-130) which is impacted by the works shall be reinstated to the same quality and finish as the future baseline.

6.2.5. AGRICULTURAL SOILS AND LAND USE

6.2.5.1. Within the current design for the Onshore Cable Route, trenches within agricultural land will be excavated to a typical depth of 1300 mm (depth dependent on the existing utilities). The contractor will ensure that topsoil and subsoil resources are kept separate and placed either side of the exposed trenches. The cables ducts will be laid within approximately 400 mm of cement-bound sand and the remainder of the void is to be backfilled with the excavated soil. Priority should be given to full use of the topsoil resource in the reinstatement of soils above the cable: the surplus material should all be subsoil.

6.2.5.2. As stated in Waste and Material Resources above, the current design of the Converter Station seeks to balance cut and fill, and excess material (estimated at 45,325 tonnes) will be available for use in reprofiling the landform, pond fill and screening. Outstanding surplus will be suitable for off-site general or landscaping fill.

6.2.6. GROUNDWATER

6.2.6.1. Any groundwater or rainwater that collects in a trench will be pumped into locations agreed with the landowners, local authorities, EA or drain operators (Highways Authorities). The method of water discharge has yet to be determined.

6.2.6.2. The water management permitting, licenses and agreements will be completed by the appointed contractor, with the quantities of groundwater management determined at the detailed design stage. This applies to all sections. The groundwater collected will either be discharged to surface water, sewer, disposed of off-site or a combination of these three methods. This applies to all sections.

6.2.6.3. If the water is to be discharged to sewer or a surface waterbody then a discharge consent(s) may be required. The permitting process will be completed by the contractor, after detailed design, once a dewatering and discharge management methodology has been agreed upon. This applies to all sections.

6.2.6.4. Should groundwater dewatering be substantial (greater than or equal to 20m^3/day) an abstraction licence and discharge consent will be required from the EA. At present the requirement for a groundwater abstraction for trench installation is not confirmed, the quantities of groundwater removal will be determined at detailed design stage. The appointed contractor will be responsible for acquiring the relevant consents and adhering to the conditions of said consents. All groundwater abstraction licensing and discharge permits will not be disapplied but obtained during the detailed design Stage, as agreed upon with the EA.

HDD Groundwater Level and Flow

6.2.6.5. To ensure drilling fluids do not break out into the groundwater environment nor groundwater seeps into the bore, a mud engineer will be present at all times during the HDD drilling process to monitor drilling fluid viscosity, density, annual pressure, solids contents, filter cake quality and total mud volume and thereby ensuring the filter cake remains intact and that drilling fluid is not lost to the ground and that groundwater does not seep into the bore annulus. In addition, a review of the proposed drilling fluid and inert polymers will also be completed before ground is broken. All drilling fluids, including polymers, will be CEFAS rated products.

6.2.6.6. Drilling fluid losses to groundwater can occur in high permeability ground materials~~.~~, which are areas with intense fracturing/dissolution features. This is a particular concern in areas which are designated as groundwater Source Protection Zone 1 (SPZ1). These are assigned to the Portsmouth Water public water supply abstractions, the protection of which is of the utmost importance.

6.2.6.7. The scheme design in the first instance ensures that the trenchless construction avoids karst dissolution features (in the Chalk) as much as possible. At HDD-5 (Kings Pond), the drilling will be kept in the overlying Lambeth Group only. The contractor will ensure that when drilling HDD-5 there will be at least a 5m standoff between the proposed HDD alignment and the Chalk at all times. Karst dissolution features can also be present in ground materials overlying the Chalk, in the form of voided overburden.

6.2.6.8. The drilling team will also need to be briefed on the environmental sensitivity of the SPZ1 and the importance of identifying karst dissolution features prior to work commencing and during the works. They will need to monitor the fluid pressures and observe for significant pressure drops throughout the works. A significant pressure drop would indicate that loss of fluid, potentially to fractures/dissolution features, may be occurring. A watching brief will also need to be implemented to identify any elements of karst dissolution features at any time during the works.

6.2.6.9. Should such features be detected, drilling should be paused temporarily, until the Engineer on site can determine the most suitable course of action for mitigation, from a catalogue of actions already agreed with Portsmouth Water and the EA. A number of actions can be taken to seal the area of loss, for example increasing the drilling fluid viscosity or introducing a cement grout. Real time downhole annular pressure monitoring should be completed to allow for these observations. The exact pressure change parameters and procedures to evaluate mitigation would need to be agreed with Portsmouth Water and the EA at detailed Design Stage. Portsmouth Water and the EA will also be notified immediately of any loss of drilling fluid. Once the risk from the dissolution feature has been satisfactorily mitigated (i.e. to no risk of contamination), works will then resume.

6.2.6.10. The launch and receptor pits for the HDD-4 (Farlington Railway Crossing (Trenchless)) will include perimeter sheet piled walls toed into the Chalk to reduce groundwater ingress from the superficial River Terrace Deposits. Groundwater seepage at the base of the pits could occur and this will be sump pumped during operation. The potential consents and permits required to manage this water will be completed by the appointed contractor. The method of discharge has yet to be determined. The groundwater collected will either be discharged to surface water, sewer, disposed of off-site or a combination of these three methods. If the water is to be discharged to sewer or a surface waterbody then a discharge consent(s) may be required. The permitting process will be completed by the contractor, after detailed design, once a dewatering and discharge management methodology has been agreed upon. The appointed contractor will be responsible for acquiring the relevant consents and adhering to the conditions of said consents. Any contaminated water would require off-site disposal.

6.2.6.11. The required groundwater dewatering quantities for HDD-4 pits will be determined at detailed design. The designer must ensure the discharge quantities are accurate or conservative to ensure no flood risk should be increased due to surplus groundwater encountered during construction.

HDD Groundwater Quality

6.2.6.12. All drilling equipment will be checked and cleaned before use. This will prevent cross contamination. A review of the drilling fluid and inert polymers will also be completed before ground is broken. All drilling fluids, including polymers, will be Cefas rated.

6.2.6.13. Drilling through alternative geologies can transfer existing contamination from one source to another. Drilling can also generate fines which can increase sediment in the water column, creating turbidity contamination. The Filter Cake will prevent the mobilisation of contaminants from one groundwater body to another, as the cake 'self-seals' as the drilling progresses. Therefore, no cross contamination is anticipated. Following the embedded mitigation measures the drilling fines and fluids will be contained in the drilling cake, preventing contamination from spreading between sources and drilling fines entering the local groundwater receptors.

6.2.6.14. To ensure surface breakout is not lost to the environment a flexible hose pump will be contained at the exit compound site so breakout fluid can be retained on site. A sufficiently sized Intermediate Bulk Container or similar will be stored on site to store such a breakout.

Onshore Cable Route Trench Excavation Works

6.2.6.15. A catalogue of potential mitigation measures is to be developed for the Onshore Cable Route Trench Excavation Works, to deal with potential areas of insufficient Head deposits in Sections 1, 2 and 3 (designated as a Groundwater Source Protection Zone 1). This is driven by the possible presence of unidentified karst dissolution features in the areas outside of the Converter Station Area but within the Order Limits. These have been raised as a topic of a concern by Portsmouth Water and the EA, due to their potential ability to act as rapid contamination pathways directly to Portsmouth Water's public water supplies (at Lovedean and H&B Springs). Based on the available information, it is considered likely that sufficient Head deposit cover is present throughout the proposed route in these sections.

6.2.6.16. The types of proposed mitigation measures are discussed in Section 6.4.3 below.

6.2.7. SURFACE WATER RESOURCES AND FLOOD RISK

Surface Water Drainage Patterns

6.2.7.1. A number of Main River and Ordinary Watercourse crossings are located within the Order Limits, as detailed within Table 6.1. To limit the impact to the surface water environment alongside other environmental and design constraints it is proposed to pass under a number of these open channel watercourses using HDD or Trenchless techniques to pass under the watercourses open channel. HDD / Trenchless techniques are proposed at:

- Kings Pond (HDD) (Soake Farm - Main River) – HDD-5;
- Farlington Railway Crossing (Trenchless) (Farlington Marshes Gutter - Ordinary Watercourse) – HDD-4; and
- Langstone Harbour (HDD) (Broom Channel - Transitional/ Tidal Watercourse) – HDD-3.

6.2.7.2. Thereafter the other Main Rivers and Ordinary Watercourses identified, as detailed within Table 6.1, are proposed to be crossed within the public highway where the watercourses are confined to a culvert, and works within the cable corridor will not impact on the watercourses drainage patterns.

Water Supply and Surface Water Wastewater Infrastructure – Quantity

6.2.7.3. During construction it is proposed that any temporary requirements for water supply and foul wastewater throughout the Order Limits are to be provided through temporary site compounds and construction set up that would not utilise the existing local networks.

6.2.7.4. Notwithstanding the above, an in-principle connection agreement with Portsmouth Water has been obtained for the proposed permanent connection for the Converter Station Area with agreement for temporary use during construction, if required, subject to detailed design and to be determined by the appointed contractor. This in-principal agreement is for a connection point at Broadway Lane, and has been obtained from Portsmouth Water for an assumed demand requirement of 105 ‘loading units’ based on Portsmouth Waters application for water supply calculations.

6.2.7.5. Any changes to the assumed demand and construction demand shall be agreed with Portsmouth Water prior to connection, with the contractor responsible to account for any head loss when sizing the supply.

6.2.7.6. If the contractor determines, during detailed design, that it would be appropriate to utilise a local water infrastructure network throughout the Onshore Cable Corridor, the anticipated quantities are likely to be variable depending on its specific use. Furthermore, a proposed temporary connection for either clean water supply, surface water and foul water discharge would be subject to approval from Portsmouth Water (clean water supply) and Southern Water (wastewater).

Surface Water Features Water Quality

6.2.7.7. The Proposed Development and associated works are proposed to avoid disruption to the Main Rivers and Ordinary Watercourses (Table 6.1) located within the Order Limits by ensuring that all installed ducts and trenching across watercourses are undertaken within the highway carriageway. By remaining within the carriageway any existing watercourses are expected to pass under the carriageway within a watercourse structure (e.g. culvert or sewer).

6.2.7.8. Where open channel watercourses are present within the Order Limits HDD or Trenchless techniques are to be used to pass under the watercourses open channel.

Human Receptors and Infrastructure as a Consequence of Flood Risk

6.2.7.9. The Converter Station Area is located on high ground and away from any watercourse and is located within Flood Zone 1.

6.2.7.10. Proposed watercourse crossings detailed within Table 6.1 are proposed to be via HDD/ Trenchless techniques or within the carriageway around a watercourse structure (culvert or sewer). Other minor ditches and dry watercourses, also defined as Ordinary Watercourses, have not been individually identified at this stage; however, it is anticipated that a number of additional Ordinary Watercourse crossings may be required within the Onshore Cable Corridor. Identification of any other Ordinary Watercourse crossings will be further investigated post-application as part of the detailed design undertaken by the appointed contractor once the specific Cable Route is confirmed within the Onshore Cable Corridor. It is anticipated that this would include ditches to the side of roads and extreme weather overland flow routes that are typically dry known as 'winterbourne or dry watercourse'. The overall principles of crossing these open watercourses would be subject to an Ordinary Watercourse Consent and in principle, any works going through these features would need to ensure that: watercourse flow is maintained, there is no increase to the local flood risk, and appropriate pollution prevention measures are in place.

6.2.7.11. Works adjacent within the Onshore Cable Corridor adjacent to the coastal flood defences have been developed alongside consultation with ESCP' where it has been agreed in principle that the design will avoid works to existing or proposed coastal flood defence alignments. Furthermore, the proposed HDD under Broom Channel (Langstone Harbour HDD-3) is proposed to pass below or avoid any sheet piling associated to the coastal flood defence.

6.2.7.12. It should be noted that the implementation of above principles will be the responsibility of the appointed contractor to develop during detailed design and be subject to relevant environmental consents prior to construction.

Table 6.1 – Summary of Watercourses within the Order Limits

Code	Watercourse Name	Classification	Typical Form with Onshore Order Limit	Structures within Onshore Order Limit	Proposed Watercourse Crossing	Water Environment Consent Regulator	Overview
WC.01	Soake Farm North	Main River	Open channel*	None	No	EA	No proposed crossing
WC.02	Soake Farm South	Main River	Open channel	None	Yes	EA	Proposed to horizontal directional drill under watercourse
WC.03	Unnamed	Ordinary Watercourse	Open channel/ culvert	Culvert	Yes	SW, LLFA	Proposed crossing culvert within carriageway build up
WC.04	Old Park Farm	Main River	Culvert	Twin culvert	Yes	SW, LLFA, EA	Proposed crossing culvert within

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Code	Watercourse Name	Classification	Typical Form with Onshore Order Limit	Structures within Onshore Order Limit	Proposed Watercourse Crossing	Water Environment Consent Regulator	Overview
							carriageway build up
WC.05	Unnamed	Ordinary Watercourse	Culvert	Culvert	Yes	SW, LLFA	Proposed crossing culvert within carriageway build up
WC.06	Unnamed	Ordinary Watercourse	Culvert	Box Culvert	Yes	SW, LLFA	Proposed crossing culvert within carriageway build up
WC.07	Unnamed	Ordinary Watercourse	Swales*	None	No	LLFA	No proposed crossing
WC.08	Unnamed	Ordinary Watercourse	Culvert	Culvert	Yes	SW, LLFA	Proposed crossing culvert

Code	Watercourse Name	Classification	Typical Form with Onshore Order Limit	Structures within Onshore Order Limit	Proposed Watercourse Crossing	Water Environment Consent Regulator	Overview
							within carriageway build up
WC.09	North Purbrook Heath (North)	Main River	Culvert	Twin box culvert	Yes	EA	Proposed crossing culvert within carriageway build up
WC.10	North Purbrook Heath (South)	Main River	Open channel	None	No	EA	No proposed crossing
WC.11	Unnamed	Ordinary Watercourse	Open channel	None	Yes	LLFA	Proposed Trenchless techniques under watercourse

Code	Watercourse Name	Classification	Typical Form with Onshore Order Limit	Structures within Onshore Order Limit	Proposed Watercourse Crossing	Water Environment Consent Regulator	Overview
WC.12	Farlington Marshes Gutter	Main River	Open channel	None	No	EA	No proposed crossing
WC.13	Broom Channel	Main River	Channel	None	Yes	EA, HE, ESCP	Proposed horizontal directional drill under watercourse and defences
WC.14	Great Salterns Drain	Main River	Culvert	Culvert	Yes	EA, HE, ESCP	Proposed crossing culvert within carriageway build up
Other minor Ordinary Watercourses not identified in the list above may also be crossed, any such crossing will also require an Ordinary Watercourse Consent or exemption and shall follow the principles set out in Section 5.7							

6.2.7.13. Land affected by open trenching will be reinstated with native soil and or surfacing, typically with no infrastructure left above ground.

6.2.7.14. The only proposed infrastructure outside the Converter Station Area above ground includes boxes/ pillars associated with the intermediate and transition joint bays and the two ORS at Section 10 - Eastney (Landfall).

6.2.8. NOISE AND VIBRATION

Environmental Control Measures to be employed for specific activities

Trenching

6.2.8.1. The majority of duct laying activities via trenching are will take place during weekdays between the hours of 07:00 and 17:00 and Saturdays from 08:00 to 13:00 hours. Due to the transient nature of the duct laying works, and the substantial space constraints anticipated, noise mitigation in the form of screening is unlikely to be feasible.

6.2.8.2. However, there are some locations where trenching may take place outside of core working hours (i.e. during evenings, weekends and at night-time) to mitigate negative traffic effects on the surrounding road network and minimise disruption to businesses (e.g. Sainsbury's supermarket). The potential works locations outside of core working hours are as follows:

1. Section 4 – a c.90m section of the A3 London Road in Purbrook near Stakes Road;
2. Section 5 – Havant Road between Farlington Avenue and Eastern Road;
3. Section 6 –Sainsbury's Car Park;
4. Section 8 – Eastern Road between Airport Service Road and the north of Milton Common (c. 350m south of Tangier Road); and
5. Section 8 – Eastern Road between HDD-6 and Eastern Avenue.

6.2.8.3. For further information, see section 2.3.1 and the Framework CTMP (REP1-070).

6.2.8.4. The following mitigation measures will be employed during the trenching works outside of core working hours:

All locations

6.2.8.5. Mitigation for trenching works outside of core working hours will incorporate screening achieving at least 5 dB attenuation. The exact form that this screening would take is unknown at this stage, and will be confirmed following the contractor appointment and the production of detailed works plans It could, for example, comprise solid (e.g. timber) 2 m high site hoarding around the construction works. All gaps (e.g. knot holes, cracks and other joints) will be sealed to minimise the escape of noise. Alternatively, if this is not possible due to time or space constraints, Heras fencing around the compounds will be fitted with acoustic quilts, and combined with further localised screening of particularly noisy equipment items. Acoustic quilts must be fitted to fencing with no gaps underneath or between the panels. Screening is considered an important mitigation measure at these locations because of receptors being more sensitive to noise during the night-time period when stricter criteria apply. Plate 6.1 provides some examples of potential screening solutions.

6.2.8.6. In addition to the community liaison measures outlined in sections 4.4.3 and 5.12.2, nearby residents will be informed of the specific timings when road cutting/breaking activities are expected to take place outside of their property so that they can make alternative arrangements, if their wish, whilst the noisiest works are taking place.

6.2.8.7. Works in these areas should be completed as quickly as possible to minimise the duration of residents' exposure to high noise levels, whilst minimising the duration of works during the most sensitive periods (i.e. night-time).

Section 4 – a c.90m section of the A3 London Road in Purbrook near Stakes Road

6.2.8.8. Aim to complete duct laying for each circuit over eight weekends (four weekends per circuit). It is most likely that each circuit would be completed in four c.22-23m sections, one per weekend. At this stage, it has not been confirmed if these would be consecutive weekends. However, completing the works across non-consecutive weekends would reduce negative noise impacts through respite periods.

6.2.8.9. Work will be completed between 08:00and 18:00 on Saturday and Sunday.

Section 5 - Havant Road between Farlington Avenue and Eastern Road

6.2.8.10. There are three potential options for the out-of-hours works in section 5:

- Option 1 – Works for each circuit could be completed in a single weekend per circuit (two weekends in total which could be consecutive or non-consecutive). Works would commence at sunrise on Saturday morning and continue until sunset on the Sunday evening. Whilst this would include night-time working on Saturday, the noisiest activities (road cutting/breaking and re-surfacing) will be avoided at night (22:00-07:00) to minimise sleep disturbance in the immediate area.
- Option 2 – Works for each circuit could be completed in two consecutive weekends per circuit (four weekends in total) during the daytime and evening (from 07:00 to 22:00).
- Option 3 – Works for each circuit could be completed in two non-consecutive weekends per circuit (four weekends in total) during the daytime and evening (from 07:00 to 22:00).

6.2.8.11. Whilst the option that will be chosen cannot be confirmed until a contractor is appointed, avoiding night-time working, and/or completing the works across non-consecutive weekends would reduce negative noise impacts by avoiding the most sensitive time periods and providing respite.

Section 6 - Fitzherbert Road and Sainsbury's Car Park

6.2.8.12. The installation of the cable ducts at Sainsbury's car park and associated access road may need to take place during the evening and at night to minimise disruption to the supermarket.

6.2.8.13. The noisiest activities (road cutting/breaking and re-surfacing) will be avoided at night (22.00 – 07.00) to minimise sleep disturbance in the immediate area.

Section 8 - Eastern Road between Airport Service Road and the north of Milton Common (c. 350m south of Tangier Road)

6.2.8.14. In order to minimise traffic disruption, 24-hour working seven days per week may be undertaken.

6.2.8.15. Noisiest activities (road cutting/breaking and re-surfacing) will be avoided outside the Harbourside Caravan Park at night (22:00-07:00) to minimise sleep disturbance.

6.2.8.16. Until a contractor is appointed, and detailed work plans are produced, it is not feasible to identify further specific physical mitigation measures that could be employed. However, the contractor appointed will engage with local residents affected by the works and the environmental health department at the local planning authorities to agree additional mitigation to reduce the significant effects as far as reasonably practicable.

Section 8 – Eastern Road between HDD-6 and Eastern Avenue

6.2.8.17. To minimise traffic disruption, there is a potential for seven day working between 07:00-17:00 if cable ducts are required to be installed within the Eastern Road between HDD-6 and Eastern Avenue.

6.2.8.18. There are other preferential options for the installation of the cable ducts in section 8 which would avoid the need for works outside of core working hours on Eastern Road between HDD-6 and Eastern Avenue. There are as follows:

- Installing the cable route along the other two options through Milton Common;
- Installing the cable route within the open ground adjacent to the south of Eastern Road; or
- Installing the cable route within Eastern Road during Core Working Hours only.

Joint Bays

6.2.8.19. Mitigation for Joint Bays which are predicted to have any more than a negligible impact at surrounding receptors will be in the form of screening achieving at least 5 dB attenuation. Generally, Joint Bays located in rural areas distant from sensitive receptors would not require screening, whereas those in more urban areas in close proximity to sensitive receptors would require screening. Example noise screening solutions are illustrated in Plate 6.1.

HDD sites

6.2.8.20. Screening achieving at least 5 dB attenuation will be required at all HDD compounds. As work associated with HDD compounds will be scheduled for longer relative to trenching and Joint Bay activities, it is assumed that this screening would take the form of solid (e.g. timber) hoarding around the HDD compounds. The screening is required to provide noise mitigation to surrounding residential receptors and/or Solent Wader Brent Goose Strategy (SWBGS) sites. Example noise screening solutions are illustrated in Plate 6.1.

6.2.8.21. At HDD-1 (Landfall), HDD-3 (Portsea Island), HDD-4 (Railway), HDD-5 (Kings Pond) and HDD-6 (Milton Common), hoarding around the HDD compound is required to be at least 2m high. At HDD-2 (Eastney and Milton Allotments), hoarding around the compound is required to be approximately 3.5m high, to provide sufficient mitigation to the Thatched House public house.

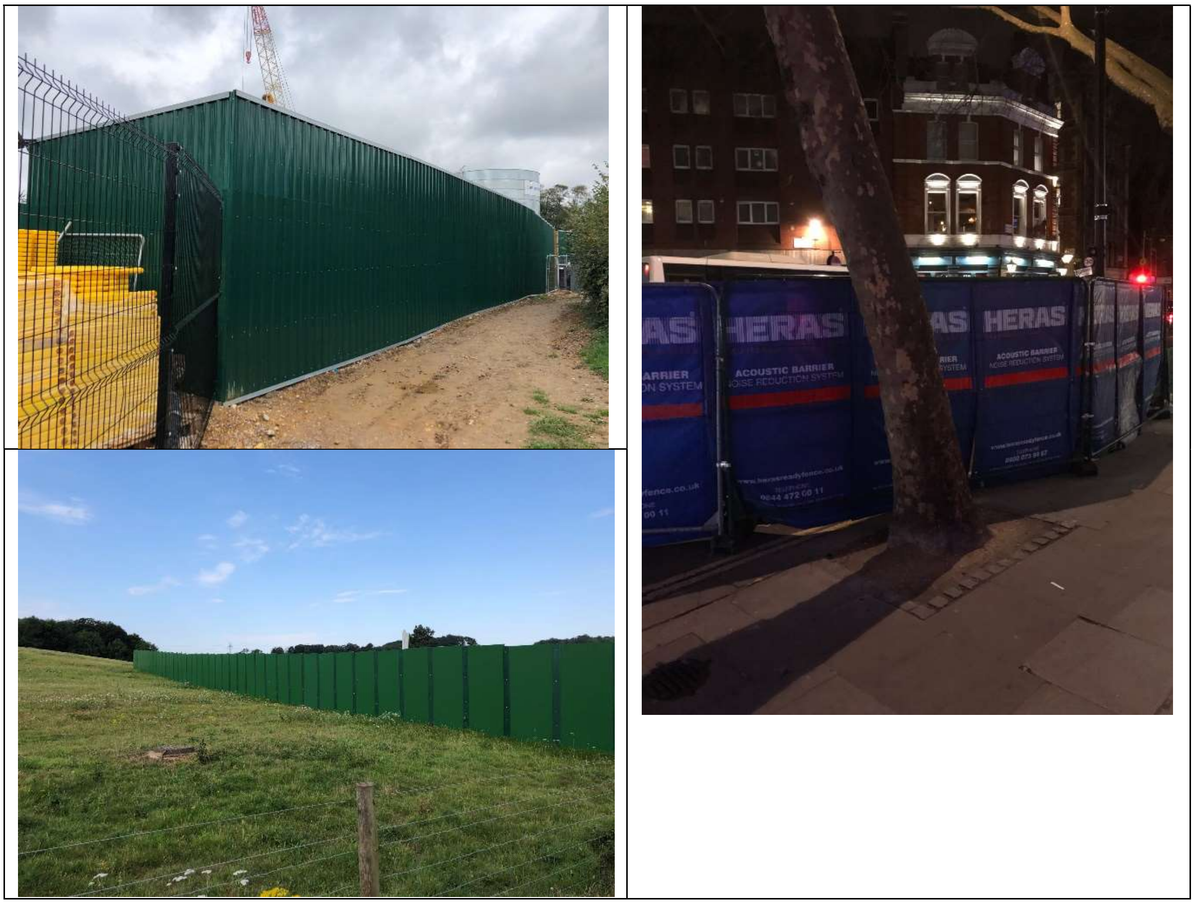

Plate 6.1 – Example noise screening solutions

6.2.9. SOCIO-ECONOMICS

6.2.9.1. HDD will be used at Landfall, Eastney and Milton Allotments/ Milton Locks Nature Reserve and Milton Common. This avoids direct impacts on Eastney Beach, the Allotments and Milton Locks Nature Reserve respectively.

6.2.9.2. Where the Onshore Cable Corridor crosses open space, the Onshore Cable Route would be designed to avoid key recreational facilities. This includes avoiding:

- Two cricket squares at Farlington Playing Fields and the cricket square at Langstone Harbours Sports Ground; and
- A football pitch and, skate park at Bransbury Park.

6.2.9.3. The Framework Traffic Management Strategy (REP1-068), including Appendix 1, Onshore Cable Route Construction Impacts on Access to Properties and Car Parking and Communication Strategy also sets out principles for mitigation, including:

- Traffic Management to keep one lane open including temporary traffic signals on single carriageways and lane closures on wider roads including dual carriageways;
- Access to residences, businesses and community facilities - including access to driveways outside working hours and three-way signals for business premises with their own access onto affected highways; and maintenance of side road access;
- A communication strategy to allow stakeholders such as residents, businesses and community facilities to keep up to date with construction works;
- Access principles for pedestrians and cyclists; public transport; school access; and emergency services; and
- Programme constraints, taking into consideration major events.

Disruption to Residences and Local Businesses

6.2.9.4. Overall, residential and business access will be maintained, wherever practicable, albeit with different traffic management approaches applied depending upon the circumstances as described in the Framework Traffic Management Strategy, Appendix 1, Onshore Cable Route Construction Impacts on Access to Properties and Car Parking and Communication Strategy.

6.2.9.5. Along the majority of the roads within the Order Limits, a single lane will remain open to traffic and access will be maintained for cyclists and pedestrians at all times. Pedestrian and cycle routes along the Onshore Cable Corridor will be maintained wherever practicable, with full closure considered as the last resort, such as where it would prevent full closure of a major road. In all cases the construction works will ensure that pedestrians and cyclists can pass the corridor in a safe manner, with suitable barriers between the construction works.

6.2.9.6. Access to junctions with roads affected by the Order Limits, business premises and retail parks will be maintained using three-way traffic lights.

Disruption to Community Facilities

6.2.9.7. As set out in the Framework Traffic Management Strategy, to avoid disturbance to schools, construction of the Cable Corridor will not take place outside of the school holidays where they there are schools located directly adjacent to the Onshore Cable corridor. These include:

- Solent Junior School on Solent Road and Solent Infant School on Evelegh Road, adjacent to Farlington Avenue; and
- Mooring Way Infant School, Moorings Way.

6.2.9.8. The Framework Traffic Management Strategy Transport Strategy also includes measures to continue to provide access to emergency services adjacent to the Order Limits.

Effects on Users of Recreation, Leisure Facilities and Open Space and Non-Motorised User Routes

6.2.9.9. A Framework Management Plan for Recreational Impacts (REP4-026) has been developed to demonstrate ways in which the general mitigation principles described in Section 5.12 above can be applied to construction to minimise effects with a particular focus on carefully timing the works and minimising the working areas in the open spaces affected. In addition, specific mitigation (for example relocation of pitches) has been explored and would be adopted where necessary and practicable.

6.2.9.10. Seven PRoW are potentially affected by the Onshore Cable Corridor The PRoW are listed below:

- PRoW 4 (and PRoW 16) – Section 1, farm track between Broadway Farm and Little Denmead Farm a temporary diversion would be required;
- PRoW 41 – Section 2, bridleway between Anmore Road and Edney Lane a temporary diversion would be required;
- PRoW 11– Section 4, starting/ending at Maurepas Way, no diversion required as route terminates at the public highway;
- PRoW 17 – Section 4, located along Milk Lane, no diversion required as route terminates at the public highway;
- PRoW 24 – a short length of footpath connecting Drayton Lane and the B2177 to the south west of the Order Limits for the Proposed Development, temporary diversion required;
- PRoW 31 – Section 5, a small section of footpath which provides a link between Eastern Road and Copsey Grove, no diversion required as route terminates at the public highway; and
- PRoW 33 – Section 6, Zetland Fields, temporary diversion required.

6.2.9.11. Additionally, there are a number of permissive paths including four Long Distance Walking Routes (Monarchs Way in Section 1, Wayfarers Walk in Section 3- 4, The Solent Way in Sections 7-10, and Shipwrights Way in Section 10) within the Order Limits.. Diversions will be provided at Milton Common and at Bransbury Park.

6.2.9.12. The Transport Assessment programmes work outside key periods, such as including December for Christmas Shopping and the Victorious Festival on Farlington Playing Fields.

6.2.10. HUMAN HEALTH

- Cable ducts allow short sections to be worked on at any one time. This will minimise the duration of disruption;
- Joint Bays will be positioned in highway verges, fields or car parks, where practicable, to limit the need for road closures;
- Temporary fencing will be used to secure the areas under construction during the construction works;
- Apart from the entry and exit points of the HDD, there will be no impact on the areas in between, including Eastney Beach, the Eastney and Milton Allotments and Milton Locks Nature Reserve;
- Where the Onshore Cable Corridor crosses greenspace, the route has been designed to avoid key recreational facilities, wherever practicable;
- Public activities and events that are planned in proximity to the Proposed Development will be taken into consideration during the phasing of the of construction works along the Onshore Cable Route; and
- To minimise disruption, a single lane closure would be used, where practicable, rather than a full road closure. Road closures (70 m distance in total) are anticipated at:
  - Broadway Lane (one days per circuit, two days total);
  - Anmore Road (one day to two weeks);
  - A3 London Road between Poppy Fields and Ladybridge Roundabout (one weekend for both circuits);
  - Farlington Avenue between Sea View Road and Solent Road (one - two weeks for both circuits);
  - Farlington Avenue between Solent Road and Havant Road (one - two weeks for one or both circuits, therefore up to two – four weeks for both circuits);
  - Evelegh Road (one - two weeks for one circuit, therefore three - four weeks total);

  - The entirety of Yeo Court within Section 9;
  - Havant Road between Farlington Avenue and Waterworks Road (one - two days for one circuit, therefore up to four days total);
  - Eastern Avenue (two - three weeks per circuit, therefore four - six weeks for both circuits);
  - Furze Lane Bus Link (two weeks); and
  - Yeo Court (one week per circuit therefore up to two weeks).
- Where construction works do obstruct a footway an absolute minimum unobstructed width of 1.0 m will be provided alongside the construction corridor and where this is not possible a safe alternative route will be provided. This will include provision of suitable crossing facilities where required, including the temporary replacement of existing pedestrian crossings that may need to be closed to facilitate construction.
- During construction of the Onshore Cable Route, where existing bus stops need to be closed, a temporary bus stop will be provided as close as practicable to the original location, taking into account highway safety of all road users.
- While residents will be informed of construction works and encouraged to make alternative arrangements where practicable, such as parking on-street, steel plating over the trench will be available during working hours in the case of emergencies. Outside of these times road plates will be installed and construction fences removed to allow access over the construction zone. Where the construction zone falls on the opposite side of the carriageway to driveways access will be maintained at all times, but drivers will be made aware of construction works/traffic signal control, as appropriate.
- Access to business premises will be maintained using either three-way traffic signals, with excavation of the trench taking place in two phases to allow a 3 m access to be maintained at all times, or through use of road plates.

6.2.10.1. It is expected that there will be a programme of community liaison to ensure that the potentially effected receptors are provided with early warning of construction activities (including targeted leafleting at affected properties and community facilities). Signage and advanced warning will be provided in advance of the temporary closure. Any diversions will be suitable to accommodate all users.

6.2.12. HORIZONTAL DIRECTIONAL DRILLING POSITION STATEMENT

6.2.12.1. The Horizontal Directional Drilling Position Statement (REP1-132) outlines the requirements on the contractor for the HDD locations, setting out the constraints and specific requirements for construction at each HDD location. HDD/Trenchless installation will be used in the locations identified in the Horizontal Directional Drilling Position Statement and provides indicative information outlining the requirements for the compounds and work methodology for the HDD works at these locations.

6.2.13. CABLE BURIAL DEPTHS

6.2.13.1. Burial depths of the cable will be consistent with the industry practice for Extra High Voltage (EHV) cables installations, as stated in NGTS 357, ENA TS 09-02 and most Utility's specifications for EHV cable installations.

6.3. SECTION 1 – LOVEDEAN (CONVERTER STATION AREA)

6.3.1. WASTE AND MATERIAL RESOURCES

6.3.1.1. The design of the Converter Station will seek to balance cut and fill of excavated earthworks in order to minimise the quantity of imported earthwork material and to maximise re-use of arisings. Based on the preliminary design, there is a surplus of 45,325 tonnes of material generated.

6.3.2. LANDSCAPE AND VISUAL

6.3.2.1. The Proposed Development will be constructed in line with a suite of Design Principles (which include landscape design principles) and a detailed landscaping scheme which will be submitted for approval to the relevant discharging authority prior to any phase of the works being carried out (and, where related to the Converter Station Area, for this approval to be in consultation with the South Downs National Park Authority). The detailed landscaping scheme will be prepared in accordance with the updated Outline Landscape and Biodiversity Strategy (REP1-034) which includes specific references to fixed offsets and constraints required due to a range of utilities and landscape and ecological constraints present. The detailed landscaping scheme will include detailed landscape mitigation plans reflecting the indicative landscape mitigation plans, together with management, maintenance and monitoring plans and confirmed management responsibilities. The monitoring plans will include periodic reviews to determine the success of planting in mitigating landscape and visual effects.

6.3.2.2. The detailed landscaping scheme will require the implementation of mitigation planting alongside the construction programme where works would not affect planting and during winter (November – February) (APP-405). The programme will be refined further subject to DCO consent.

6.3.2.3. Construction cranes will be retracted when not in use. The height of the cranes when not in use will be dependent on the crane manufacturer, but is likely to be approximately 5m.

6.3.4. ONSHORE ECOLOGY

6.3.4.1. The Proposed Development has incorporated a 15m buffer between works and Stoneacre Copse, Crabden's Copse and Crabden's Row to avoid direct effects on this feature. No ancient woodland is present within the Order Limits.

6.3.4.2. Landscape planting around the Converter Station will incorporate ecologically important habitats to offset those lost due to construction work. Planting will include mixed woodland, scrub, hedgerow, scattered trees and marshy grassland associated with flood attenuation features. Sections of hedgerows removed to accommodate the installation of the Onshore Cable Route will be replanted. These planting measures are designed to enhance biodiversity within the Converter Station Area and will replace grassland which has developed on arable land that is no longer farmed.

Improvement of remaining grassland at Lovedean

6.3.4.3. At the Converter Station the botanical diversity of the grassland will be improved by application of green hay. Green hay contains seed from a diversity of wildflower species and will inoculate retained grassland at Lovedean with new flora. The green hay will be sourced from a suitable donor site (e.g. Denmead Meadows) to ensure native plants of local provenance are used to colonise and increase the value of the grassland.

6.3.4.4. Improvement using green hay will take place in late spring (June-July) in the year following completion of construction work.

Closure of badger setts under licence

6.3.4.5. The two badger setts to be lost to the converter station footprint (option B(i)) will be closed using badger gates outside of the badger breeding season (June-November inclusive).

6.3.4.6. Setts will be closed using one-way gates so badgers can leave but cannot return to the sett. Following a period of monitoring to ensure badgers are not within them, the setts will be dug out.

6.3.4.7. This process will avoid potential death or injury to badgers as a result of development, and work will be undertaken under a Natural England licence to allow legal sett closure.

6.3.4.8. In addition, open excavations will be fitted with mammal ladders (planks of wood at either end) to allow animals to climb out if they fall in and prevent the trapping of animals including badgers.

6.3.5. ARBORICULTURE

6.3.5.1. Design shall avoid positioning cables in conflict with the above (stem and canopy) and below ground (RPA's) elements of existing trees. Where significant incursion is unavoidable, trees shall be appropriately replaced.

6.3.5.2. Mitigation for the loss of hedgerows and hedgerow trees will be replaced with like for like species of a similar size with hedgerow trees repositioned at least 5 m away from the Onshore Cable Route within the Order Limits.

6.3.5.3. In line with the proposed Arboricultural Method Statement (see Appendix F of the Arboriculture Report (APP-411)) the process of construction of the Converter Station shall minimise encroachment on the west side of the Converter Station and impacts on the existing hedgerow and hedgerow trees.

6.3.5.4. Works Compound and Laydown Area shall be prohibited within 15 m of the ancient woodland and hedgerows. When storing materials, particularly liquids, slopes and drainage channels shall be used to prevent spillages and flow into the buffer zone of the ancient woodland and hedgerows.

6.3.6. CONSTRUCTION SURFACE WATER MANAGEMENT

6.3.6.1. In addition to the General Environmental Control Measures contained within Sections 5.5, 5.6 and 5.7, the following shall also be prepared and implemented and shall be discussed and agreed with the statutory authorities and other stakeholders to avoid potential pollution of the surface and ground water:

- Construction Surface Water Management Plan ('CSWMP'). Area with prevalent run-off shall be identified and drainage shall be actively managed, e.g. through bunding and/or temporary drainage. Temporary drainage works shall be designed and constructed to relevant statutory guidance in consultation with statutory authorities and other stakeholders.
- Emergency Pollution/Spill Response Plan. The Emergency Incident Response Plan shall be prepared in compliance with Section 4.6.
- Earthwork Management Plan ('EWMP'). EWMP shall be prepared in conjunction with CSWMP to ensure the risk of flooding and contamination of SPZ1 is not increased during bulk earthworks. These shall be formed part of the CEMP.
- To mitigate any potential impact of the known and unknown karst features to the ground water receptors, the Contractor shall prepare a project specific Method Statement and Communication Plan detailing mitigation for bulk earthworks in compliance with the procedures provided within the Supplementary Karst Report (REP1-156).

- SPZ1 protection measures shall be agreed by put in-place by the appointed contractor for any further site investigation. Any further site investigation shall be undertaken in accordance with Environment Agency guidance as outlined in "Technical Report P5-065/TR" (Environment Agency, 2000).
- The appointed contractor shall design and construct a temporary low permeable construction compound to house the heavy vehicles and construction works and shall take all steps necessary to avoid cross contamination and shall use appropriate water management techniques during the ground work to control potential pollution of the surface water and ground water.
- The temporary car park layout shall be impermeable with surface water collected and conveyed by channel drains discharging to an underground network with oversized pipes to provide surface water storage. If necessary, an infiltration drain shall be constructed to intercept overland flow from the fields and direct it away from the carpark. A raised kerb shall surround the car park on all sides to prevent potentially polluted surface water from running off the site to surrounding fields. Water quality treatment shall be provided by a proprietary treatment (eg hydrocarbon interceptor) followed by a sealed filter drain. This shall connect to the infiltration swale adjacent the access road that can also convey water to the infiltration basin, both of which shall be designed for the operational phase. The interceptor volume and type shall be specified by the contractor. Design of the infiltration drain shall be in accordance with the Operational Stage SuDS and is illustrated on the Indicative Temporary Carpark and Compound Drainage Layout Drawing, within Appendix 6.
- All temporary diesel generator(s) shall be bunded with drainage design to be undertaken by the contractor and complying with the treatment and flow control principles of the Operational Stage and contractor's carpark.
- Refuelling of machinery shall be undertaken within designated areas where spillages can be easily contained. Machinery shall be routinely checked to ensure it is in good working condition.
- Any tanks and associated pipe work containing hazardous substances shall be double skinned and be provided with intermediate leak detection equipment.
- Area at risk of spillage, such as vehicle maintenance areas and hazardous substances stores (including fuel, oils, and chemicals) shall be bunded and carefully sited to minimise the risk of hazardous substances entering the drainage system to the local watercourses, additionally the bunded areas shall have impermeable base to limit the potential for migration of contaminants into ground.

- It is recommended that the excavation works in the proposed areas of “cut” (in approximately the northern third of the Converter Station area) be undertaken outside of the winter wet season and in the summer dry season if feasible. This will significantly help in reducing the likelihood of infiltration of surface runoff water containing suspended sediments (turbidity) into the exposed Chalk aquifer. If the works are undertaken in the wet season, the works should be undertaken using a staged approach, where any exposed Chalk is covered over as soon as possible to prevent the ingress of turbid runoff. This runoff should be collected by the temporary water management system. This approach should be undertaken regardless of time of year, however, is especially critical should the undertaking of the works in the winter wet season be unavoidable (due to programme constraints).

6.3.6.2. The updated version of the Surface Water Drainage and Aquifer Contamination Strategy (APP-360 Rev002) is submitted as Appendix 7 to the Onshore Outline CEMP and secured under requirement 6 and 15 of the dDCO (REP3-003)”

6.3.7. HUMAN HEALTH

6.3.7.1. Landscaping (including reprofiling if/where appropriate and associated planting) is proposed around the perimeter of the Converter Station Area and other necessary/appropriate locations to mitigate against the Landscape and Visual Amenity impacts and integrate the Converter Station into its surroundings.

6.3.7.2. Permanent fencing will be provided around the Converter Station, FOC Infrastructure, and anywhere else it is needed for the life of the Proposed Development.

6.3.8. NOISE AND VIBRATION

6.3.8.1. The following best practice noise and vibration mitigations measures will be employed at the Converter Station Area.

6.3.8.2. Throughout the Construction Stage, the Converter Station access road will be maintained in a good condition (i.e. free from bumps/potholes) to minimise the generation of noise or vibration from vehicles.

6.3.8.3. The layout and form of the laydown areas, vehicle parking and works compounds at the Converter Station will be planned carefully to minimise noise at nearby sensitive receptors as far as practicably possible through best practice measures including the following:

- The noisiest activities will be planned to take place as far as practicably possible from nearby sensitive receptors.
- Careful positioning of site cabins and other equipment to provide screening between site activities and nearby sensitive receptors. Where appropriate, this could be supplemented by localised noise barriers in the areas adjacent to sensitive receptors (see Plate 6.1 for illustrative examples).

6.4. SECTION 2 – ANMORE AND SECTION 3 – DENMEAD/KINGS POND MEADOW

6.4.1. ONSHORE ECOLOGY

6.4.1.1. HDD work already avoids much of the impacts of the Onshore Cable Route through Denmead Meadows, and as the cables will be buried there will be no permanent habitat loss within the site. However, as work is proposed within Denmead Meadows measures are proposed that first avoid potential effects through controlling working practices, secondly to preserve turves and the physical structure of soils within the site, and thirdly collect seed from the site itself to allow it to be restored using plants native to it.

Avoidance and General Measures

6.4.1.2. The size of working areas, including compounds, will be kept to a minimum to reduce the effects of grasslands, especially Habitats of Principal Importance ('HPI') lowland meadow habitat exists. Works areas will be securely fenced and procedures put in place to prevent damage to grassland habitats adjacent to them (e.g. by the use of Heras fencing).

6.4.1.3. Works will be monitored by an Ecological Clerk of Works that is experienced in management of priority habitats who will provide toolbox talks to contractors and staff working at the site.

Timing of Work

6.4.1.4. The growing season and winter wet season will be avoided as both these are important for maintaining the conditions within the habitat; work will therefore be undertaken in late summer/autumn (August to November).

Seed Harvesting and Reseeding

6.4.1.5. In addition to soil horizon preservation and ground protection, where particularly sensitive Habitats of Principal Importance ('HPI')-quality Lowland Meadow habitat is present in Field 3 (see Plate 6.2 below) at Denmead Meadows, regrowth will be promoted by collecting seed from plants already present and reseeding using this collected seed following work. This will preserve the local mixture if meadowland plants unique to Denmead Meadows. For Field 3 only, where HPI habitat is present, seed will be collected prior to commencement of work and used to re-seed it following work, rather than buying in a commercial seed mix.

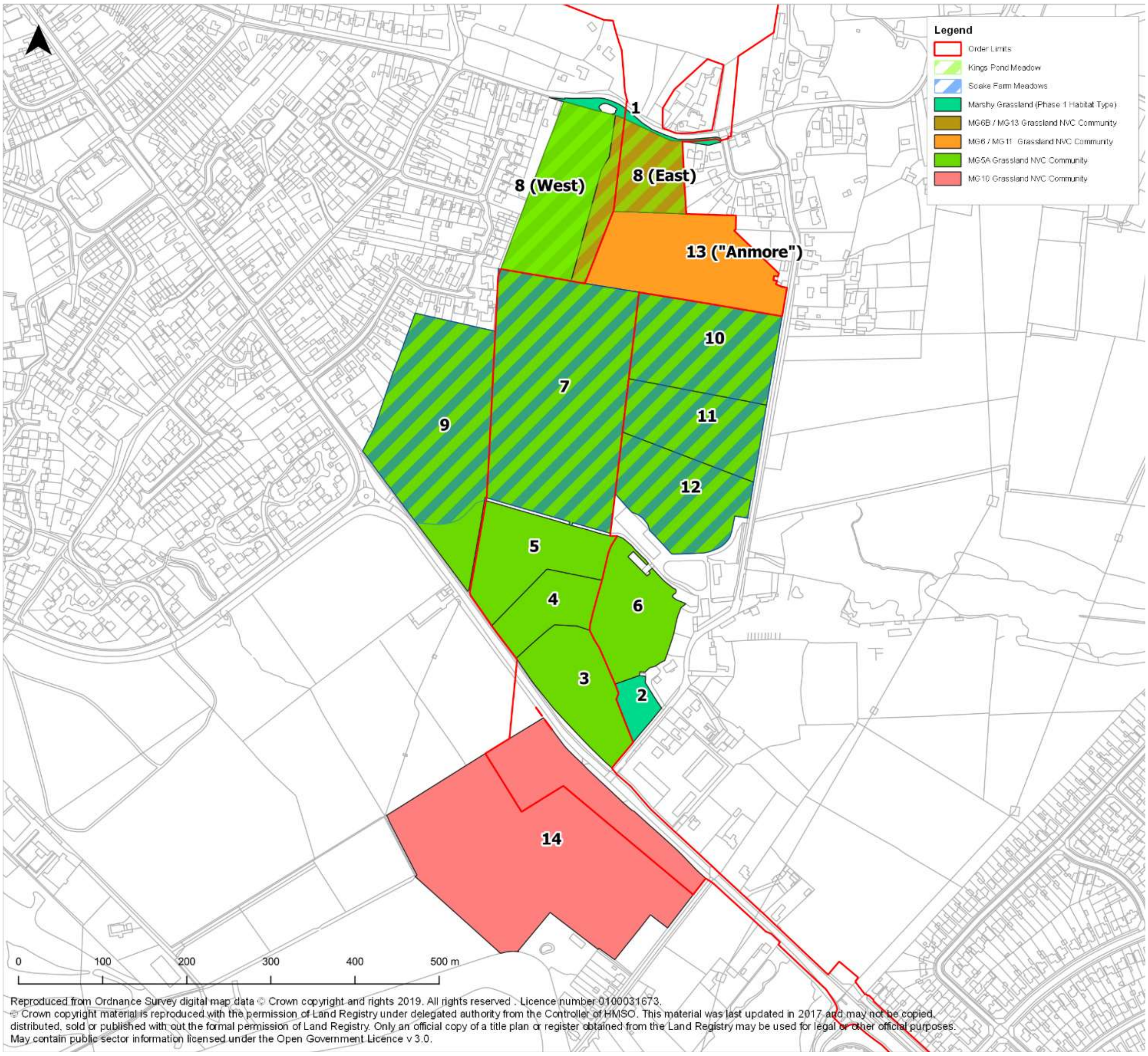

Plate 6.2 - – Denmead Meadows Mitigation Strategy Map

6.4.1.6. Using a specialist contractor, a seed harvester will be used to collect seed prior to the onset of works. Seed will be dried and stored until work is complete.

6.4.1.7. Two seed collection sweeps will be undertaken prior to the onset of works, one in late June/Early July to catch early flowering plants and one in late August/early September for late flowering plants.

6.4.1.8. Re-seeding will take place using collected seed in spring following the completion of construction works.

Stripping of turves and their preservation

6.4.1.9. Turves will be removed from Field 3 and stored away from Denmead Meadows locally. This action will only take place at Field 3 as this is HPI Lowland Meadow. Other fields do not comprise HPI habitat or are under HDD route so will not be affected.

6.4.1.10. Cutting will utilise a turf cutting machine attached to low ground pressure machinery (e.g. farm tractor) with an operator with appropriate experience. Turves are to be cut to a thickness of 2-3 inches to maintain root systems, seed bank and soil to provide material to aid keeping turves moist whilst they are stored. Rolls of turf will be collected for movement by a telehandler, with pallets used to transport the rolls as necessary.

6.4.1.11. At the storage site, turves will be unrolled onto the ground and will not be stacked. Measures will be put in place to maintain the turves and keep them moist; daily monitoring and potentially twice daily watering would be a minimum but dependent on weather conditions.

6.4.1.12. Storage area vegetation will be cut tight to the ground prior to delivery of turves to create a relatively smooth surface for storage.

6.4.1.13. Turves will be kept moist with watering as required; daily monitoring and potentially twice daily watering required. Use of an automatic sprinkler system preferable.

Protection of Soil Structure and Avoidance of Soil Compaction

6.4.1.14. Top soil and sub soil removed from Field's 3, 8 and 13 as part of works will be stored during works with no mixing of soils from different locations. Resultant soil piles will not be stored on HPI quality habitat.

6.4.1.15. The replacement of soil structure will follow completion of work. Ground protection (temporary membrane + type 1 aggregate or bog matting, decision to be informed by contractor) will be implemented to prevent soil compaction.

Restoration of Lowland Meadow Habitat

6.4.1.16. At Field 3, turves will be returned following completion of HDD work and demobilisation of the compound. Replacement work will proceed from back of field towards the access point to avoid tracking over turves. Watering in of turves will follow their replacement while re-seeding of Field 3 will be undertaken using collected seed in spring following the completion of works.

6.4.1.17. Fields 8 and 13 will be reseeded with any seed remaining from that harvested from Field 3. The storage area will be reseeded with a seed mix appropriate for the land use.

Monitoring and Management

6.4.1.18. A pre-construction survey will be undertaken in spring 2021 to establish the green winged orchid population in Field 3 and the general character of the vegetation there. Suitably qualified botanists will carry out direct counts of green winged orchid plants present within Field 3. They will also use quadrats to carry out a National Vegetation Classification ('NVC') survey of the field, identifying plant species present and classifying the habitat type present.

6.4.1.19. Three years of management e.g. cutting/weed pulling will take place over 5 years (i.e. management will take place in year 1, 3 and 5) at Fields 3, 8 and 13. Management will be kept to areas that fall within Order Limits. Management will be consistent to how it is managed now to maintain diversity, including any grazing which may be present.

6.4.1.20. No additional heavy interventions will be made and cuts will be restricted to a once yearly hay cut.

6.4.1.21. A botanical survey will be undertaken in each year of management (years 1, 3 and 5 post-construction) to inform changes required to maintain habitats, comprising the same method as the pre-construction survey.

6.4.2. ARBORICULTURE AND LANDSCAPE

6.4.2.1. Mitigation of impacts shall be achieved by avoiding higher value features including mature trees, those subject to TPOs and deciduous copse. For Section 2 no trees shall be lost. For section 3 where features are to be removed, replanting is required with like for like species of a similar size at least 5 m from the Onshore Cable Route within the Order Limits. Works running close to the edge of specific tree groups subject to TPOs shall be reviewed at detailed design to minimise impacts through Onshore Cable Micrositing, in accordance with BS 5837 and under the supervision of a suitably qualified clerk of works.

6.4.2.2. Sections of hedgerows bounding the edge of the Order Limits shall remain unaffected. Hedgerows and hedgerow trees where lost shall be replaced with like for like species where practicable in agreement with the LPA, with hedgerow trees repositioned at least 5 m away from the Onshore Cable Route within the Order Limits.

6.4.3. GROUNDWATER

6.4.3.1. Trenching in Section 3 and parts of Section 2, in the vicinity of the Kings Pond and Denmead Meadows, will avoid the wet winter season. The trenches will be installed at end of the summer to ensure groundwater is at its lowest elevation. If the trenches were to be installed during the peak winter months, groundwater dewatering would likely be required, and this could potentially impact upon Kings Pond which is considered to have a proportion of groundwater dependency. This applies to Section 3 and the southerly 100 m of Section 2 adjacent to Kings Pond.

6.4.3.2. The required groundwater dewatering quantities for trench construction will be determined at detailed design. The designer must ensure the discharge quantities are accurate or conservative to ensure no flood risk should be increased due to surplus groundwater encountered during construction. This applies to all sections.

6.4.3.3. Sections 1, 2 and 3 have been identified as areas which may contain dissolution features. Previous investigations suggest a very low likelihood of encountering such features. Such features would represent potential contaminant transport pathways (directly to public water abstractions) and have been raised as a particular concern by Portsmouth Water and the EA. Although no dissolution features have been identified within the Order Limits, there may be features present which are as yet unidentified.

6.4.3.4. A catalogue of detailed descriptions of mitigation measures will be agreed with Portsmouth Water and the EA prior to construction of Sections 1, 2 and 3. Typically, such measures could include:

- Wherever practical the Onshore Cable Route trench excavation works will only be undertaken in the superficial Head deposits and not in the Chalk;
- If the Head deposits are of insufficient thickness (or not present), making excavating in the Chalk unavoidable, then extra care will be taken to avoid fracture zones and karst features. The appearance of any sudden increase in thickness of Head deposits during trenching could indicate the presence of a karst dissolution feature.
- During the construction works a watching brief will be employed to detect any unknown karst dissolution features when works are taking place;

- Any detection of karst dissolution features may result in a temporary pause of the works for the engineer on site to determine which of the agreed actions in the catalogue of mitigations agreed with Portsmouth Water and the EA should be applied;
  - Portsmouth Water and the EA will be notified should such an instance occur;
  - The engineer on site may determine that the karst dissolution feature is sufficiently filled by low-permeability overburden that it presents little or no risk of acting as a pathway for potential contaminants during construction, and therefore works can continue;
  - A possible course of action could be the Onshore Cable Micrositing in order to alter the course of the Onshore Cable Route locally, just enough to avoid the dissolution feature (within the Order Limits and dependent of other constraints);
  - Another possible action could be to fill the karst dissolution feature with impermeable grout before continuing the works;
- A drainage strategy during the works will be put in place, which will ensure that no untreated runoff is allowed to flow freely and potentially entering karst dissolution features;
- Drip trays and spill kits will be utilised throughout the works to prevent fuel spillages, and;
- If required to support the discharge of Requirement 13, the appointed contractor may decide to undertake more GI (prior to the main works starting) to confirm ground conditions and identify the Onshore Cable Route (i.e. trenching strategy by the contractor as part of detailed design) in Sections 1, 2 and 3 to determine the thickness of the Head superficial deposits and check for the presence of karst dissolution features.

6.5. SECTION 4 – HAMBLEDON ROAD TO FARLINGTON AVENUE

6.5.1. ARBORICULTURE AND LANDSCAPE

6.5.1.1. Detailed design of the Onshore Cable Route and detailed analysis of impacts shall be required as the route is refined through Onshore Cable Micrositing overseen by a suitably qualified clerk of works. All works must be carried out within the carriageway, avoiding the use of footways or verges to minimise impacts on structural roots except where technical constraints make this unavoidable.

6.5.1.2. High and medium value features including trees subject to TPOs shall be avoided where practicable, and design and construction shall follow BS 5837 as a minimum.

6.5.1.3. Design shall avoid positioning cables in conflict with RPAs of existing trees. Where significant incursion is unavoidable, replanting in the locality is required with like for like species of a similar size positioned a minimum of 5 m away from the Onshore Cable Route in discussion with the relevant LPA. Where the siting of new trees cannot be accommodated, replanting in the locality is required.

6.6. SECTION 5 - FARLINGTON

6.6.1. ARBORICULTURE AND LANDSCAPE

6.6.1.1. Detailed design of the Onshore Cable Route and detailed analysis of impacts shall be required as the route is refined through Onshore Cable Micrositing overseen by a suitably qualified clerk of works.

6.6.1.2. High/medium value features including impacting on trees subject to TPOs shall be avoided where practicable, and design and construction shall follow BS 5837 as a minimum.

6.6.1.3. Hedgerows, hedgerow trees and ornamental trees lost shall be replaced with like for like species subject to agreement with PCC with trees positioned a minimum of 5 m away from the Onshore Cable Route within the Order Limits.

6.6.1.4. Design shall avoid positioning cables in conflict with RPA's of existing trees. Where significant incursion is unavoidable, replanting in the locality is required.

6.6.1.5. In agreement with PCC, in the event that TPO feature H896 (201/1997) requires replacement, other than the poplar (T925), these features shall be replaced with like for like species of a similar size. For T925, alternative species such as beech, sweet chestnut or yew would be considered.

6.7. SECTION 6 – ZETLAND FIELD AND SAINSBURY'S CAR PARK

6.7.1. ARBORICULTURE AND LANDSCAPE

6.7.1.1. High value features shall be avoided and design and construction must follow BS 5837 as a minimum. Where medium value features are at risk of removal, impacts shall be minimised to secure the retention of as many features as practical through detailed design measures considering Onshore Cable Micrositing and overseen by a suitably qualified clerk of works.

6.7.1.2. Design shall avoid positioning cables in conflict with RPA's of existing trees. Trees and shrubs shall be replaced with like for like species of a similar size and trees repositioned at least 5 m away from the Onshore Cable Route within the Order Limits. Where the siting of new trees cannot be accommodated within the Order Limits, replanting in the locality is required.

6.9. SECTION 7 – FARLINGTON JUNCTION TO AIRPORT SERVICE ROAD

6.9.1. ARBORICULTURE AND LANDSCAPE

6.9.1.1. Through detailed construction works traffic shall avoid impacting on medium value tree groups (G680, G783, G706, G671 and G582) which form strong landscape features, including individual trees within Farlington playing fields, mature avenue trees running to the pavilion, within the car park and around the northern and western edge of the hotel. Should the access track to the cricket pavilion and hotel car park be insufficient to withstand heavy vehicular loading bog matting or similar techniques shall be used to avoid compaction to RPAs. If any trees are affected by construction work traffic, they must be pruned back sufficient to avoid accidental damage and monitored. If it becomes necessary to remove trees, they shall be replaced with like for like species of a similar size subject to agreement with PCC. Replacement trees shall be repositioned at least 5 m away from the Onshore Cable Route within the Order Limits.

6.9.1.2. The Onshore Cable Corridor shall impact on Category C trees and shrubs (a mix of poplar, willow, lime, pine and sycamore - G663, W885, W886, G908 and G909). All of these trees and shrubs serve a limited visual amenity function apart from G663 which visually connects with tree planting south of the access road to the Football Ground and Watersport Centre. Where significant incursion is unavoidable, trees must be replaced with like to like species subject to agreement with PCC and positioned at least 5 m away from the Onshore Cable Route within the Order Limits. It is assumed a similar tree mix shall be planted on either side of the access road into Kendalls Wharf and Andrew Simpson Watersports Centre allowing for easements associated with the Onshore Cable Route.

6.9.1.3. Trees and shrub planting (Category B G695, G711 and T70) and associated root protection areas to the west of the Baffins Milton Rovers Football Ground (Kendall Stadium) shall experience partial loss by the cable routing since the cable routing would run through the football ground rather than to the west. Detailed design shall avoid positioning cables in conflict with RPAs of existing trees.

6.9.1.4. Detailed design shall avoid impacts to large groups of roadside trees, while balancing impacts on traffic congestion, for example, where cables may be positioned within the carriageway. Detailed design of the Onshore Cable Route and detailed analysis of impacts shall refine the impacts through Onshore Cable Micrositing, following BS 5837 and overseen by a suitably qualified clerk of works. Where significant incursion is unavoidable and the siting of new trees cannot be accommodated within the Order Limits, replanting in the locality is required.

6.9.2. SURFACE WATER RESOURCES AND FLOOD RISK

Artificial land drainage at Farlington Playing Fields

6.9.2.1. Farlington Playing Fields have a history of surface water and groundwater flooding due to artificial land. A Land Drainage survey at pre-Construction Stage, reinstatement plan and post-Construction Survey will be undertaken in order to monitor the impacts of the Proposed Development.

6.9.3. SOCIO-ECONOMIC EFFECTS

6.9.3.1. Opportunities to minimise impacts on sports pitches will be required to be discussed with relevant stakeholders. This includes ongoing discussions with the Chairman of the Baffins Milton Rovers Football Club on timing of construction and reinstatement requirements within this section. It also includes discussion with Portsmouth City Council to minimise impacts to pitches at Farlington Fields and Langstone Harbour Sports Ground.

6.10. SECTION 8 – EASTERN ROAD (ADJACENT TO GREAT SALTERNS GOLF COURSE) TO MOORINGS WAY

6.10.1. ARBORICULTURE AND LANDSCAPE

6.10.1.1. Works will avoid the footway or verge where there are mature trees except where existing constraints make this unavoidable.

6.10.1.2. Detailed design measures shall be undertaken to minimise the impact on mature Category B trees, TPO tree T59, trees within Milton Common and the eastern edge of Portsmouth College/Eastern Road. Through design and construction, measures shall be taken to avoid positioning cables in conflict with RPA's of existing trees and follow BS 5837 as a minimum overseen by a suitably qualified clerk of works. Trees shall be replaced with like for like species of a similar size and trees repositioned at least 5 m away from the Onshore Cable Route within the Order Limits. Where the siting of new trees cannot be accommodated within the Order Limits, replanting in the locality is required

6.10.2. GROUND CONDITIONS

6.10.2.1. Mitigation measures required specifically where the route traverses Milton Common include:

- The works will be carefully and sensitively managed and executed to minimise impact on the local environment through the use of appropriate mitigation measures outlined below.

- There is a potential for noise, dust and odour impacts in the immediate vicinity of the proposed excavations within Milton Common. The appointed contractor will prepare a detailed specification of the proposed excavation and installation methodology in this location outlining the measures to be put in place to monitor and mitigate such impacts.
- the introduction of an exclusion zone in the immediate area of the excavation to keep members of the public at distance.
- excavation of the trench in short lengths to minimise odour and dust impacts.
- a programme of noise, dust and odour monitoring with agreed red/amber/green alerts and associated actions to reduce impacts.
- odour control such as the installation of a perimeter fog and misting system.
- agreed limits on hours of working.
- A programme of community engagement will be carried out before and during the works to inform the local community of the nature of the works and to provide comfort and reassurance that the works will be carried out in a way that minimises impacts as far as is reasonably practicable. This may include local notices, mail drops, liaison with the LPA.
- The excavated waste will be carefully segregated and handled so as not to contaminate areas away from the works themselves. Excavated materials will be removed from site and disposed of or treated for reuse at a suitably licensed waste receiving facility. Full details and records of the movement of excavated soils will be presented in a Verification Report upon completion of the works.
- Reinstatement of an engineered landfill cap to its existing condition or better.
- Clay stanks (or similar) will be installed at regular intervals along the trench to prevent migration of landfill gas along the route and beyond the existing gas vent trench around Milton Common.
- Appropriate gas protection measures will be applied to access chambers or jointing pits to prevent ingress of landfill gas.
- Should significant unexpected contamination be encountered this will be managed appropriately and reported to the EA. If required, the contamination risk assessment and remediation strategy will be updated.

6.11. SECTION 9 – MOORINGS WAY TO BRANSBURY ROAD

6.11.1. ARBORICULTURE AND LANDSCAPE

6.11.1.1. Works shall avoid the footway or verge where there are mature trees except where existing constraints make this unavoidable.

6.11.1.2. Impacts on tree group G900 within Milton Locks Nature Reserve and tree group G697 within Bransbury Park shall be minimised through design and construction methodology. Measures shall be taken to avoid positioning cables in conflict with RPAs of existing trees, following BS 5837 as a minimum, and overseen by a suitably qualified clerk of works. Liaison shall take place with the site manager at Milton Locks Nature Reserve to agree the most appropriate form of mitigation.

6.11.1.3. In general, high and medium value features shall be avoided. Detailed design measures shall be undertaken to avoid positioning cables in conflict with RPAs of existing trees. Where significant incursion is unavoidable, trees shall be replaced with like for like species of a similar size subject to agreement with PCC and planted 5 m beyond the Onshore Cable Route within the Order Limits. Where the siting of new trees cannot be accommodated within the Order Limits, replanting in the locality is required. Opportunities shall also be explored to remove trees in poor condition and, where appropriate, replace with other ornamental species in agreement with PCC.

6.11.1.4. It must be possible to minimise the long-term impact on retained trees within Bransbury Park must be minimised through Onshore Cable Micrositing within the Onshore Cable Corridor, under the supervision of a suitably qualified clerk of works.

6.12. SECTION 10 – EASTNEY (LANDFALL)

6.12.1. ARBORICULTURE AND LANDSCAPE

6.12.1.1. Impacts on medium value trees including trees subject to TPO shall be avoided. Measures shall be taken to avoid positioning cables in conflict with RPA's of existing trees and follow BS 5837 as a minimum overseen by a suitably qualified clerk of works. Where significant incursion is unavoidable, trees shall be replaced with like for like of a similar size species subject to agreement with PCC and planted at least 5 m beyond the Onshore Cable Route within the Order Limits. Where the siting of new trees cannot be accommodated, replanting in the locality is required. The northern (east bound) side of Henderson Road and Fort Cumberland Road would be a preferred choice to avoid impact on existing street trees in this section.

7. MONITORING

7.1. MONITORING AND REVIEW

7.1.1.1. The Environment Manager will hold the responsibility for maintaining a register of all environmental monitoring, which will be made available for auditing and inspection.

7.1.1.2. Reporting procedures will be defined by the Environment Manager who will hold overall responsibility for providing feedback to the appointed contractor on the environmental performance of the construction works.

7.1.1.3. A framework for environmental monitoring on site is set out in Table 7.1. Records of environmental inspections and audits will be kept and appended to the CEMP.

Table 7.1 - AQUIND Onshore Monitoring Plan

Discipline	Monitoring Requirement / Commitment	Responsibilities	Construction / Operation Stage	Location in Control Document	Trigger leading to Non-Compliance	Further Action / Remedial Measures
Landscape and Visual Amenity	**Management of Vegetation** Management of vegetation through a detailed landscaping scheme which would form part of the draft DCO's requirements and implemented following approval by the host authority.	The appointed contractor to appoint a specialist contractor.	Construction / Operation	Onshore Outline Construction Environmental Management Plan ('OOCEMP') (APP-505) Section 7 - Table 7.1 AQUIND Onshore Monitoring Plan	Actions do not accord with the Outline Landscape and Biodiversity Strategy ('OLBS') (APP-506) and the approved detailed landscaping scheme.	Review of role and responsibilities of appointed farmer / contractor and reappointment if deemed necessary.
	Monitoring of Planting New planting would be subject to a five-year liability period to secure successful establishment, commencing on completion of landscaping works associated with each phase. All plants found dead or dying would be replaced in the first available planting season.	**Local farmer with agreed management plan** - existing planting (hedgerows and hedgerow trees). **External landscape contractor** - all new planting. **Appointed Ecological Clerk of Works** - undertaking ecological monitoring surveys, advising Applicant. **Environmental Clerk of Works** - specialist site supervision for walkover assessments, analysis of impacts associated with RPAs, monitoring effectiveness of the first 5 years following completion of the development, ensures review of landscape features every 5 years, reviews against aims and objectives of Outline Landscape and Biodiversity Strategy and the approved detailed landscaping scheme. It is currently suggested that the local farmer (following assurance of good horticultural experience, and awareness of invasive species, diseases and	Construction / Operation	OLBS - Sections 1.7.1 Monitoring of Planting; 1.7.2 Management Responsibilities;	**New planting**: An unapproved contractor proceeding with works. Implementation of works not in accordance with the approved detailed landscaping scheme considering agreed specification and programme covering implementation, planting and management including watering, planting schedule and planting plans, changes in stock, species and size. Changes taking place without written agreement, not in accordance with relevant Codes of Practice and British Standards, a lack of communication over activities which require support / supervision and not enacting on recommendations made by the Clerks of Work, landscape architect and /or arboriculturalist. **Existing and replacement planting:** A change of appointed farmer without agreement, an absence of / or incorrect management practices, lack of compliance with the OLBS and detailed landscaping	Review of role and responsibilities of appointed farmer / contractor and reappointment if deemed necessary. Regular reviews will be undertaken by a Clerk of Works every five years to ensure works accord with the OLBS and the approved detailed landscaping scheme.

Discipline	Monitoring Requirement / Commitment	Responsibilities	Construction / Operation Stage	Location in Control Document	Trigger leading to Non-Compliance	Further Action / Remedial Measures
		pests) undertakes existing management practices, with a specialist contractor overseeing the new planting to ensure compliance with OLBS objectives in terms of long term planting. An update to the OLBS and management responsibilities is submitted as APP-506 Rev002.			scheme and lack of communication over activities which require support / supervision and not enacting on recommendations made by the Clerks of Works, landscape architect and arboriculturalist and not keeping a record of measures taken to deliver actions.	
	Management Plan Reviews - Site walkover following any extreme weather event to inspect health of landscape features and trees. Any trees that have suffered damage would be subject to an arboricultural survey by an arboriculturalist. - The OLBS and detailed landscaping scheme and its objectives will be reviewed against current environmental conditions to consider unforeseen circumstances. - The OLBS, detailed landscaping scheme and detailed management plans will be reviewed annually. Any significant changes must be agreed between the project landscape architect, arboriculturalist, ecologist and appointed contractor.		Operation	OLBS - Section 8.4 Management Plan Reviews	Health and Safety incidents resulting from inclement weather and a lack of action / notification to the Clerks of Works, arboriculturalist and landscape architect and need for support / supervision. Non adherence to detailed landscaping scheme including specification and management plans and recommendations made by Clerks of Works, arboriculuralist / landscape architect and record of measures taken to deliver recommendations.	Review of role and responsibilities of appointed farmer / contractor and reappointment if deemed necessary. Regular reviews will be undertaken by Environmental Clerk of Works every five years to ensure works accord with the OLBS and the approved detailed landscaping scheme.
Onshore Ecology	**Closure of badger setts under licence** - Setts will be closed using one-way gates so badgers can leave but cannot return to	Named ecologist responsible for badger licence.	Construction	OOCEMP - Section 6.3.3.6	- One-way gates not installed for the 21 day monitoring period; and - 21 day period not completed.	Review of situation by Environmental Clerk of Works. Installation of gates and/or additional days of monitoring to

Discipline	Monitoring Requirement / Commitment	Responsibilities	Construction / Operation Stage	Location in Control Document	Trigger leading to Non-Compliance	Further Action / Remedial Measures
	the sett. Following a period of monitoring to ensure badgers are not within them, the setts will be dug out.					be undertaken until 21 days is reached.
	Post-construction monitoring of vegetation re-establishment at Denmead Meadows - Monitoring at years 1, 3 and 5 post-development will be undertaken to inform potential management interventions at the site. - It will comprise botanical survey of the reseeded areas, and will allow interventions that may be necessary to maintain HPI-quality grassland remains in the long-term.	Appointed contractor and Environmental Advisor/Manager	Operation	OOCEMP – Section 6.2.1.8	- Monitoring not undertaken during years 1, 3 and 5; and - Habitats start to change from their state prior to construction and no interventions are made to return them to the correct status.	Review of monitoring work by appointed contractor and monitoring surveys commissioned to replace those missed. Management of site habitats put in place to return them to their baseline condition.
Arboriculture	**Ancient Woodland** Works Compound and Laydown Area would be prohibited within 15 m of the ancient woodland and hedgerows. When storing materials, particularly liquids, slopes and drainage channels would be used to prevent spillages and flow into the buffer zone of the ancient woodland and hedgerows.	Environmental Clerk of Works to lead, with specialist input from an arboriculture consultant where required, to be appointed by the appointed contractor.	Construction	OOCEMP - Section 6.3.4.4	Protective measures not in place or tampered with / works within Root Protection Area (‘RPA’) not agreed with Project Arboriculture consultant	Remedial work may involve de-compaction of RPA, tree condition assessment to understand impact to long term retention
	Protection of trees and RPA - Where practicable design would avoid positioning cables in conflict with RPAs of existing trees. Where significant incursion is		Construction	OOCEMP - Section 6.5.1.1 and 6.5.1.2	Protective measures not in place or tampered with / works within Root Protection Area not agreed with Project Arboriculture consultant	Remedial work may involve de-compaction of Root Protection Area, tree condition assessment to understand impact to long term retention

Discipline	Monitoring Requirement / Commitment	Responsibilities	Construction / Operation Stage	Location in Control Document	Trigger leading to Non-Compliance	Further Action / Remedial Measures
	unavoidable, trees would be appropriately replaced.					
	Hedge removal - Hedge removal in the Converter Station Area would be minimised by only removing what is required to lay the Access Road. - Mitigation for the loss of hedgerows and hedgerow trees will be replaced with like for like species, where practicable, with hedgerow trees repositioned at least 5 m away from the Onshore Cable Route.		Construction	OOCEMP - Section 6.5.1.3 and 6.10.1.2	Replanting and after care not completed or not completed in accordance with best practice / British Standard.	"Beating up" or snagging planting may be required.
	Replanting of trees - - Where significant incursion is unavoidable, consideration for replanting in the locality is required with like for like species positioned a minimum of 5 m away from the Onshore Cable Route in discussion with the relevant LPA. - Opportunities should also be explored to remove trees in poor condition and, where appropriate, replace with other ornamental species in agreement with PCC.		Construction	OOCEMP - Section 6.5.1.3 and 6.10.1.2	Replacement trees not provided or not planted in accordance with best practice or British Standard. Alternatively, incorrect species may be selected if Portsmouth City Council not consulted correctly.	Incorrect trees or trees planted incorrectly to be made good.
Soils and Agricultural Land Use	**Construction Impacts to soil, waste and material resources** - Implementation of a Construction Environmental Management Plan ('CEMP'),	Appointed contractor and Environmental Advisor/Manager	Construction	OOCEMP Section 7 Table 7.1	The absence of a contractor prepared CEMP, SWMP and MMP prior to construction works commencing, and failure to update / record outputs from	Review of contractor prepared CEMP, SWMP and MMP by suitably qualified and experienced personnel prior to and during construction works. This will ensure

Discipline	Monitoring Requirement / Commitment	Responsibilities	Construction / Operation Stage	Location in Control Document	Trigger leading to Non-Compliance	Further Action / Remedial Measures
	incorporating a Materials Management Plan ('MMP'), Soil Resources Management Plan ('SRMP') and Site Waste Management Plan ('SWMP').				these documents during on site activity.	documents have been prepared and are suitable for the Proposed Development, and arisings are managed in accordance with legal and best practice requirements.
Ground Conditions	**Contaminated Land at Milton Common** - Detailed management plan for future maintenance and entry to below ground access chambers. - Prepared during detailed design stage and will form part of the Health and Safety File.	Appointed contractor and Environmental Advisor/Manager	Construction / Operation	OOCEMP Section 7 Table 7.1	The absence of a contractor prepared Construction Phase Plan ('CPP') (needed for all intrusive works), and absence of a management plan for future maintenance works and entry to below ground access chambers. These documents must be included in the Health and Safety File. Also, failure to update / record outputs from these documents during on-site activity.	Review of contractor management plan including CPP and the Health and Safety File by suitably qualified personal prior to and during the works in the construction / operational and decommissioning stages. This will ensure documents have been prepared and are suitable for the proposed works to minimise risks to receptors particularly Human Health due to the exposure of contaminated soils / groundwater and potential landfill gases.
Heritage and Archaeology	**Archaeological Monitoring** - Depending on the results of the Trial Trench evaluation, mitigation could take the form of targeted archaeological excavation (preservation by record) in advance of construction and/or an archaeological watching brief. - Archaeological watching brief (a programme of strip, map and sample) carried out alongside the preliminary topsoil removal.	Any archaeological work would need to be undertaken in consultation with the local authority's archaeological advisor in accordance with an approved archaeological Written Scheme of Investigation ('WSI').	Construction	OOCEMP Section 7 Table 7.1	- The programme of archaeological and heritage mitigation that is set out in the DCO submission is an Applicant's commitment that would need to be carried out to mitigate the adverse effects identified. If this is not the case it would be non-compliant. Irreplaceable heritage assets, which are a finite resource and which form part of our collective heritage, would be permanently removed without record. - All required historic environment site-based investigation should be carried	Supervision of works for compliance against the WSI by a suitably qualitied archaeologist

Discipline	Monitoring Requirement / Commitment	Responsibilities	Construction / Operation Stage	Location in Control Document	Trigger leading to Non-Compliance	Further Action / Remedial Measures
					out in accordance with a WSI for each element. The WSI sets out the scope of work, aims and objectives, methodology and reporting requirements. Each WSI will need to be approved by the Archaeological Advisor to the relevant local planning authority (LPA) prior to undertaking the work. The lack of an approved WSI would be non-compliant. - The Construction programme will need to allow sufficient time to undertake the required historic environment investigations, whether it is preliminary work in advance of the main construction stage, or during construction. The lack of sufficient time to meet the professional standards required by the Chartered Institute for Archaeologists and the LPA Archaeological Advisor would be non-compliant. - All work should be carried out by a suitably qualified historic environment organisation. The organisation and/or staff should be are recognised by the Chartered Institute for Archaeologists, to ensure appropriate professional standards. If this is not the case, it might be seen as non-compliant by the LPA Archaeological Advisor.	
Traffic and Transport	Travel Plan monitoring of construction worker journeys to the Converter Station Area.	Appointed Contractor Travel Plan Coordinator.	Construction	Framework Construction Worker Travel Plan ('FCTMP')	The Travel Plan will set modal share targets for construction workers, which are to be agreed	The likely forms this remedial action are set out in the Construction Worker Travel

Discipline	Monitoring Requirement / Commitment	Responsibilities	Construction / Operation Stage	Location in Control Document	Trigger leading to Non-Compliance	Further Action / Remedial Measures
	To be completed at 6-months, 1 -year and 2-years into site occupation.			(APP-450) / Requirement 21 of dDCO	with Hampshire County Council as the relevant Highway Authority. These targets will need to be agreed between The Applicant and the Highway Authority and will be used as the basis to determine the performance of the Travel Plan. Failure to meet these targets will be the trigger leading to non-compliance.	Plan at Appendix 7 of the Updated Framework Construction Traffic Management Plan (APP-450 Rev002) - includes further promotion of sustainable transport alternatives / extension of shuttle bus service provision to nearby train / bus stations and hotels
Air Quality	**Risk of fugitive emissions of dust and air emissions** - Undertake daily on-site and off-site inspections where receptors are nearby to monitor dust. Should include regular dust soiling checks of surfaces within 100 m of the construction site boundary, with cleaning to be provided if necessary. - Regular site inspections to monitor compliance with the Dust Management Plan; increasing the frequency of site inspections on site when activities have a high potential to produce dust and during prolonged dry or windy conditions. - Agree dust deposition, dust flux or real-time PM10 continuous monitoring locations with the Local Authority. Where practicable, commence baseline monitoring at least three months before work commences on site or, if it a	Appointed contractor and Environmental Advisor/Manager	Construction	OOCEMP Section 7 Table 7.1	All triggers are to be agreed following consultation with the local Environmental Health Officer. Sample triggers according to the Institute of Air Quality Management ('IAQM') Guidance on Monitoring in the Vicinity of Demolition and Construction Sites include: - Dust complaint from a member of the public; - Dust complaint from the local authority Environmental Health Officer; - Dust complaint from a member of the public via the local authority; - Visible dust observed at the locations of nearby receptors and on surfaces within 100m of the construction site boundary during routine inspections; - Visible dust emission from an on-site process that, in the judgement of a trained individual, constitutes an excessive emission;	All site monitoring and recording should be implemented with the full cooperation and in consultation with the local Environmental Health Officer. Detailed monitoring requirements will be in place at each location of the Proposed Development in agreement with the EHO. Where a complaint is issued, this should be fully investigated, including records of activities undertaken on-site at the time the complaint relates to and accompanying meteorological conditions, and a judgement issued to the relevant party and the local authority. All complaints should be recorded in a complaints log, recorded in the site log book, and all records kept and made available on request to the local authority. Where dust is observed during routine inspections of the

Discipline	Monitoring Requirement / Commitment	Responsibilities	Construction / Operation Stage	Location in Control Document	Trigger leading to Non-Compliance	Further Action / Remedial Measures
	large site, before work on a phase commences.				- A recorded 1-hour average PM concentration of 190 µg/m³ where continuous monitoring is undertaken; - A 4-week average of 200 mg/m²/day where deposition monitoring is undertaken; and - An Effective Area Coverage ('EAC') of 5% per day averaged over 1-week where dust flux is monitored. All triggers will require agreement from the local Environmental Health Officer on an site-by-site basis.	surrounding area, and investigation of the activities on site since the last inspection and the prevailing meteorological conditions during that period, and additional on-site measures undertaken or a review of working practises as appropriate, and the investigation and results recorded in the site log book. Where short-term (1-hour) monitoring exceeds 190 µg/m³ of PM, then the dust-causing activities being undertaken should be immediately stopped and on-site conditions and the effectiveness of mitigation reviewed before restarting works, and the results recorded in the site log book. Where excessive dust emission is, in the judgement of a trained individual, observed on-site during a dust-causing process, then the related activity should be immediately stopped and the effectiveness of mitigation, on-site conditions and/or working methods reviewed prior to re-starting the activity. The event should be recorded in the site log book. Where a longer-term monitoring average is exceeded, a review of activities

Discipline	Monitoring Requirement / Commitment	Responsibilities	Construction / Operation Stage	Location in Control Document	Trigger leading to Non-Compliance	Further Action / Remedial Measures
						undertaken, meteorological conditions and the effectiveness of on-site mitigation should be undertaken, with the results recorded in the site log book.
Noise and Vibration	**Control of noise during operational period** A noise monitoring scheme for testing the attenuation and mitigation measures required to achieve the broadband and octave band noise criteria.	Appointed contractor responsible for installation of noise producing equipment at Converter Station Area and Optical Regeneration Station(s).	Operation	Requirement 20 of the dDCO.	Significant exceedance of the noise criteria specified in the broadband and octave band noise criteria document.	Investigation of the exceedance and identification of cause. If required, proportionate rectification of noise attenuation or mitigation measures.
Socio-economics	N/A					
Human Health	N/A					
Waste and Material Resources	N/A					
Climate Resilience	- Reviewing wind speed before commencing work at height. - Ensuring welfare facilities are available and sufficiently cool. Ensure rest breaks are taken, particularly during the hottest part of the day.	Appointed contractor and Environmental Advisor/Manager	Construction	OOCEMP Section 5.14.3	Health risks to construction workers.	Review of contractor management plan including CPP and the Health and Safety file by suitably qualified personnel prior to and during the works in the construction / operational and decommissioning stages. This will ensure documents have been prepared and are suitable for the proposed works to minimise risks to construction workers.
	Regular clearing and maintenance of drainage infrastructure to prevent blockage.	Appointed contractor and Environmental Advisor/Manager	Operation	OOCEMP Section 5.14.3	Blockage of drainage infrastructure.	Investigation of source of blockage and emergency clearance of drains to be undertaken. Review of

Discipline	Monitoring Requirement / Commitment	Responsibilities	Construction / Operation Stage	Location in Control Document	Trigger leading to Non-Compliance	Further Action / Remedial Measures
						maintenance plans to identify cause and to prevent further blockages.

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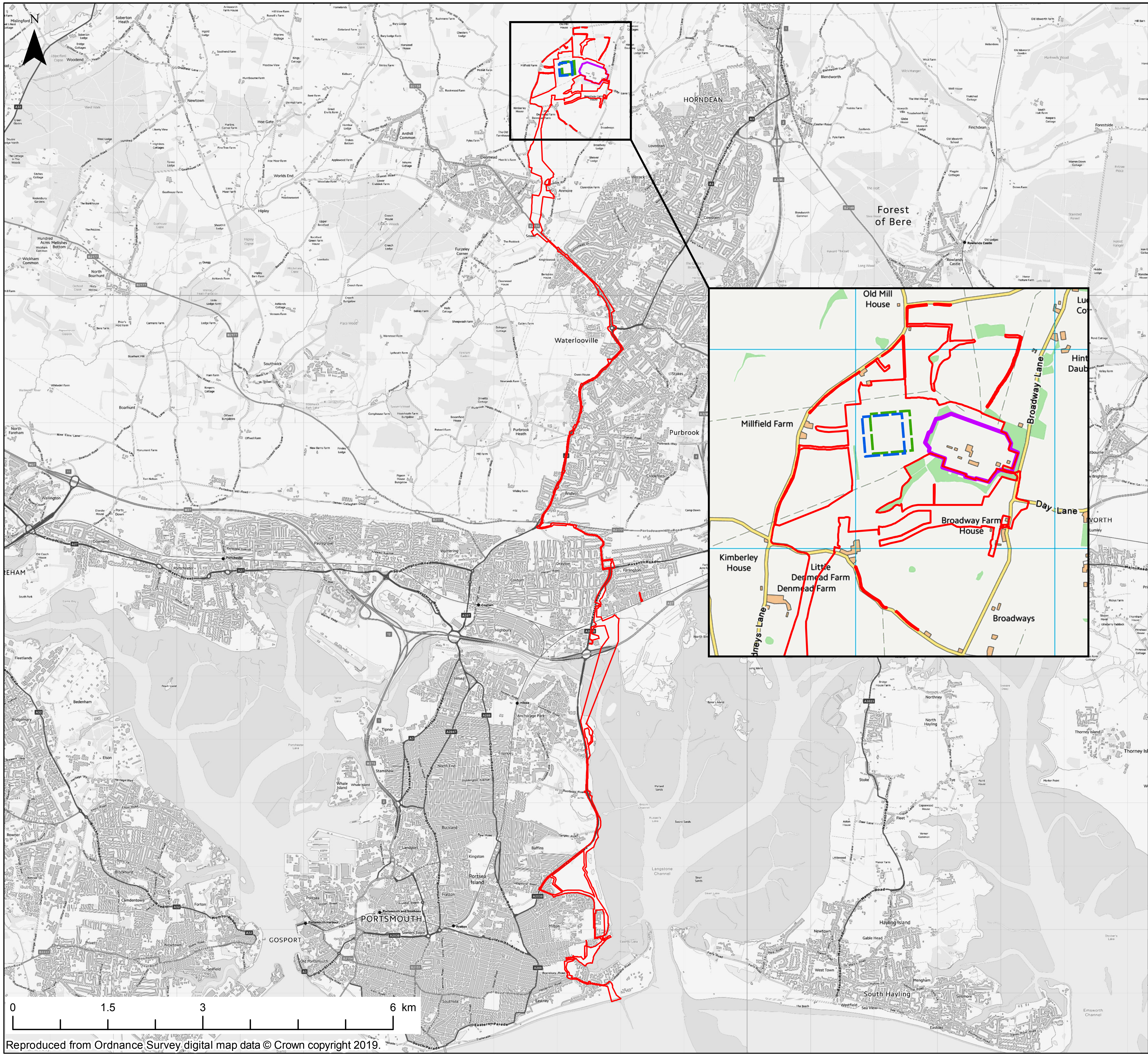
Appendix 1 – Site Drawings and Environmental Constraints



Key

- Order Limits
- Converter Station Perimeter Option B (i)
- Converter Station Perimeter Option B (ii)
- Existing Substation Boundary

The Infrastructure Planning (Applications: Prescribed Forms and Procedures) Regulations 2017 – Regulation 5(2)(a)

REV	DATE	BY	DESCRIPTION	CHK	APP
01	29/10/2019	JT	First Issue	GI	MMcG

DRAWING STATUS:

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PROJECT:

AQUIND Interconnector

TITLE:

Figure 1
Order Limits (Onshore)

SCALE AT A3	CHECKED:		APPROVED:
1:59,806	GI		MMcG
PROJECT NO:	DESIGNED:	DRAWN:	DATE:
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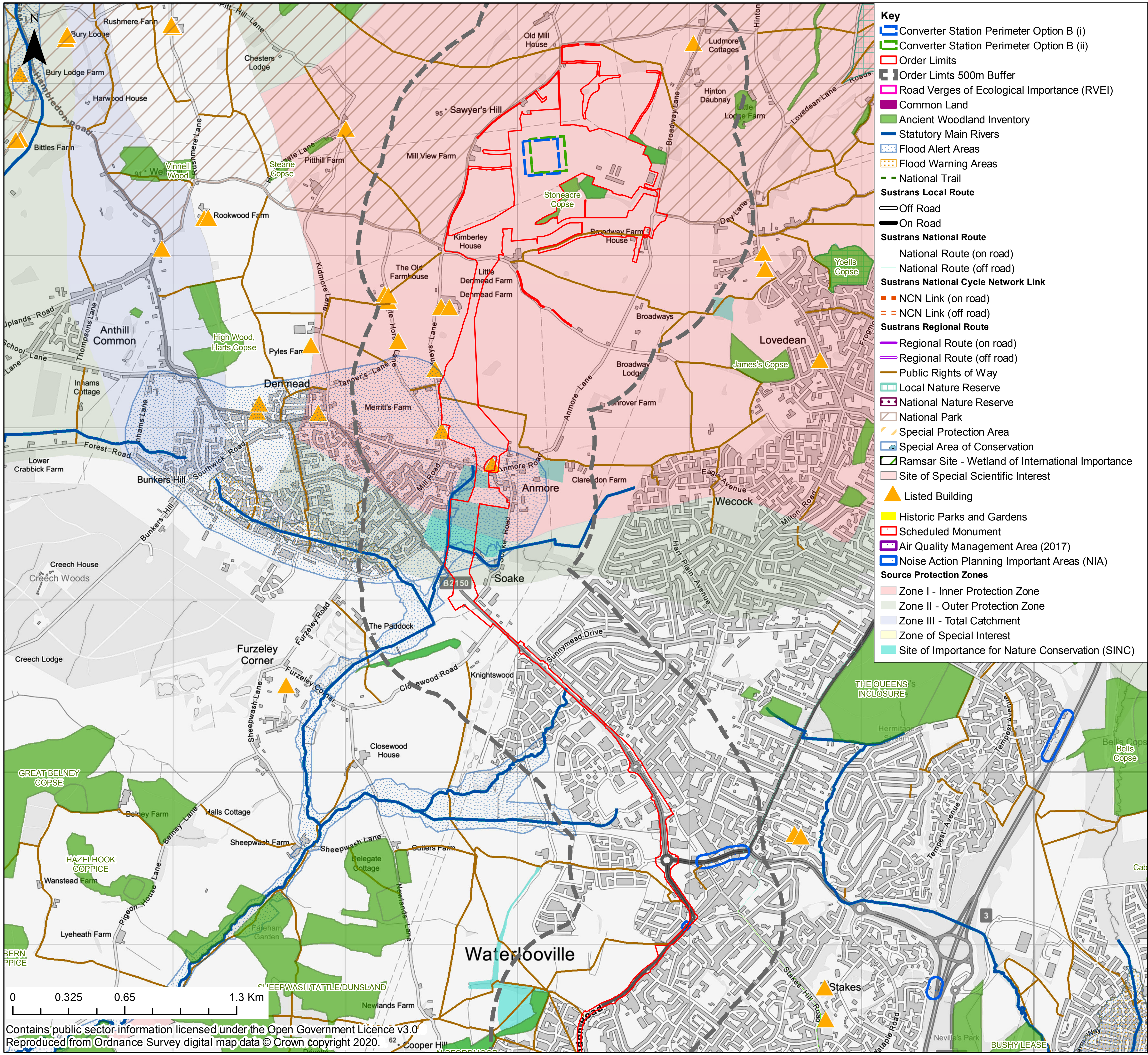

Key

- Converter Station Perimeter Option B (i)
- Converter Station Perimeter Option B (ii)
- Order Limits
- Order Limts 500m Buffer
- Road Verges of Ecological Importance (RVEI)
- Common Land
- Ancient Woodland Inventory
- Statutory Main Rivers
- Flood Alert Areas
- Flood Warning Areas
- National Trail

Sustrans Local Route

- Off Road
- On Road

Sustrans National Route

- National Route (on road)
- National Route (off road)

Sustrans National Cycle Network Link

- NCN Link (on road)
- NCN Link (off road)

Sustrans Regional Route

- Regional Route (on road)
- Regional Route (off road)
- Public Rights of Way
- Local Nature Reserve
- National Nature Reserve
- National Park
- Special Protection Area
- Special Area of Conservation
- Ramsar Site - Wetland of International Importance
- Site of Special Scientific Interest
- Listed Building
- Historic Parks and Gardens
- Scheduled Monument
- Air Quality Management Area (2017)
- Noise Action Planning Important Areas (NIA)

Source Protection Zones

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment
- Zone of Special Interest
- Site of Importance for Nature Conservation (SINC)

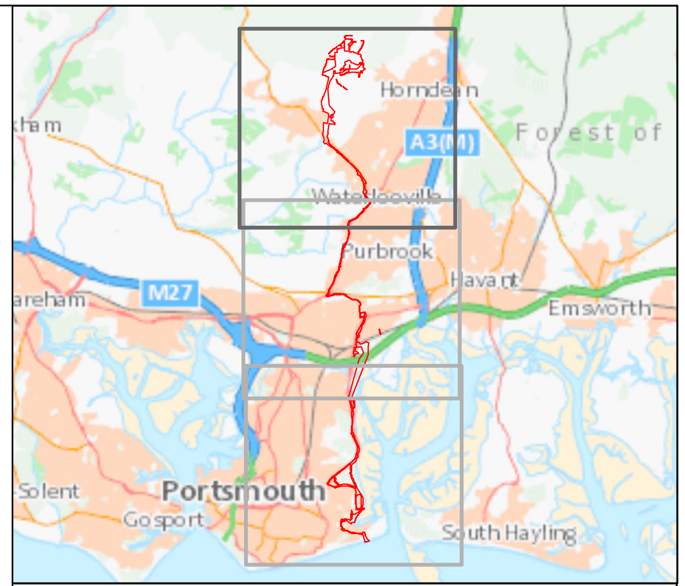

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Figure 2
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Sheet 1 of 3

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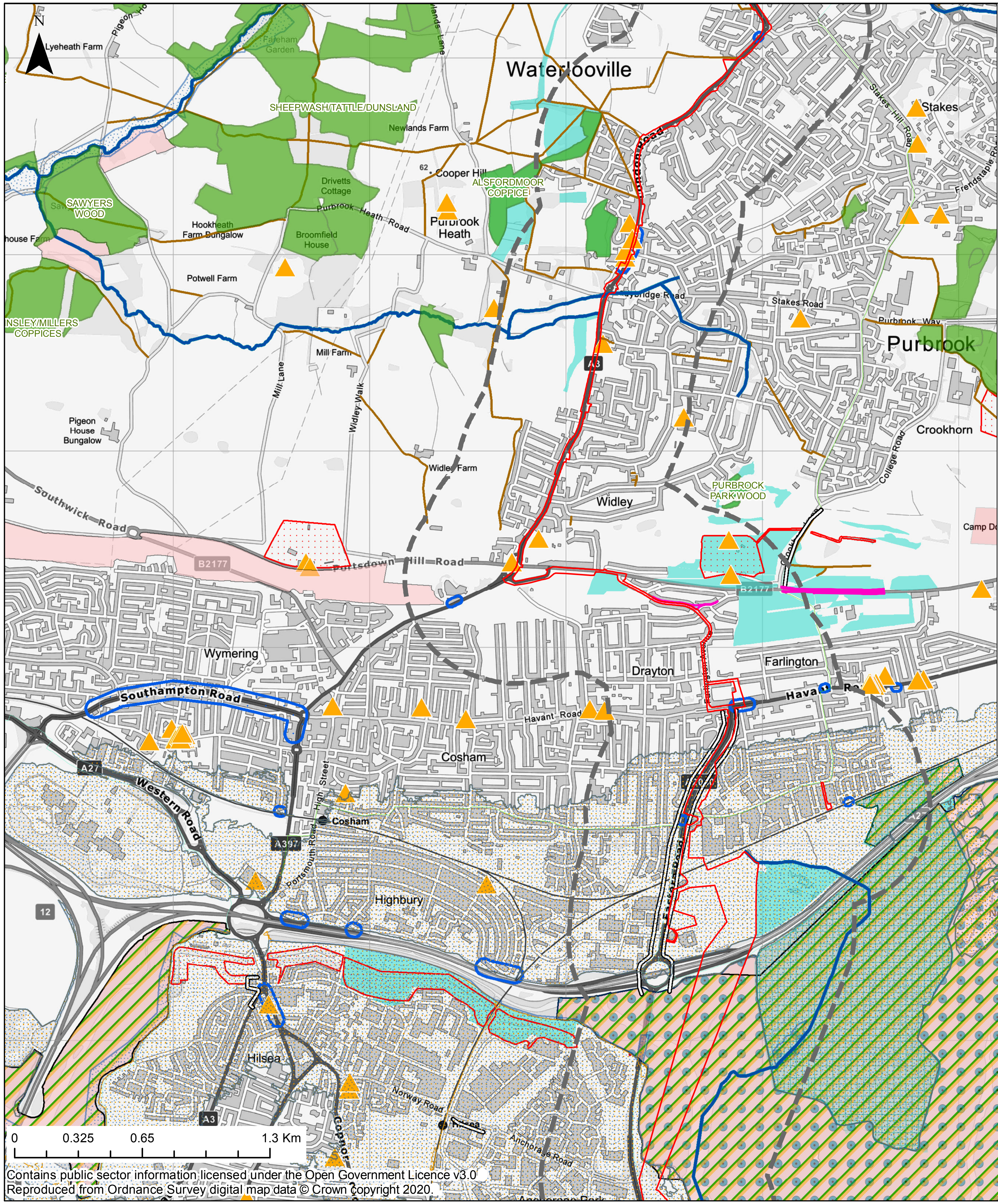


Key

- Converter Station Perimeter Option B (i)
- Converter Station Perimeter Option B (ii)
- Order Limits
- Order Limts 500m Buffer
- Road Verges of Ecological Importance (RVEI)
- Common Land
- Ancient Woodland Inventory
- Statutory Main Rivers
- Flood Alert Areas
- Flood Warning Areas
- National Trail

Sustrans Local Route

- Off Road
- On Road

Sustrans National Route

- National Route (on road)
- National Route (off road)

Sustrans National Cycle Network Link

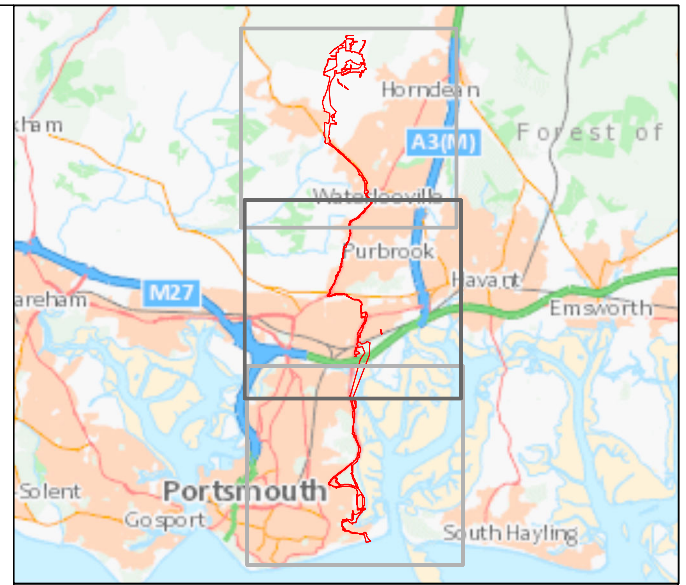
- NCN Link (on road)
- NCN Link (off road)

Sustrans Regional Route

- Regional Route (on road)
- Regional Route (off road)
- Public Rights of Way
- Local Nature Reserve
- National Nature Reserve
- National Park
- Special Protection Area
- Special Area of Conservation
- Ramsar Site - Wetland of International Importance
- Site of Special Scientific Interest
- Listed Building
- Historic Parks and Gardens
- Scheduled Monument
- Air Quality Management Area (2017)
- Noise Action Planning Important Areas (NIA)

Source Protection Zones

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment
- Zone of Special Interest
- Site of Importance for Nature Conservation (SINC)



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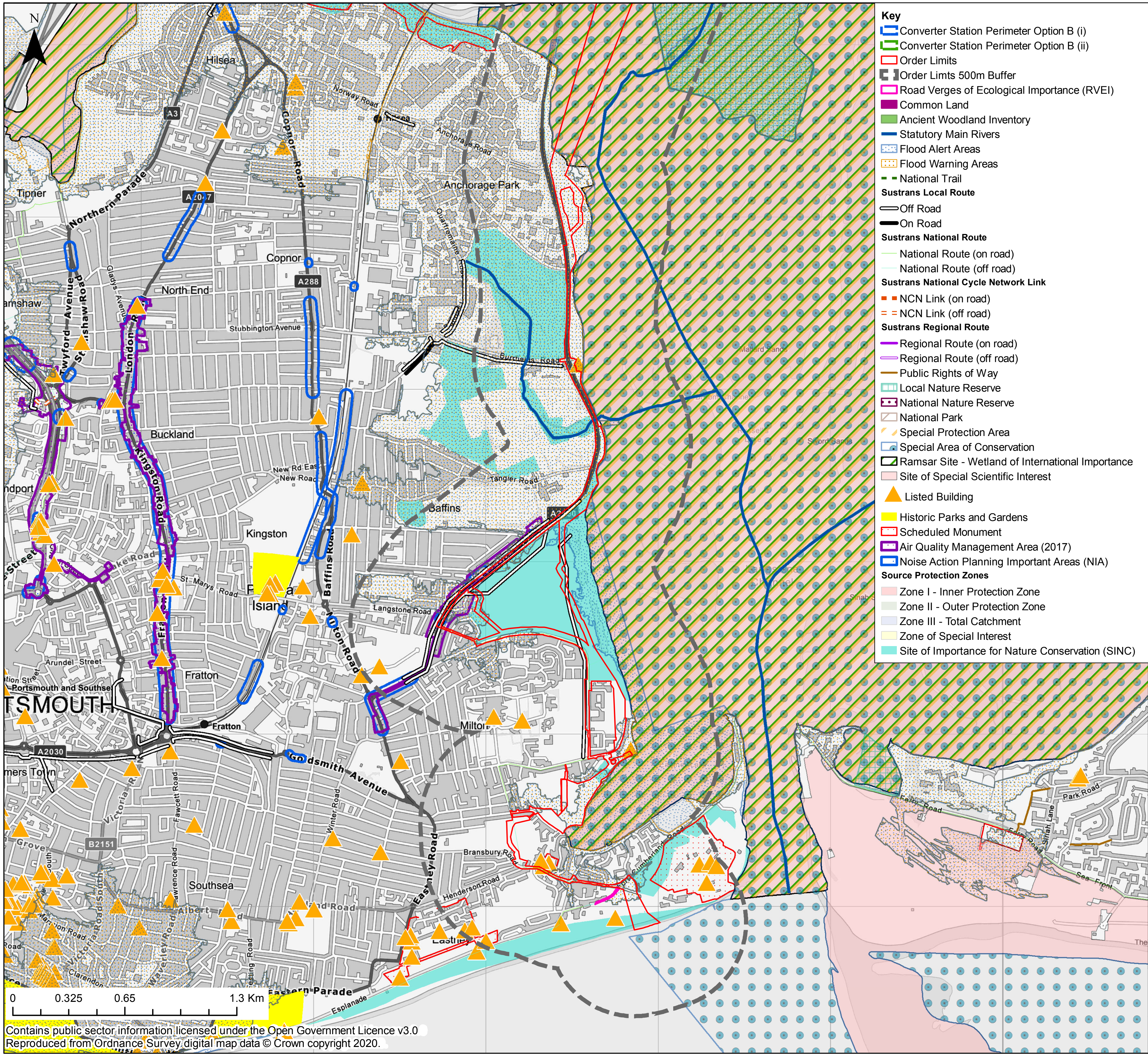

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- Zone of Special Interest
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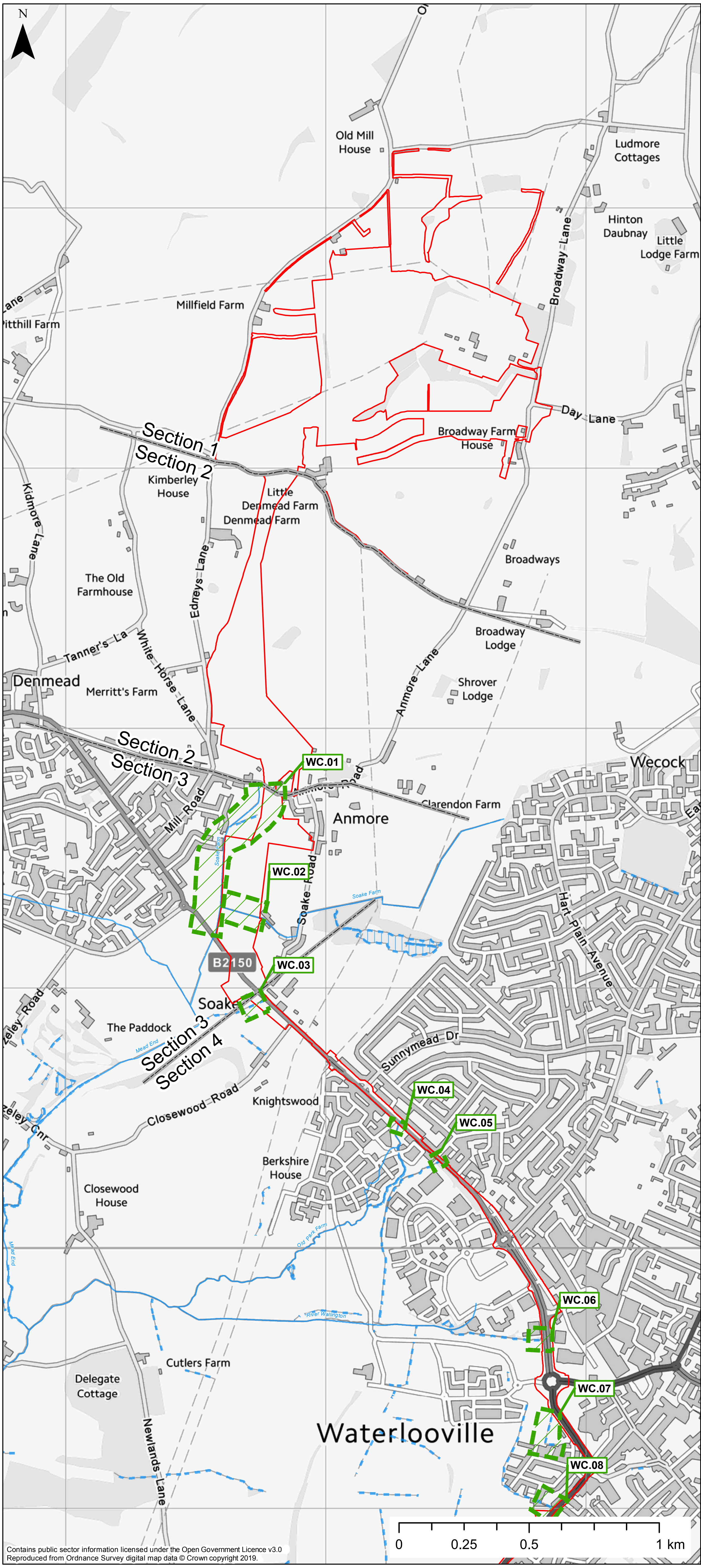
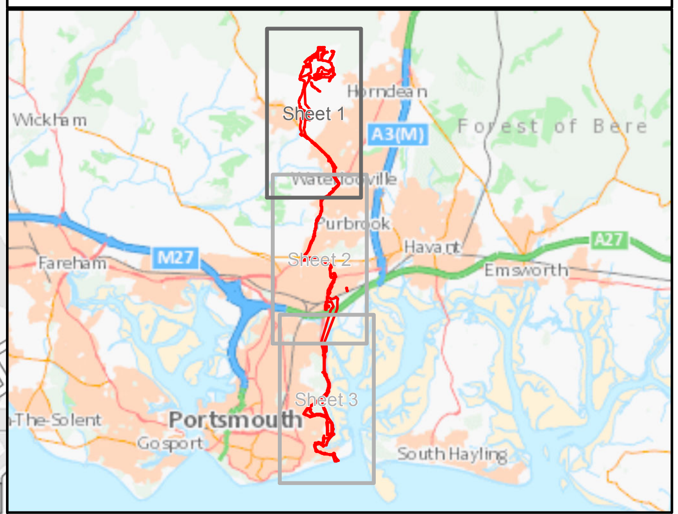


Key

- Order Limits
- Order Limits Section Breaks

STATUS

- Main River
- Ordinary Watercourse
- Water Body
- Watercourses within or directly adjacent to Onshore Order Limits



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TITLE:
Figure 3
Watercourses
Sheet 1 of 3

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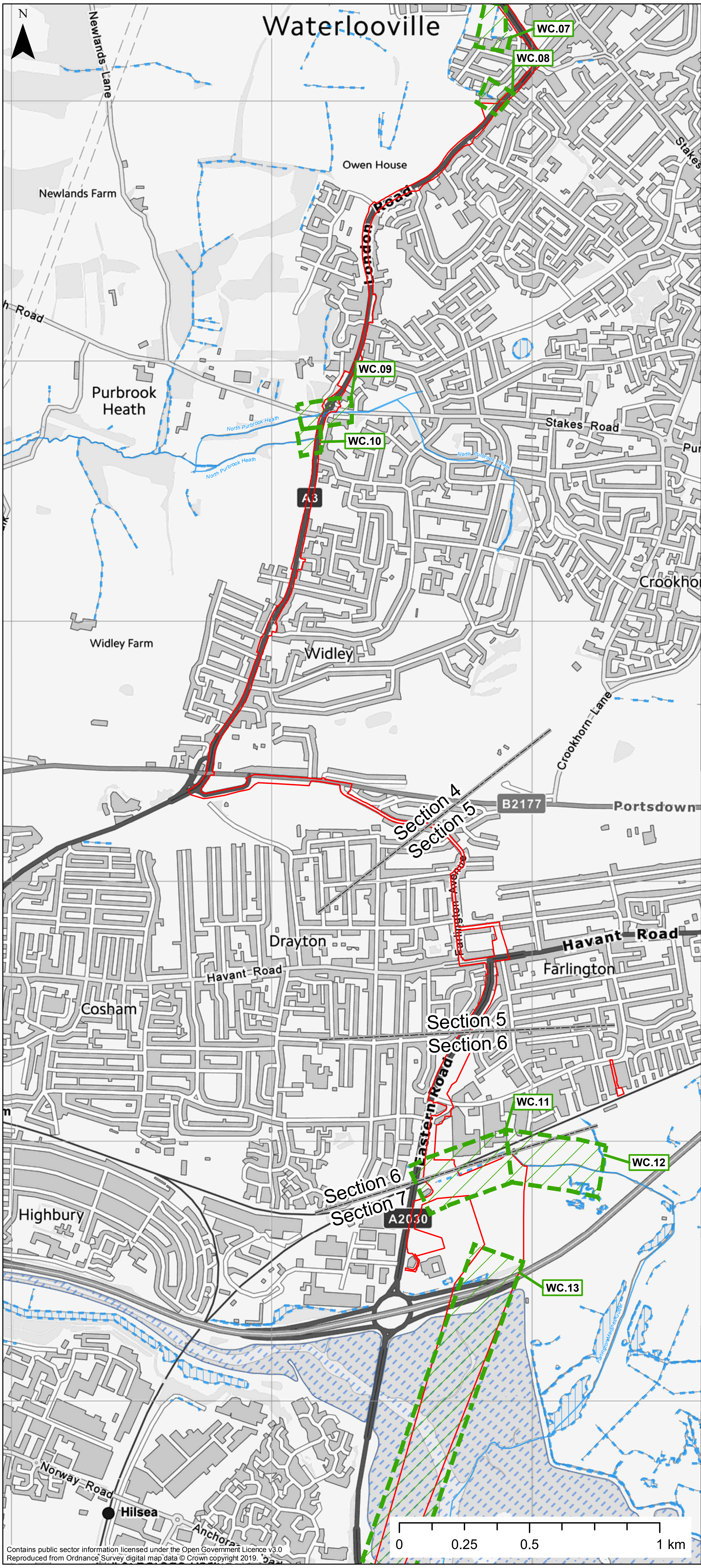
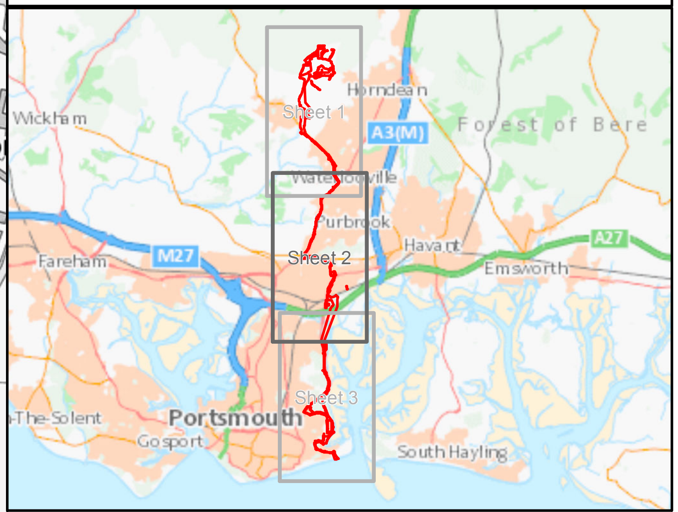


Key

- Order Limits
- Order Limits Section Breaks

STATUS

- Main River
- Ordinary Watercourse
- Water Body
- Langstone Harbour
- Watercourses within or directly adjacent to Onshore Order Limits



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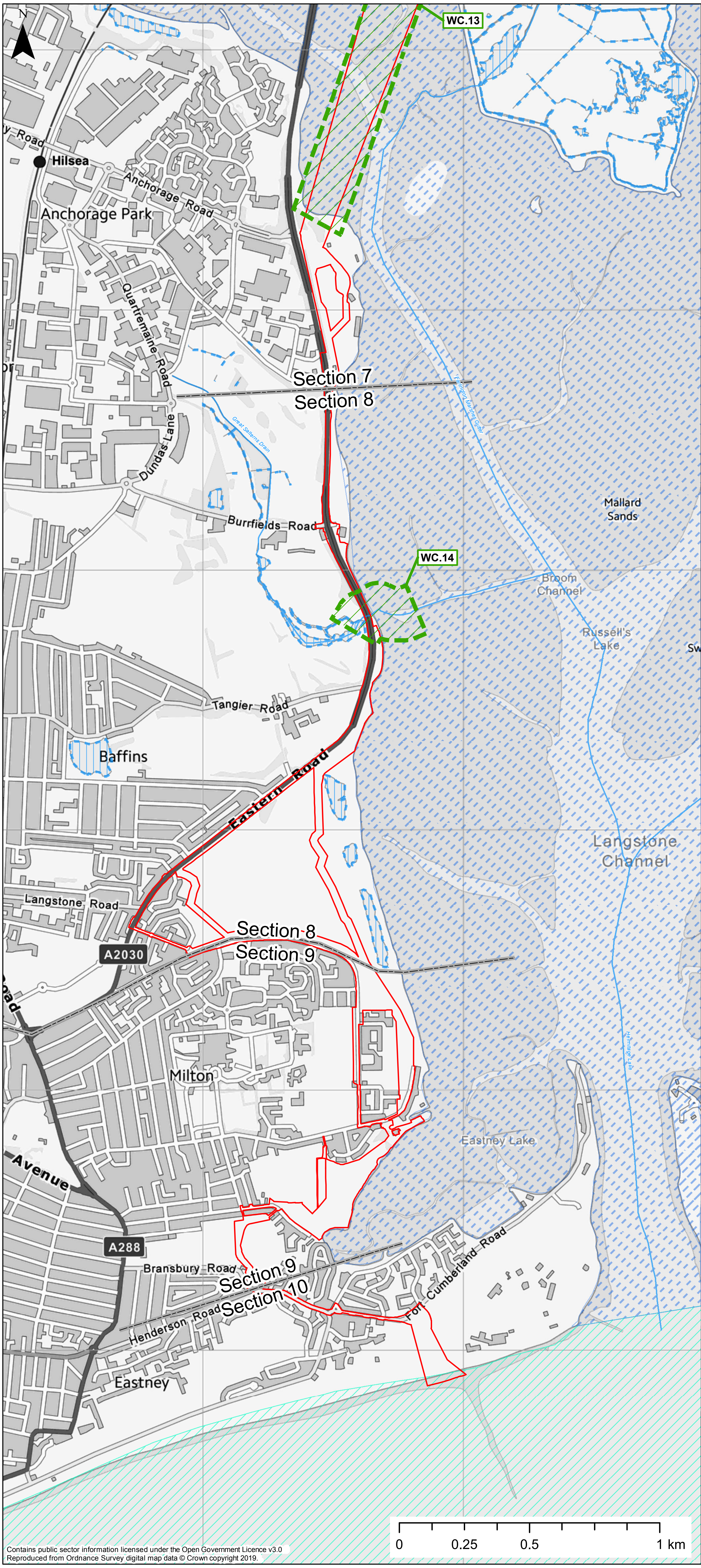
REV.NO. 01



Key

Order Limits

Order Limits Section Breaks

STATUS

Main River

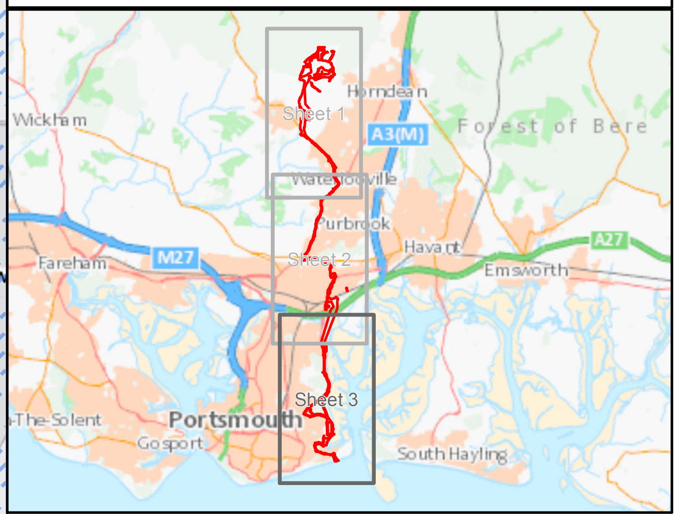
Ordinary Watercourse

Water Body

Langstone Harbour

Solent

Watercourses within or directly adjacent to Onshore Order Limits



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DRAWING NO: EN020022-ES-20.3-Sheet3

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Appendix 2 – Relevant Legislation

Environmental Legislation	Summary of Relevance to the Site
Hazardous substances	
Control of Substances Hazardous to Health (COSHH) Regulations 2002 (and amended 2003, 2004)	The COSHH regulations provide a legal framework for controlling people's exposure to all 'very toxic, toxic, harmful, corrosive or irritant' substances and apply to all places of work. There are various requirements including an assessment of the risk to the health of employees arising from their work and what precautions are needed, introduction of appropriate measures to prevent or control the risk (ensuring that measures of control do not increase the overall risk to health and safety), use of control measures and maintenance of equipment.
Waste	
Control of Waste (Dealing with Seized Property) (England and Wales) Regulations Statutory Instrument ('SI') 2015/426	This legislation provides powers to control fly-tipping and prevents the unlicensed transport of waste materials. All carriers of controlled waste including the producers of building and demolition waste are required to be registered with the EA. Controlled waste is defined as household, industrial, radioactive or commercial waste other than agricultural, mineral/ quarrying or explosive wastes. This registration must be renewed every 3 years.
The Environmental Permitting (England and Wales) Regulations 2010 (amended 2011, 2012, 2013, 2014, 2015 and 2016)	The Regulations consolidate the Pollution Prevention and Control and waste Management Licencing regulations to provide a more streamlined approach to environmental regulations, by allowing for a number of different activities to be regulated under one permit by the EA.
Hazardous Waste (England and Wales) Regulations 2005 (amended 2009)	The Regulations ensure the sound management, storage and safe disposal of hazardous wastes, to prevent environmental pollution and harm to human health. 'Hazardous' waste applies to wastes which contain any substance which: is listed a hazardous waste in the List of Waste Regulations 2005 (see below);

	is exceptionally classified as hazardous by the Secretary of State or any of the National Executives; or is declared hazardous by virtue of any regulations under section 62 of the Environmental Protection Act (EPA) 1990. All hazardous waste movements require pre-notification to the EA prior to any hazardous waste being produced (where possible). Producers are required to know and document the quantity, nature, origin and final destination of the Hazardous Waste and to certify that the waste carrier is registered under the Controlled Waste (Registration of Carriers and Seizure of Vehicles) Regulations 1991. Copies of the completed consignment notes must be retained for at least 3 years by all those in the waste chain.
Hazardous Waste (England and Wales) Regulations 2005 and Hazardous Waste (Miscellaneous Amendments) Regulations SI 2015/1360	These regulations relate to environmental permitting, landfill allowances, hazardous and non-hazardous waste. The definitions of Waste Framework Directive and the WEEE Directive have been updated within amended legislation to refer to the current legislation; Directives 2008/98/EC and 2012/19/EU.
Environmental Protection (Duty of Care) Regulations 1991 (as amended, SI 1991/2839)	A legal duty of care is imposed on anyone – from producers, to carriers and disposers of waste, to ensure that: Waste is not illegally disposed of or dealt with without a licence or in breach of a licence or in any way that causes pollution or harm; Waste is transferred only to an ‘authorised person’, i.e. a local authority, registered carrier or a licensed disposer; and When waste is transferred, it is accompanied by a full written description which forms part of a waste transfer note (or consignment note for hazardous wastes). All persons subject to duty of care are required to ensure that neither they nor any other person commit an offence under the Regulations.
Environmental Protection Act (EPA) 1990: Part 2 –	This Act builds on the system put in place by the Control of Pollution Act with stricter licensing controls and other provisions aimed at ensuring waste handling, disposal

Waste on Land (amended 2010 and 2019)	and recovery operations do not harm the environment. It reorganised Local Authority responsibilities for waste management, introduced a duty of care for producers and handlers of waste and described the offences of unauthorised storage, treatment and disposal of waste.
Environmental Protection Act (EPA) 1990: Part 2a (as amended)	The section of the EPA created by the Environment Act 1995 setting out the legislative framework for identifying and dealing with contaminated land.
Environment Act 1995 (as amended)	Inserted Part '2a' to the EPA 1990 giving powers and responsibilities to Local Authorities regarding contaminated land.
Discharge to Water / Land	
Anti-Pollution Works Regulations 1999 SI 1999 / 1006	Aimed at ensuring that site owners pay for the prevention and remediation of pollution arising from their activities. Notices can be served by the EA directing a site owner to carry out anti-pollution works where any poisonous, noxious or polluting matter is likely to enter, or to be, or to have been present in any controlled waters.
Water Industry Act 1999	The Act prohibits certain discharges to sewers including: Any matter likely to injure the sewer or interfere with the free flow of its contents or to affect the treatment, disposal of its contents; Liquid waste or steam at a temperature higher than 110ºF or any other chemical waste which is dangerous, a nuisance or prejudicial to health; Any petroleum spirit; and Calcium carbide. Trade effluents may be discharged into public sewers only with the consent, or by agreement with, the sewerage undertaker (i.e. local water company). The consent may stipulate conditions relating to: Nature or composition of the effluent; Maximum daily volume allowed; Maximum daily rate of flow; and Sewer into which the effluent is discharged.

Water Resources Act 1991 (amended 2009)	The Act requires water abstractions to be licensed and certain discharges into controlled waters to be subject to EA consent. It is an offence under the Act 'to cause or knowingly permit': Poisonous, noxious or polluting matter, or any solid waste matter, to enter controlled waters Matter, other than trade or sewage effluent, to be discharged from a sewer in contravention of a relevant prohibition; Trade or sewage effluent to be discharged into controlled waters or through a pipe into the sea (beyond the controlled waters) Unauthorised work in a water protection zone; Trade or sewage effluent to be discharged onto land or into a lake or pond in contravention of a relevant prohibition or; Any matter to enter inland waters so as to cause or aggravate pollution by impeding flow. Pollution from individual discharges into water is controlled by a system of discharge consents which set legal limits on the type, concentration and total volume of discharge which can be released. If a pollution incident occurs, a description of the nature and extent of harm must be produced.
Water Act 2003 and 2014	The Water Act replaces parts of the Water Resources Act 1991 and will be fully implemented by 2012. The Water Act introduces a new abstraction licence system which reduces the number of licences and encourages the development of Catchment Abstraction Management Strategies (CAMS).
Groundwater (England and Wales) Regulations 2009	The Regulations transpose the requirements of the Groundwater Directive into UK legislation. The Regulations aim to prevent and limit the pollution of groundwater by certain listed substances or groups of substances. The listed substances are the same as those in the Groundwater Directive. The Regulations aim to prevent entry of List I substances into groundwater and prevent groundwater pollution by List II substances.

	The direct or indirect discharge of List I or II substances must be subject to prior investigation and authorisation. The Regulations also allow notices to be served to control activities which might lead to an indirect discharge of List I substances or groundwater pollution by an indirect discharge of substances in List II.
Control of Pollution (Oil Storage) (England) Regulations 2001	These Regulations require a person having custody or control of oil to carry out certain works and to take certain precautions and other steps for preventing pollution of any waters which are controlled waters for the purposes of Part III of the Water Resources Act 1991. The Regulations impose general requirements in relation to the storage of oil and the types of container used. Where the EA considers that there is a significant risk of pollution of controlled waters from the oil in question it has the power to serve a notice on the person having custody or control to minimise the risk.
Contaminated Land (England) Regulations 2000 (as amended 2006 and 2012)	Local Authorities have a duty to inspect land, to identify contamination and to decide whether any such land should be designated a 'special site'. Public registers of contaminated land and special sites are kept by the local authority and the EA. Following designation of land as contaminated or a special site, the enforcing authority can serve a remediation notice on the appropriate person(s) specifying what needs to be done and the period within which remedial work should be completed. The appropriate person will be the person(s) who caused or permitted the contamination of the land. If this person cannot be identified, then responsibility falls to the current occupier or owner of the land.
Building Regulations 2010 SI 2010 / 2214	The Regulations impose requirements upon people carrying out certain building operations, including new buildings, building extensions and a material change of use of land or a building. Building work must comply with schedule 1 of the Regulations which include minimum standards for various aspects including site preparation, toxic substances, drainage etc.
Emissions to Air / Noise	

Control of Pollution Act (COPA) 1974 (Sections 60, 61) (amended 1989)	Section 60 of COPA gives powers to the Local Authority to control noise and vibration from construction sites. The basis of the COPA legislation is that Best Practical Means should be used to control noise and vibration pollution. Control is by service of an abatement notice (under S60) on the person responsible for the noise requiring specific controls to minimise noise and vibration. The notice may specify types of plant and machinery, hours of work, boundary noise levels, etc. Section 61 provides for the Contractor to apply to the Local Authority for consent before works commence. This protects the contractor from action by the local authority under S60, but not from individual residents' complaints.
Clean Air Act 1993	The Act prohibits, subject to certain conditions, the emission of dark and black smoke from chimneys serving boilers and other industrial plant. Limits also apply to dust, grit, sulphur and car fume emissions. All new furnaces shall be so far as practicable, smokeless. The Local Authority is empowered to undertake an examination of a plant likely to be causing air pollution, taking into account the possible relevance of statutory exemptions.
Noise and Statutory Nuisance Act 1993	This Act amends the Environmental Protection Act (EPA) 1990 to make noise emitted from vehicles, machinery or equipment in the street a statutory nuisance. It gives the Local Authority powers to serve an abatement notice on the person responsible.
Noise Act 1996	Introduces a new procedure for Local Authorities to seize noisy equipment, in relation to statutory nuisance offences under the EPA 1990.
Control of Noise at Work Regulations 2005	Requires that all employers must conduct an assessment of the exposure and therefore of the risk of their employees to noise where they have reason to believe that any of the specified action levels for various noise exposures is or could be exceeded.
Construction Plant and Equipment (Harmonisation of Noise Emission	Provides for examination and certification of construction plant that comply with noise emission standards. The Regulations require that plant is certified by approved bodies. Various types of plant

Standards) Regulations 1985 (as amended 1995)	manufactured after the dates of the regulations are to meet noise emission standards and are certified as such.
Environmental Protection Act (EPA) 1990: Part 3 – Statutory Nuisance (section 80)	When a complaint of statutory nuisance is made to the Local Authority by a person living in its area, the Authority has to take steps to investigate the nuisance. Statutory nuisances include any premises maintained in such a state to be prejudicial to health or a nuisance; any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance. Noise emitted from premises so as to be prejudicial to health or a nuisance.
Vehicles	
Road Vehicles (Construction and Use) Regulations 1986 (as amended 2015)	It is an offence to use a vehicle if it is emitting 'smoke, visible vapour, grit, sparks, cinders or oily substances' in such a way as is likely to cause 'damage to any property or injury to any person'. It is an offence to use a vehicle in such a way as to cause excessive noise.
Road Traffic (Vehicle Emissions) (Fixed Penalty) Regulations 1997 (as amended 2002 and 2003)	These Regulations give powers to Local Authorities to enforce vehicle emission standards at the roadside as part of the implementation of the national air quality strategy. Under the Regulations, Local Authorities may issue fixed penalty notices to users of vehicles that do not comply with emissions standards set in the Road Vehicles (Construction and Use) Regulations 1986 as amended. Appropriately trained Local Authority officers can test emissions from vehicles with the help of a uniformed police officer to stop the vehicle. The Local Authority officer may also issue a fixed penalty notice to drivers who leave their engines running unnecessarily.

Appendix 3 – Outline Site Waste Management Plan

OUTLINE SITE WASTE MANAGEMENT PLAN

INTRODUCTION

1.1.1.1. This Outline Site Waste Management Plan ('SWMP') defines the procedure by which waste will be managed during the lifetime of the Proposed Development, with all relevant information relating to waste going off site via an authorise waste contractor.

1.1.1.2. The Site Waste Management Regulations (2008) were repealed in December 2013 and therefore no legal obligation to provide a SWMP is required. However, these regulations are now commonly used as best practice guidance and provide a useful tool for helping demonstrate the management of waste on a project and to inform the technical assessments at the time of the planning application and in anticipation of the likely planning conditions. The 15 steps of the SWMP are outlined in Section 1.2 and have been written in conjunction with the following documentation:

- Outline Construction Environmental Management Plan ('CEMP');
- Site Waste Management Regulations 2008 (Repealed December 2013*);
- Waste & Resources Action Programme ('WRAP') Construction guidance (www.wrap.org.uk/construction);
- Waste Hierarchy;
- The Waste Regulations 2011;
- The European Waste Catalogue ('EWC'); and
- Other relevant legislation.

1.1.1.3. The aim of this Outline SWMP is to:

- Identify the volume of waste streams likely to be produced during the works to establish the potential for reuse and recycling;
- Identify possible options for waste to be 'designed out';
- Identify opportunities for waste minimisation and management;
- Identify the most significant opportunities to increase re-use and recycling rates;
- Identify suitable waste management contractors and record appropriate licences, permits, waste transfer notes and hazardous waste consignment notes;

- Consider appropriate site practices such as how materials will be segregated and the measures that will be used for raising awareness among site operative for waste reduction, reuse and recycling; and
- Set out the method for measuring and auditing Construction and Excavation waste to enable more effective waste management through the setting of performance targets for segregation, recycling and monitoring sub-contractors.

1.1.1.4. This Outline SWMP shall be developed into a full SWMP once the Appointed Contractor has been appointed. It is the Appointed Contractor's responsibility to produce the full SWMP and develop the required information in the steps outlined below.

1.1.1.5. This Outline SWMP will evolve during the project as and when information becomes available, and as a result of periodic reviews to ensure continual improvement, compliance and the best cost-effective solutions are in place.

1.1.1.6. The key benefits of having a SWMP for the Client and Appointed Contractor(s) include:

- Providing a structured and forward-thinking approach to waste management and sustainability onsite;
- Collate all Duty of Care information, waste data etc. from the whole supply chain;
- Identifying savings through improved design, resource efficiency, ordering, material storage and handling to eliminate waste at source;
- Assisting with compliance of internal Environment Management Systems ('EMS'), objectives and targets, and associated Key Performance Indicators ('KPIs');
- Greater control of regulatory risks relating to virgin materials, waste storage, handling and disposal at site level;
- Saves environmental resources and money;
- Greater transparency with interested parties including BREEAM, Local Planning Authorities ('LPAs'); Portsmouth City Council ('PCC'), Havant Borough Council ('HBC'), Winchester City Council ('WCC'), East Hampshire District Council ('EHDC') and Hampshire County Council ('HCC'), and the Environment Agency ('EA'); and
- Enhance waste storage and segregation practices to facilitate higher recycling and recovery onsite.

1.1.1.7. All waste will be managed by the Appointed Contractor in accordance with the Waste Hierarchy (see Plate 1 below) (European Parliamentary Research Service Blog, 2016). This principle shall be incorporated by the Appointed Contractor whenever practical, into all stages of work during the course of this project.

1.1.1.8. The hierarchy gives top priority to preventing waste in the first instance, but where waste is created, it gives priority to preparing it for re-use, then recycling, then recovery, and last of all disposal (e.g. landfill).

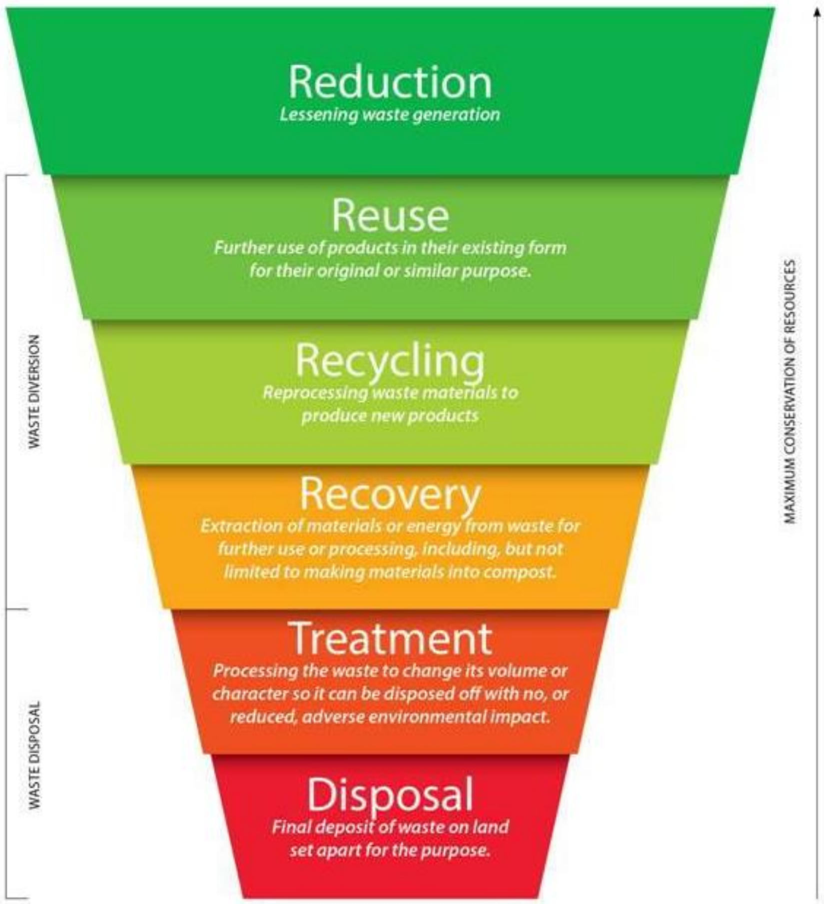


Plate 1 – Waste Hierarchy

1.2. 15 STEPS

1.2.1.1. The following section outlines the 15 steps of the Outline SWMP. These steps provide a framework and should be developed further by the nominated Appointed Contractor once appointed and when further information is available.

1.2.2. STEP 1: ADMINISTRATION AND PLANNING

1.2.2.1. Step 1 identifies basic information about the project and the key individuals involved. This includes both Client and the Appointed Contractor(s).

1.2.3. STEP 2: ACTION LOG

1.2.3.1. The Action Log provides a framework for recording the outcome of project meetings on waste management. An Action Log will help to maintain a record of agreed actions throughout the projects and therefore, will inform waste forecasts.

Table 1 - Action Log

Action Log	Date	Organiser	Attendance Record (name & company)	Notes taken by	List of Actions

1.2.4. STEP 3: KEY PERFORMANCE INDICATORS AND TARGETS

1.2.4.1. Step 3 provides a means to report progress against a series of KPIs. The Appointed Contractor is responsible for establishing a series of KPI's based on UK industry standards outlined in Table 2.

1.2.4.2. Waste Operators will be asked at the tender stage to outline how they will achieve above the UK industry standards and will be required to report monthly on the KPI's in Table 2.

Table 2 – Key Performance Indicators

KPIs
Amount of excavated material produced
Amount of excavated material recycled
Amount of excavated material sent to landfill
Amount of construction waste produced
Amount of construction waste recycled

Amount of construction waste sent to landfill
Total amount of waste produced
Total amount of waste recycled
Total amount of waste sent to landfill
Amount of waste classified as hazardous, including proportion resulting from contaminated soils
Amount of contaminated soil cleaned

1.2.5. STEP 4: DESIGN MEASURES AND COST SAVINGS FROM DESIGN

1.2.5.1. The following step is to enable the recording of all waste reduction opportunities adopted during design. Table 3 below records a series of design decisions and helps quantify the impact of these.

Table 3 – Design Measures

Nature of Project		
Primary Waste Stream	Opportunity for Waste Reduction	Implemented? (If not why?)
Design		
Construction Method		
Materials Employed		

1.2.6. STEP 5: RESPONSIBILITIES FOR WASTE MANAGEMENT

1.2.6.1. Step 5 documents the waste management responsibilities. It is vital for the SWMP to be successfully implemented, that key roles and responsibilities for waste management are clearly defined, documented and communicated.

1.2.6.2. The Client is responsible for the production of the Proposed Development's SWMP via instruction to the Project Manager, with the Appointed Contractor(s) responsible for developing and maintaining the project SWMP and for making available the necessary resources to ensure that the SWMP is fully implemented. A series of key roles have been identified and are as follows:

The Client

1.2.6.3. The Client understands the responsibility to prepare a SWMP for the project, and that it is passed down to the Design Team(s) and Appointed Contractor(s) using the SWMP template and standards. The resulting SWMP will then form part of the contract between the Client and the relevant personnel/organisations involved in the project (see Tables 4 and 5).

1.2.6.4. The project roles are set in Table 4 below.

Table 4 - Project Roles

Responsibility	Actions
Client	Instruct the Design Team to initiate a suitable SWMP/ data to be collated at tender stage.
Client	Instruct the Appointed Contractor for the project.
Client	Review and approve targets suggested by the Appointed Contractor.
Client	Sign off of the project once completed in conjunction with the Appointed Contractor.
The Project Manager	Coordinate the estimation of total volumes of waste expected to be generated by the project with the Appointed Contractor, and relay and review the targets with the Client.
The Project Manager	Identify key SWMP related issues to contractors at Tender stage, including

	information required to complete the site waste matrix.
The Project Manager	Effective relay of the SWMP to the Appointed Contractor to enable successful implementation of the SWMP on site.
The Appointed Contractor / The Project Manager	Estimation of the total volumes of waste expected to be generated by the project with the Project Manager, and the setting of targets relating to reuse, recycling, and disposal of wastes on and off site prior to approval by the Environmental Manager.
The Appointed Contractor	Ensuring suitable resources are made available during the construction phase in relation to working towards the requirements of the SWMP.
The Appointed Contractor	Ensuring the implementation and ongoing monitoring of the SWMP.
The Appointed Contractor	Ensuring, so far as is reasonably practicable, that waste produced during construction is reused, recycled or other form of recovery.
The Appointed Contractor	The production and issue of the site waste matrix and implementation of the Site Waste Policy.
The Appointed Contractor	Signing Waste Transfer Notes and assigning responsibility for this to nominated persons on site in their absence.
The Appointed Contractor	The identification and support of a suitable Waste Champion who will deal with the ongoing monitoring and enforcement of the SWMP at an operational level.

The Appointed Contractor	Ensuring the collation of data relating to waste management and the input of data into the nominated monitoring tool.
The Appointed Contractor	The sign off of the project once completed with the Client.
The Appointed Contractor	So far as is reasonably practicable, ensure coordination of the work and cooperation amongst contractors at work during the construction phase.
The Appointed Contractor	The Appointed Contractor must: Plan, manage, monitor and coordinate the entire construction phase Take account of the health and safety risks to everyone affected by the work (including members of the public), in planning and managing the measures needed to control them Liaise with the client and principal designer for the duration of the project to ensure that all risks are effectively managed Prepare a written construction phase plan PDF before the construction phase begins, implement, and then regularly review and revise it to make sure it remains fit for purpose Have ongoing arrangements in place for managing health and safety throughout the construction phase Consult and engage with workers about their health, safety and welfare Ensure suitable welfare facilities are provided from the start and maintained throughout the construction phase

	Check that anyone they appoint has the skills, knowledge, experience and, where relevant, the organisational capability to carry out their work safely and without risk to health Ensure all workers have site-specific inductions, and any further information and training they need Take steps to prevent unauthorised access to the site Liaise with the principal designer to share any information relevant to the planning, management, monitoring and coordination of the pre-construction phase
The Appointed Contractor	Must make and maintain arrangements that will enable the workers engaged in the construction work to cooperate effectively in promoting and developing measures to ensure that any waste arising on site is managed within the terms of the SWMP and in checking the effectiveness of such measures.
Principal Designer, Client and Appointed Contractor	The Principle Designer is to liaise directly with the Client and Appointed Contractor regarding Health & Safety related issues and the SWMP.
Waste Champion	The effective communication of the SWMP to their operatives and ensures enforcement of the SWMP at an operational level e.g. identifying areas for improvement where segregation is not being followed.
Waste Champion	For the delivery of relevant toolbox talks where necessary.

1.2.6.5. Table 5 below will require completion once the Appointed Contractor is appointed and subcontractors known as the majority of projects are delivered by a range of sub-contractors, each of which will need to manage their waste in line with the project SWMP. The table below provides a framework to be developed by the Appointed Contractor to allocate responsibility to individuals/ organisations for different elements of the work.

Table 5 – Assignment of waste management responsibility by site activity/sub-contractor (once appointed)

Site Activity/ Sub contractor workplace	Primary waste stream	EWC Code	Waste Management responsibility	Relevant Specification/ Contract Clause for Waste Management
Groundworks				
Foundations, Piling				
Structure				
Dryliners				
Building Envelope/Cladding				
Mechanical Electrical				
Trades (Joinery, painting, Plastering, Rendering, Plumbing, Heating etc.)				
Landscaping & habitat creating/ restoration				
Removal of site offices, temporary works & final clear away				
Cable civils and Cabling works (installation and jointing / terminating and HDD)				

1.2.7. STEP 6: COMMUNICATION, TRAINING AND DISTRIBUTION OF THE SWMP

1.2.7.1. Copies of the SWMP will be made available to all principal and sub-contractors at tender stage for reference. The SWMP will also assist in defining terms and conditions through the implementation and monitoring of this plan relating to waste management on site during the project lifetime. In addition to these key project partners, the Construction Design Manager ('CDM') coordinator will have full access to this SWMP in order for comments to be made with regard to any additional Health and Safety requirements envisaged as part of the development of this project.

1.2.7.2. A waste planning meeting will be scheduled for all key project team members (see distribution list) at the tender stage to formulate a waste management strategy to optimise best practice waste management through the lifetime of the project.

Date Waste Planning Meeting set	___/___/___
Date Waste Planning Meeting held	___/___/___

1.2.7.3. A copy of the latest version of the SWMP will be displayed in a prominent location on site including the site office and the signing in area (if applicable).

1.2.7.4. Training and communication of this SWMP will be made by the following means:

- Within the Appointed Contractor's site induction;
- Formal training course on waste management; or
- The delivery of Toolbox Talks by Principal/ Sub Contractor or waste champion.

1.2.7.5. Training and communication will be provided to all personnel working on the project. This will be implemented in order to highlight the importance of the SWMP and individual responsibility in ensuring effective waste minimisation and management on site.

1.2.7.6. The Appointed Contractor is responsible for the distribution of the latest version of the SWMP to all parties on the distribution list. Each will be responsibility for distributing updated versions and removing superseded copies (hard and electronic format) in their particular work field. The Appointed Contractor must ensure that every contractor knows where the SWMP is kept, and must make it available to any contractor carrying out work described in the plan.

1.2.8. STEP 7: FORECASTING WASTE PRODUCTION AND PLANNING REUSE AND RECYCLING

1.2.8.1. Step 7 forecasts the waste streams, sub divided by material type (inert, non-hazardous and hazardous) and project phase (e.g. enabling, construction). Waste forecasting is an essential part of the SWMP. Forecasting waste allows a clear strategy to be established to effectively manage the waste.

1.2.8.2. The Client and Project Team shall investigate all likely waste streams to be generated from this project, approximate volumes of material and assigned relevant targets. Targets will set by the Appointed Contractor (with final approval by the Environmental Manager/Waste Champion) and will go beyond the UK industry standards to maximise reuse and recycling of material both on and offsite, and opportunities for both financial savings and environmental sustainability.

1.2.8.3. Table 6 shall be completed by the Appointed Contractor once appointed including type of each material, the volume of that material, the % target from diversion to landfill and the method of treatment or disposal.

Table 6 - Waste Forecasts

Waste Category	Type of Material	Estimated volume	% Target	Method of treatment/ disposal
Enabling Works and Reinstatement				
Inert				
Non-hazardous				
Hazardous				
–Construction Works				
Inert				
Non-hazardous				
Hazardous				

1.2.8.4. The assessment shall include site generated wastes (e.g. arisings and construction specific waste such as concrete break out/ re-bar) and imported waste materials (e.g. imported secondary aggregates/ soils from other client or third-party construction sites).

1.2.8.5. The project team shall ensure the principles of the Waste Hierarchy will be applied to the SWMP to enable best practice onsite to improve the overall sustainability of the project. It is intended that the SWMP should evolve during the course of the project. Regular monitoring and reviews will be undertaken (see Section 1.7) to ensure continual improvement, legal compliance and that cost-effective solutions are in place.

Recycling & Reuse Initiative

1.2.8.6. As part of the development of the SWMP the Appointed Contractor and Project Team shall review and agreed upon initiatives to reduce the amount of waste produced in the first instance, and assisting in the recycling and reuse of waste as an alternative to offsite disposal as outlined in Table 7.

Table 7 - Recycling & Reuse Initiatives

Material	Legislation/ Notes
Recycling Offsite	
Plastic packaging	
Paper & Cardboard	
Plasterboard via British Gypsum/ Knauf	
Concrete wastes (processed)	
Recycling Onsite	
Concrete waste (processed)	Environmental Permit Regulations 2010. Schedule 3. Chapter 2*. i.e.: -Use waste under exemption U8; -Treat waste to make it suitable for use in construction under exemption T5; -Treat bricks, tiles, concrete by crushing T7.

	* if not in this chapter will require permit.
Reuse Onsite	
Arisings, uncontaminated[1]	Environmental Permit Regulations 2010
Wood	
[1]If the excavated material does not prove to be contaminated in accordance with the WAC testing and Soil Guideline Values (SGVs), then there are a number of reuse and recycling opportunities that exist.	

1.2.9. STEP 8: WASTE STORAGE AND DISPOSAL OPTIONS

1.2.9.1. Suitable waste storage facilities/arrangements must be made onsite to ensure effective segregation of wastes onsite to aid higher rates of recovery (e.g. through recycling or reuse initiatives. See Section 1.4).

1.2.9.2. The placing of waste management contracts will, where possible, consider the implications of long distance travel in terms of health and safety risk, commercial terms and increased emissions from vehicles. Wherever possible, contracts will be awarded as locally as possible.

1.2.9.3. It is essential that the construction work is carried out closely with the waste management contractors, in order to determine the best techniques for managing waste and ensure a high level of recovery of materials for recycling.

1.2.9.4. A specific area shall be laid out and labelled to facilitate the separation of materials for potential recycling, salvage, reuse and return. Recycling and waste bins are to be kept clean and clearly marked in order to avoid contamination of materials. Skips for segregation of waste identified currently are:

- Metal (e.g. copper and iron);
- Inert (e.g. inert plastics, concrete and rubble);
- Hazardous (e.g. asbestos, Poly Chlorinated Bi-phenols);
- Mixed non-hazardous (biodegradable waste); and
- Waste Electrical and Electronic Equipment (‘WEEE’).

1.2.9.5. All waste management contracts are listed within the Waste Carrier and Destination Register in Table 8. This is to be updated regularly with any additional service providers, changes in destination sites or additional waste streams being generated. The responsibility for ensuring the register is completed and kept up to date is with the Appointed Contractor.

1.2.9.6. Both the Client and Appointed Contractor will take reasonable steps to ensure site security measures are in place to prevent illegal disposal of waste at the site.

1.2.10. STEP 9: REGISTER OF LICENCES, PERMITS AND MOVEMENTS

1.2.10.1. This step documents the tracking of waste carriers and waste destinations, which are mandatory to comply with the Environmental Protection Act 1990.

1.2.10.2. The Environmental Permitting (England and Wales) Regulations 2016 require that disposal sites are classified into one of three categories dependent on the chemical composition of the material; these are hazardous, non-hazardous and inert. Prior to disposal, if material is deemed hazardous it must be pre-treated to meet the Waste Acceptance Criteria. Further stipulations within the Environmental Permitting Regulations 2016 are as follows:

- Higher engineering and operating standards to be followed;

- Hazardous liquids, flammable, corrosive, explosive, oxidising and infectious wastes have been banned from landfill since July 2002;
- Non-hazardous liquids have been banned since 2007;
- Co- disposal has been banned since 16 July 2004;
- Whole tyres were banned from 2003, and shredded tyres have been banned since 2006;
- Waste will be required to be pre-treated prior to landfilling; and
- Operators must demonstrate that they and their staff are technically competent to manage the site, and have made adequate financial provision to cover the maintenance and aftercare requirements.

Table 8 – Waste Carrier and Destination Register

Waste		Waste Carrier			Waste Management Facility					
Waste type and EWC code	Person responsible for disposal	Name of waste carrier	Waste carriers licence no. & expiry date	Validated with EA?	Disposal site name & address	Type of facility (e.g. landfill, transfer station or exempt site)	% recycled	Environmental permit no. or permit exemption no. (& expiry date)	Validated with EA?	Waste type and EWC code
Enabling Works and Reinstatement										
Notes:										
Arisings **17-05-04**	J.Bloggs	R. Plant Hire	SSU/458637/CB 12/05/2008	✓	Foxes Quarry. Daventry Road, Bristol, BS2 3BB	Landfill	10%	45731	✓	Site office

Construction Works										
Notes:										

1.2.11. STEP 10: MONITORING & MEASUREMENT

1.2.11.1. Step 10 ensures that the project is being monitored throughout construction.

1.2.11.2. The effectiveness of the SWMP will depend upon the enforcement of its requirements on site and include monitoring to be made by the Waste Champion and Site Manager on site. Responsibility for the formal recording of all waste movements shall be with the Site Manager and is to be recorded on a weekly basis using an approved nominated system (e.g. weekly monitoring sheet). It is the responsibility of the Appointed Contractor to ensure the data is collated and that this is inputted into the nominated monitoring tool, and that all waste transfer notes/ Hazardous waste consignment notes are forwarded to the waste champion weekly.

1.2.11.3. A 'spot check' will be made by the Site Manager in relation to the completeness of the weekly monitoring sheet, any waste transfer note and any hazardous waste consignment note against the Waste Carrier and Destination Register. (see Table 9). This will ensure both the accuracy of data entered in to the monitoring tool.

1.2.11.4. The skips will be monitored to ensure that cross-contamination of segregated skips does not occur. This will be covered in the toolbox talks – reviewing how the onsite waste management system is working and point out the extra costs associated with contamination. The Appointed Contractor will continually review the type of surplus materials being produced and change the site set up to maximise on reuse or recycling and the use of landfill will be the last option.

1.2.11.5. If any problems are identified during the lifetime of the project in relation to exceeding the expected SWMP waste stream volumes, failure to meet stated targets or issues relating to cost effective and legal transfer of waste materials, then they are to be escalated to the Project Manager for further discussion on the best solution. This may trigger a review of the SWMP in relation to adjustment of targets, however, any change would need to be documented and justified.

Table 9 - Deviations

Issue	Details
[waste forecast – exceeded]	
[waste forecast – not met]	

1.2.11.6. The SWMP will be reviewed at least every six months (but monthly is recommended) during the lifetime of the project by the Project Manager and the Appointed Contractor to ensure that estimated targets are being achieved and that realistic solutions are provided for unplanned events or abnormal wastes.

1.2.12. STEP 11: ACTUAL WASTE ARISINGS

1.2.12.1. This step provides a framework for recording the actual waste arisings from the project, allowing a comparison with earlier estimates. Actual waste quantities will be obtained from the monthly reports. These will be spot checked against paper Waste Transfer Notes.

1.2.12.2. The Environmental Permitting Regulations 2016 also require that waste is described by European Waste Catalogue ('EWC') codes on Transfer Notes required under the Duty of Care Regulations. The EWC categorises wastes into 20 main groups and approximately 900 codes. The EWC also identifies Hazardous Wastes, many of which are currently Special Waste and dealt with by the Special Waste Regulations, but some of which are not, such as fluorescent tubes, certain batteries and cathode ray tubes.

1.2.13. STEP 12: PROJECT COMPLETION

1.2.13.1. Upon completion of the project, the Client and Appointed Contractor(s) will review the SWMP and ensure that it is updated to and review the targets originally set.

1.2.14. STEP 13: OVERALL RECYCLED CONTENT

1.2.14.1. Step 13 is not a requirement of the SWMP Regulations 2008, although it demonstrates the project is meeting requirements for recycled content as defined by the KPI's for total amount of waste recycled, amount of excavated material recycled and amount of construction waste recycled.

1.2.15. STEP 14: IMPLEMENTATION

1.2.15.1. Step 14 provides a checklist to ensure that the necessary arrangements have been made to ensure effective SWMP implementation on site as presented in Table 10. This includes additional tasks outlined in the SWMP Regulations 2008 to ensure the effective operation, monitoring and reporting of the SWMP.

1.2.15.2. Prior to implementation of the SWMP, the Site Manager(s) or Appointed Contractor(s) should complete all necessary checks as outlined in the worksheet below. The checklist covers recommended best practice actions.

1.2.15.3. The checklist should be signed off by the Client and Appointed Contractor(s) every time the SWMP is updated.

Table 10 – SWMP Checklist

	Yes	No	Section
Client Checks			
The Client should give reasonable directions to any contractor to enable the Appointed Contractor(s) to complete the SWMP.			Section 1.2.6
Appointed Contractor(s) Checks			
The Appointed Contractor(s) should ensure that so far as reasonably practical coordination of the work and cooperation among contractors at work during the construction phase.			Section 1.2.6
The Appointed Contractor(s) should ensure that so far as reasonably practical every worker carrying out construction work is provided with a suitable site induction.			Section 1.2.6
The Appointed Contractor(s) should ensure that so far as reasonably practical every worker carrying out construction work is provided with any further information and training needed for the particular work to be carried out within the terms of the SWMP.			Section 1.2.6

The Appointed Contractor(s) should make and maintain arrangements which will enable the Appointed Contractor and workers to engage in construction work to cooperate effectively in promoting and developing measures to ensure any waste arising on site is managed within the terms of the SWMP and in checking the effectiveness of such measures.			Section 1.2.6, 1.2.7, 1.2.8
The Appointed Contractor(s) should ensure so far as reasonably practical that waste produced during construction is reused, recycled or recovered.			Section 1.2.8
Have terms and commercial rates been agreed with waste management contractors?			Section 1.2.8, 1.2.9
Have data reporting procedures been agreed with waste management contractors?			Section 1.2.10
For offsite waste management or disposal- Are all the waste destination details verified?			Section 1.2.8
Has a waste segregation/collection area been prepared?			Section 1.2.9
Has the waste management area been adequately sign posted?			Section 1.2.9
Has a waste management planning meeting been set?			Section 1.2.7
Has the waste management document control/ filing system been set up?			Section 1.2.7, 1.2.11

Have all necessary staff and contractors read and signed the SWMP?			Section 1.2.6
Have the waste management targets/ KPIs been set?			Section 1.2.4
Has the SWMP been approved by the Client?			Section 3.6
Client & Appointed Contractor(s) Checks			
Have the Client and Appointed Contractor(s) reviewed, revised and refined the SWMP as necessary, and ensured that any changes in respective roles and responsibilities are clearly communicated to those affected?			Section 1.2.6, 1.2.7
Have the Client and Appointed Contractor(s) taken reasonable steps to ensure sufficient site security measures are in place to prevent the illegal disposal of waste?			Section 1.2.9

1.2.16. STEP 15: DOCUMENT DECLARATION

FINAL SIGN OFF:		
By signing this box, I confirm that I have understood the content and requirements outlined in this document.		
Appointed Contractor(s)	../../….	
Client	../../….	

1.3. SITE WASTE MANAGEMENT GUIDANCE

1.3.1. INTRODUCTION

1.3.1.1. The following section acts to serve as guidance to all persons involved in the waste management of the project proposals.

1.3.2. CLASSIFICATION OF WASTE

1.3.2.1. The overarching requirement of classifying waste is to ensure that it is adequately described such that it can be disposed of at the appropriate disposal facilities. The responsibility for classification of waste resides with the producer of the waste, this could be classed as the Client or the Appointed Contractor, and will depend upon the specific circumstance.

1.3.2.2. Waste Transfer Notes and Hazardous Waste Consignment Notes must contain a written description of the waste and also a specific six figure code from the European Waste Catalogue ('EWC') (implemented in the UK by the List of Wastes (England) Regulations 2005 (SI 2005 No. 895). The EWC is a list of wastes divided into 20 chapters. Chapter 17 is the most relevant section for classifying waste produced on construction sites.

Inert Waste

1.3.2.3. Inert Waste is waste that does not:

- Undergo any significant physical, chemical or biological transformations;
- Dissolve burn or otherwise physically or chemically react;
- Biodegrade or adversely affect other matter with which it comes into contact; and
- its leachability is insignificant.
- Examples include: Glass, concrete, bricks, tiles, and arisings excluding peat and topsoil).

Non- Hazardous Waste

1.3.2.4. Non-hazardous waste is simply defined as waste that is not hazardous waste, which does not feature on the list of hazardous waste in the EWC. Examples include general mixed construction waste.

Hazardous Waste

1.3.2.5. Waste is generally considered to be hazardous if it (or material or substances it contains) could cause harm to humans or the environment (e.g. asbestos, batteries and solvents) (UK Government, n.d.).

1.3.2.6. Should you produce or hold hazardous waste the following steps must be followed:

- Waste must be classified to check if it is hazardous;
- Waste must be separated and stored safely;
- Authorised businesses must be used to collect, recycle and dispose of your waste (check that waste carriers are registered and waste sites have environmental permits);
- Fill in the parts of a Waste Consignment Note ('WCN') that apply to you (keeping one copy and giving two copies to the carrier collecting the waste); and
- Keep a register for 3 years at the premises that produced or stored the waste.

1.3.2.7. Each movement of hazardous waste has to be accompanied by a Hazardous Waste Consignment note (see Plate 3). These must be uniquely referenced but otherwise contain the same information as a standard WTN. To fill this out you will need to know the Standard Industrial Classification (SIC code (2007) which describes the business activity that produced the waste and the Waste Classification Code referred to as LoW (List of Waste) or WC (European Waste Catalogue) code which describes the waste.

1.3.2.8. Guidance on determining whether material is hazardous is provided in Technical Guidance WM2: Hazardous waste – Interpretation of the definition and classification of hazardous waste. It outlines the methodology for assessing wastes, determination of dangerous substances within waste and provides a hazardous waste assessment methodology.

1.4. WASTE ACCEPTANCE CRITERIA

1.4.1.1. Before waste can be accepted by a landfill, the operator must be able to show that it can be accepted in accordance with its Waste Acceptance Criteria ('WAC') (Environment Agency, 2011). Under this regime, it is the waste producer that has the responsibility for basic characterisation which uses a standard suite of leachate testing to ascertain the potential for the wastes to cause water pollution. There are published maximum leachate criteria for the following categories of waste, and are available from the landfill site you intend to use.

- Hazardous waste (numerical limits for leachable substances and organic content, along with standards for physical stability);
- Non-reactive hazardous waste;
- Non-hazardous waste (no numerical limits for non-hazardous waste); and
- Inert waste.

1.4.1.2. Certain materials meet the definition of inert waste without the need for further analysis or need for testing to show they meet the WAC for inert landfill sites. These are outlined in Table 11 as follows:

Table 11 – Inert Wastes not requiring WAC

Description	Exclusions	EWC code
Waste glass		10 11 12
Waste glass based fibrous materials		10 11 03
Glass packaging		15 11 07
Concrete		17 01 01
Bricks		17 01 02
Tiles and ceramics		17 01 03
Glass		17 02 02 20 01 02
Soil and stones		20 02 02

1.4.1.3. All other waste needs to meet the total chemical concentration and leachability levels of the WAC and therefore will need to be tested. It should be noted that individual landfill sites may have additional acceptance criteria to the standard WAC and consequently operators should be consulted before finalising the decision on disposal site.

1.5. DISPOSAL AND MOVEMENT OF WASTE OFFSITE

1.5.1. TRANSFER OF WASTE

1.5.1.1. When removing waste from site, a waste transfer note (or consignment note for hazardous wastes) must be completed prior or at the point of removal from any site as specified in the Waste (England and Wales) Regulations 2011 (See Plate 2). Waste Transfer Notes must be used for all shipments of inert and non-hazardous wastes. These documents are completed in three parts and include details for the following three parties: waste producer; waste carrier; and receiving site. The following details must be included on all Waste Transfer Notes:

- Producer site address;

- Written description of waste and EWC code;
- The quantity of waste and how it is contained (e.g. 8-yard skip);
- Waste carrier details and licence number;
- Receiving site address and licence number; and
- Confirmation that the holder of waste has fulfilled their duties under the waste hierarchy.

1.5.1.2. However, if the waste composition changes (e.g. degree of contamination, or different type of waste), or it is to be sent to a different site, or moved by a different carrier, then a new Waste Transfer Note has to be completed.

1.5.2. PRE-TREATMENT

1.5.2.1. If the material is non-hazardous and it is destined for disposal directly to landfill, pre-treatment must have been applied and a declaration detailing the treatment applied attached to the Waste Transfer Note.

1.5.2.2. All hazardous and non-hazardous wastes will be pre-treated prior to disposal to landfill. The methods of pre-treatment will enable the waste to meet the 'three-point test' as follows:

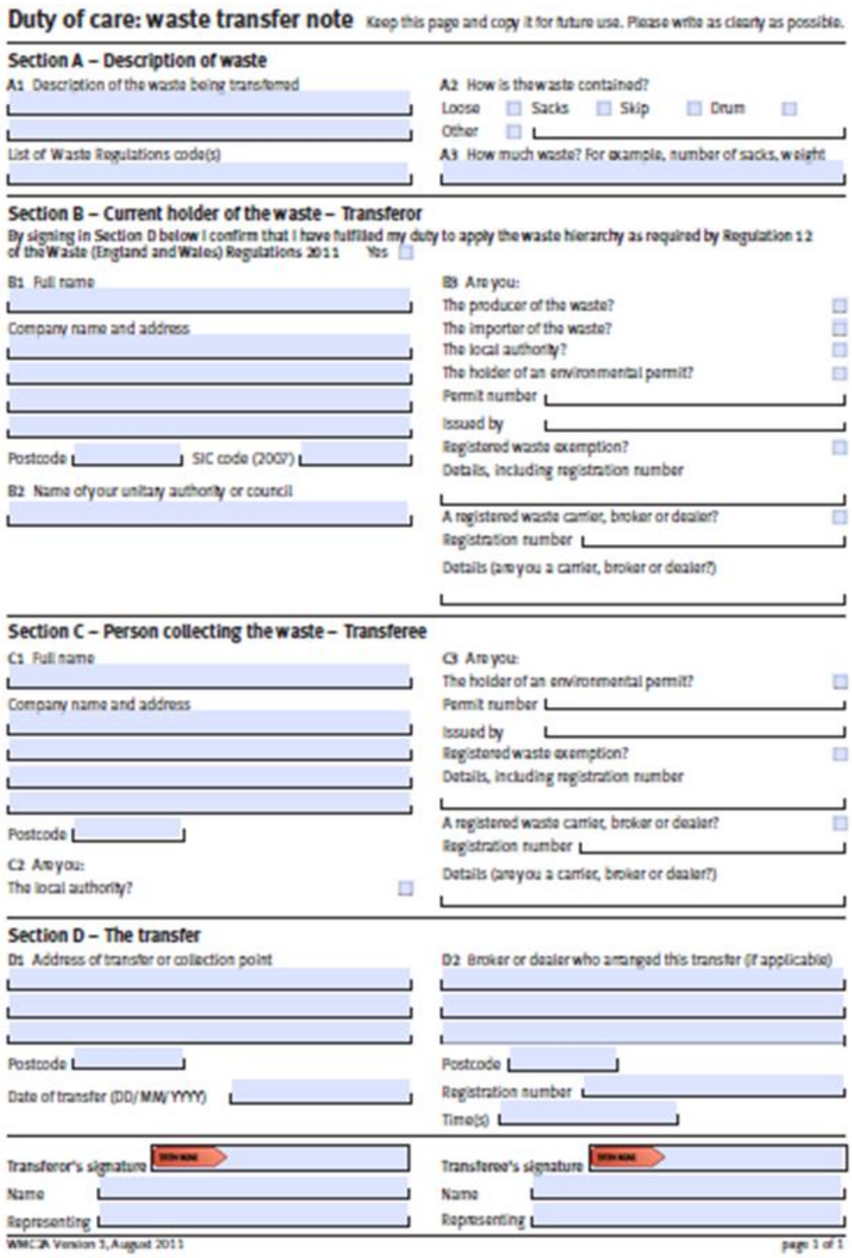
- It must be a physical, thermal, chemical or biological process (including sorting);
- It must change the characteristic of the waste;
- It must do so in order to:

1.5.2.3. Reduce its volume; or

- Reduce its hazardous nature; or
- Facilitate its handling, or
- Enhance its recovery.

1.5.2.4. Source segregation is seen as a pre-treatment option. This can be applied to waste generation on site, including general waste and arisings.

1.5.2.5. A declaration stating the pre-treatment method applied to the waste must be attached to any WTN for non-hazardous waste being disposed of to a landfill, the Appointed Contractor's Site Manager will ensure this accompanies the WTN.


Duty of care: waste transfer note Keep this page and copy it for future use. Please write as clearly as possible.

Section A – Description of waste

A1 Description of the waste being transferred

List of Waste Regulations code(s)

A2 How is the waste contained?

Loose ☐ Sacks ☐ Skip ☐ Drum ☐

Other ☐

A3 How much waste? For example, number of sacks, weight

Section B – Current holder of the waste – Transferor

By signing in Section D below I confirm that I have fulfilled my duty to apply the waste hierarchy as required by Regulation 12 of the Waste (England and Wales) Regulations 2011 Yes ☐

B1 Full name

Company name and address

Postcode SIC code (2007)

B2 Name of your unitary authority or council

B3 Are you:

The producer of the waste? ☐

The importer of the waste? ☐

The local authority? ☐

The holder of an environmental permit? ☐

Permit number

Issued by

Registered waste exemption? ☐

Details, including registration number

A registered waste carrier, broker or dealer? ☐

Registration number

Details (are you a carrier, broker or dealer?)

Section C – Person collecting the waste – Transferee

C1 Full name

Company name and address

Postcode

C2 Are you:

The local authority? ☐

C3 Are you:

The holder of an environmental permit? ☐

Permit number

Issued by

Registered waste exemption? ☐

Details, including registration number

A registered waste carrier, broker or dealer? ☐

Registration number

Details (are you a carrier, broker or dealer?)

Section D – The transfer

D1 Address of transfer or collection point

Postcode

Date of transfer (DD/MM/YYYY)

D2 Broker or dealer who arranged this transfer (if applicable)

Postcode

Registration number

Time(s)

Transferor's signature

Name

Representing

Transferee's signature

Name

Representing

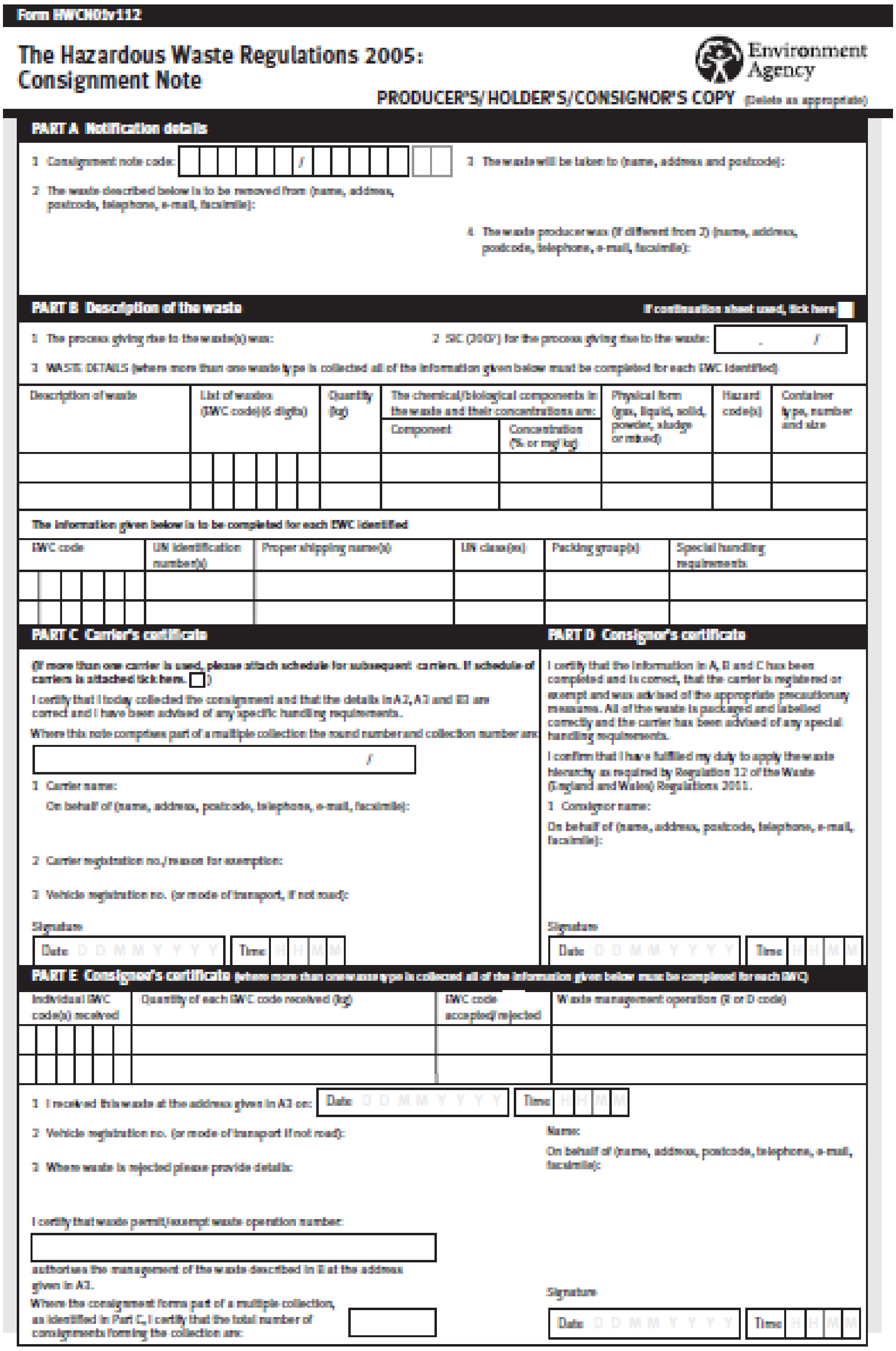
WMC2A Version 1, August 2011 page 1 of 1

Plate 2 – Waste Transfer Note Form

1.5.3. HAZARDOUS WASTE CONSIGNMENT NOTES

1.5.3.1. Hazardous Waste Consignment Notes must contain all the information identified above in section 1.4.11 for standard Waste Transfer Notes, however, they must also contain the following elements:

- Hazardous Waste Producer Premise Code;
- Details of what makes the consignment note hazardous;
- % concentration of contaminant; and
- The relevant hazard code (H1-H14).


Form HWCN01v112

The Hazardous Waste Regulations 2005: Consignment Note

Environment Agency

PRODUCER'S/HOLDER'S/CONSIGNOR'S COPY (Delete as appropriate)

PART A Notification details

1 Consignment note code: /

2 The waste described below is to be removed from (name, address, postcode, telephone, e-mail, facsimile):

3 The waste will be taken to (name, address and postcode):

4 The waste producer was (if different from 2) (name, address, postcode, telephone, e-mail, facsimile):

PART B Description of the waste — If continuation sheet used, tick here

1 The process giving rise to the waste(s) was:

2 SIC (2007) for the process giving rise to the waste: . /

3 WASTE DETAILS (where more than one waste type is collected all of the information given below must be completed for each EWC identified)

Description of waste	List of wastes (EWC code) (6 digits)	Quantity (kg)	The chemical/biological components in the waste and their concentrations are: Component	Concentration (% or mg/kg)	Physical form (gas, liquid, solid, powder, sludge or mixed)	Hazard code(s)	Container type, number and size

The information given below is to be completed for each EWC identified

EWC code	UN identification number(s)	Proper shipping name(s)	UN class(es)	Packing group(s)	Special handling requirements

PART C Carrier's certificate

(If more than one carrier is used, please attach schedule for subsequent carriers. If schedule of carriers is attached tick here.)

I certify that I today collected the consignment and that the details in A2, A3 and B3 are correct and I have been advised of any specific handling requirements.

Where this note comprises part of a multiple collection the round number and collection number are: /

1 Carrier name:

On behalf of (name, address, postcode, telephone, e-mail, facsimile):

2 Carrier registration no./reason for exemption:

3 Vehicle registration no. (or mode of transport, if not road):

Signature

Date D D M M Y Y Y Y Time H H M M

PART D Consignor's certificate

I certify that the information in A, B and C has been completed and is correct, that the carrier is registered or exempt and was advised of the appropriate precautionary measures. All of the waste is packaged and labelled correctly and the carrier has been advised of any special handling requirements.

I confirm that I have fulfilled my duty to apply the waste hierarchy as required by Regulation 12 of the Waste (England and Wales) Regulations 2011.

1 Consignor name:

On behalf of (name, address, postcode, telephone, e-mail, facsimile):

Signature

Date D D M M Y Y Y Y Time H H M M

PART E Consignee's certificate (where more than one waste type is collected all of the information given below must be completed for each EWC)

Individual EWC code(s) received	Quantity of each EWC code received (kg)	EWC code accepted/rejected	Waste management operation (R or D code)

1 I received this waste at the address given in A3 on: Date D D M M Y Y Y Y Time H H M M

2 Vehicle registration no. (or mode of transport if not road):

3 Where waste is rejected please provide details:

I certify that waste permit/exempt waste operation number:

authorises the management of the waste described in B at the address given in A3.

Where the consignment forms part of a multiple collection, as identified in Part C, I certify that the total number of consignments forming the collection are:

Name:

On behalf of (name, address, postcode, telephone, e-mail, facsimile):

Signature

Date D D M M Y Y Y Y Time H H M M

Plate 3 - Hazardous Waste Consignment

1.6. ENVIRONMENTAL PERMIT EXEMPTIONS

1.6.1.1. Environmental permit exemptions (detailed in Schedule 3 of the Environmental Permitting (England and Wales) Regulations 2016 have been developed to provide a lighter regulatory touch in order to promote the recovery of waste, as opposed to waste being disposed of directly to landfill. These exemptions take up to 25 working days to be approved, and each registration lasts 3 years. The relevant forms need to be completely by the Appointed Contractor to the Environment Agency.

1.7. LANDFILL TAX

1.7.1.1. The tax is charged by weight. There are 2 rates. You pay the lower rate on ‘inactive waste’ - for example rocks or soil. The lower rate is £2.90 per tonne (April 2019) and you pay the standard rate of £91.35 per tonne (April 2019) for ‘active’ waste. This rate is set to increase from the 1st April 2020 to £3.00 for inactive waste and to £94.15 for active waste.

Appendix 4 – Outline Materials Management Plan

Materials Management Plan (MMP) Form - October 2014

This form should be completed once the lines of evidence have been marshalled in relation to suitability for use, certainty of use and quantity required.

The answers to the questions posed within this form, together with the supporting information will constitute the MMP and must be provided to the Qualified Person.

A Qualified Person may comment on draft versions of this MMP, but will not complete the Declaration until all the relevant documents, demonstrating lines of evidence have been provided for each site.

The person / organisation who will pay the Declaration fee should confirm that they have read and understand the Terms and Conditions relating to the payment of the Declaration fee to CL:AIRE. These can be found on the CL:AIRE website.

The person / organisation agreeing to pay the Declaration Fee - Name, organisation and contact details inc. email address -	

☐ **I confirm I have read and understood the Terms & Conditions.**

Each question must be answered. If the question is not applicable please state this and provide a brief explanation.

1. Specify the scenario to which this MMP relates, as described in the Definition of Waste: Development Industry Code of Practice (DoW CoP) (1, 2, 3 or 4):

☐ 1. Reuse on the Site of Origin

☐ 2. Direct Transfer of clean naturally occurring soil / mineral materials

☐ 3. Cluster Project

☐ 4. Combination of any of the above

In the case of a combination of reuse scenarios, please describe it below (e.g. (i) Reuse on Site of Origin and Direct Transfer of clean naturally occurring unpolluted soils, (ii) Reuse on the Site of Origin with Direct Transfer of clean naturally occurring soil to x number of development sites etc:

(NB: A Declaration is required for reuse on the Site of Origin and for any 2 site arrangement i.e. there is no facility for a combination Declaration)

2. Organisation and name of person preparing this MMP	(Full address and contact details)

Document Control

Date issued	
Revision date	
Summary of revision 1	
Summary of revision 2	

Insert additional lines to the table above for any subsequent revisions.

Note - revisions to the MMP do not trigger an additional Declaration by a Qualified Person, unless an additional site is added to the project.

Revisions to the MMP must be recorded and summarised in the Document Control box above.

Site Details

3. Site / Project name(s)	
Reuse / receiving site name :	
Donor site name (if Direct Transfer)	

Landowners

4a. Name of Landowner(s) (full address and contact details) – where excavated materials are to be reused	
4b. Name of Landowner(s) (full address and contact details) – where excavated materials are arising from	

Summary and objectives

5a. Provide a brief description of the planned project and how excavated materials are to be reused.	

General Plans and Schematics

6. **Attach** a location plan for the site(s) and a plan of the site(s) which identifies where different materials are to be excavated from, stockpile locations (if applicable), where materials are to be treated (if applicable) and where materials are to be reused.	Plan Document Reference(s):

7. **Attach** a schematic of proposed materials movement. Where there is only one source area and one placement area briefly describe it. For all other projects a schematic is required.	Description & Schematic Document Reference:

Parties Involved and Consultation – if more than one party please provide additional details for them and identify the location that they will be working e.g. where a site is zoned

8a. Main earthworks contractor(s) (full address and contact details) – Where excavated materials are to be reused	
8b. Main earthworks contractor(s) (full address and contact details) - Where excavated materials are arising from	

9. Treatment contractor(s) (full address and contact details) – for treatment on site of origin, or at a Hub site within a fixed STF / Cluster Project	

10. Where wastes and materials are to be transported between sites, provide details of the transport contractor(s) (full address, contact details and waste carriers registration details (if applicable))	

11. Provide Local Authority contact details (full address and named contacts) where excavated materials are to be reused	

12a. For the site where materials are to be reused and for Hub Site locations provide Environment Agency contact details (full address and named contacts):	
For all Cluster Projects: 12b. Attach any relevant documentation	EA references:

from the EA relating to the excavation and reuse of the materials to demonstrate no objection to the proposals (see 3.37 of DoW CoP) If the EA has not been consulted please explain why (see paragraph 3.39 of the DoW CoP).	

Lines of Evidence

There is no one single factor that can be used to decide that a substance or object is waste, or when it is, at what point it ceases to be waste; as complete a picture as possible has to be created.

The following sections require completion to ensure the correct decision is made.

If a requested item is not relevant it is important to clearly state why this is so (e.g. no planning permission required because permitted development status exists).

Suitable for use criteria

13. Please describe or provide copies of the required specification(s) for the materials to be reused on each site.	Document Reference(s):

Where contamination is suspected or known to be present 14a. Please provide copies of or relevant extracts from the risk assessment(s) that has been used to determine the specification for use on the site. **This must relate to the place where materials are to be used.** This must be in terms of (i) human health (ii) controlled waters and (iii) any other relevant receptors. If a risk assessment is not relevant for a particular receptor given the site setting please explain why below:	Document Reference(s):
14b. Please attach any relevant documentation from the LA relating to the excavation and reuse of the materials to demonstrate no objection (see 3.37 of the CoP)	LA Document references:
14c. Please attach any relevant	EA Document references:

documentation from the EA relating to the excavation and reuse of the materials to demonstrate no objection (see 3.37 and Table 2 of the CoP)	
14d. Please attach any relevant documentation from any other regulators (if relevant) relating to the excavation and reuse of the materials to demonstrate no objection (see 3.37 of the CoP)	Document Reference(s):

Where contamination is not suspected 15a. Please attach copies or relevant extracts from the Desk Top Study that demonstrates that there is no suspicion of contamination.	Document Reference(s)
15b. Please attach copies of or relevant extracts from the site investigation/testing reports that adequately characterise the clean materials to be used (if appropriate).	Document Reference(s)
15c. Please attach copies of any other relevant information (if available) confirming that land contamination is not an issue.	Document Reference(s)

NB: It is your responsibility to assess the nature of the material to be used and that it fits within the limitations of the scenario under which it is to be used

Certainty of use

Various lines of evidence are required to demonstrate that the materials are certain to be used. This includes:

- The production of this MMP
- An appropriate planning permission (or conditions that link with the reuse of the said materials)
- An agreed Remediation Strategy(ies)
- An agreed Design Statement(s)
- Details of the contractual arrangements

Please identify in the following sections what lines of evidence relate to the site(s) **where the materials are to be used**.

16a. Planning Permission(s) relating to the site where materials are to be reused Please provide a copy of the relevant planning permission	Document Reference:
16b. Explain how the reuse of the excavated materials fits within the planning	

permission(s) for each site.	
16c. If planning permission is not required for any one site please explain why below e.g. permitted development, clean up of a chemical spill, surrender of an Environmental Permit, re-contouring within the existing permission.	

Where contamination is suspected or is known to be present 17. Please provide a copy of any Remediation Strategy(ies) that have been agreed with relevant regulators.	Document Reference(s):

Where contamination is not suspected 18. Please provide a copy of any Design Statement(s) that have been agreed (e.g. with the planning authority or in the case of permitted developments the client).	Document Reference(s):

Quantity of Use

19. Please provide a breakdown of the excavated materials for each site and how much will be placed at each site or sub area of each site. Where this is not specific to a single readily identifiable source refer to an annotated plan, schematic or attach a tabulated summary.	Document Reference(s):

20a. How has consolidation/compaction being considered in the above mass balance calculations?	
20b. How has loss due to treatment being considered in the above mass balance calculations (if applicable)?	
20c. How has the addition of treatment materials being considered in the above mass balance calculations (if applicable)? Note - An exact figure is not required but	

one that is reasonable in the circumstances and can be justified if challenged.	

Contingency arrangements

Explain what is to happen in the following situations and **identify the appropriate clauses** in the contract(s) (Such clauses must be provided to the Qualified Person, preferably as a summary document): or

21a. What is to happen to, and who is to pay for out of specification materials?	Reference:
21b. What is to happen to, and who is to pay for any excess materials?	Reference:
21c. What happens if the project programme slips in relation to excavated materials or materials under -going treatment?	Reference:
21d. Other identified risk scenarios for the project (relating to excavated materials)?	Reference:

The Tracking System

Where contamination is suspected or known to be present, state the procedures put in place to:

22a. For all sites please describe the tracking system to be employed to monitor materials movements.	
Where contamination is suspected or known to be present, state the procedures put in place to: 22b. Prevent contaminants not suitable for the treatment process being accepted	
Where contamination is suspected or known to be present, state the procedures put in place to: 22c. Prevent cross contamination of materials not in need of treatment, wastes awaiting treatment and treated materials	
Where contamination is suspected or known to be present, state the procedures put in place to: 22d. Demonstrate that materials that do not require treatment and successfully treated materials reach their specific destination	
Where contamination is suspected or known to be present, state the procedures put in place to:	

22e. Ensure that waste for off-site disposal or treatment is properly characterised and goes to the correct facility	

23. Please attach a copy of the tracking forms / control sheets that are to be used to monitor materials movements. To include transfer of loads on site into stockpiles prior to treatment (if applicable), stockpiled after treatment (if applicable), stockpiled awaiting use (as appropriate) and final placement.	Document reference(s)

For Hub Sites within Cluster Projects & where materials need treatment before reuse 24. Please attach a copy of the Environmental Permit covering the treatment process. Alternatively if the treatment is covered by a	Permit reference / EA letter reference:

Mobile Plant Permit and associated Deployment Form, attach a copy of the EA agreement to the Deployment Form.	

Records

25. Where, and in what form, are records to be kept? Note – records e.g. transfer notes, delivery tickets, Desk Top Study, Site Investigation, Risk Assessment(s), Verification Report(s) need to be kept for at least 2 years after the completion of the works and production of the Verification Report	

Verification Plan

26. Provide or explain the Verification Plan which sets out how you will record the placement of materials and prove that excavated materials have been reused in the correct location and in the correct	Document Reference

quantities within the development works (see 3.4 of the DoW CoP).	

Appendix 5 – Outline Soil Resources Plan

OUTLINE SOIL RESOURCES PLAN

1.1. INTRODUCTION

1.1.1.1. This Outline Soil Resources Plan ('Outline SRP') has been prepared on behalf of AQUIND Limited ('The Applicant') to support the application for a Development Consent Order ('DCO'). The application for the DCO is made in respect of the UK elements of AQUIND Interconnector Project which will operate between France and the UK.

1.1.1.2. The DCO Application for the UK elements covers the parts of the Project located onshore in the UK ('Onshore Components') and in the UK Marine area, defined as all of that part of the Project from the Mean High Water Spring Tide ('MHWS') in the UK out to the limit of the UK/France EEZ ('Marine Components'). Together the Onshore Components and the Marine Components comprise the 'Proposed Development', in respect of which the DCO Application is made.

1.1.1.3. This document sets out the Outline SRP that will be developed by the main works contractor and applied to all soil resources that are disturbed either permanently or temporarily for the Proposed Development.

1.1.1.4. A Scoping Opinion was received by the Applicant from the Planning Inspectorate (on behalf of the Secretary of State for Business, Energy and Industrial Strategy) on 7 December 2018. The Inspectorate commented that the Scoping Report refers to the intention to implement a Soil Resources Plan and that this plan should be appropriately secured. The Inspectorate recommended that an Outline Plan be provided with the DCO Application.

1.1.1.5. The purpose of a Soil Resource Plan is to:

- accurately record the existing soil resources within each Onshore Cable Route Section that are to be used temporarily in the construction of the Proposed Development. This will then be used to provide a specification for its restoration following the construction period; and
- identify the volume of each type of soil that will be available for re-use in the detailed design of the Proposed Development from land parcels that are affected by the permanent works and that will not be returned to agricultural use.

1.1.1.6. This Outline SRP sets out the requirements of the detailed SRP that will be developed by the Principal Contractor.

1.2. SOIL RESOURCE PLAN

1.2.1. CONTENT

A detailed SRP shall be produced and submitted to the relevant Local Planning Authority prior to the commencement of each phase of the Proposed Development in which the soil resource will be disturbed for either temporary or permanent works.

1.2.1.1. Within each Onshore Cable Route Section, the SRP shall identify:

- the texture of each soil horizon present;
- the depth of each soil horizon;
- the colour of each soil horizon by reference to the Munsell Soil Color Charts (Munsell Color, 2009);
- the stone content of each soil horizon;
- the pH, organic matter and major nutrients of the topsoil horizon;
- the pH, organic matter and major nutrients of the subsoil horizon (upper and lower, as present); and
- the Agricultural Land Classification ('ALC') grade.

1.2.1.2. Soil texture describes how the mineral element of soil comprises a mixture of mineral particles of different sizes, and a different texture class can be ascribed according to the proportions of sand, silt and clay. According to the BSI specifications for topsoil (British Standards Institution, 2015) and subsoil (British Standards Institution, 2013), the size ranges of these particles are:

- clay (<0.002mm);
- silt (0.002mm to 0.06mm);
- sand (0.06mm to 2.00mm) comprising:
  - fine sand (0.06mm to 0.2mm);
  - medium sand (0.2mm to 0.6mm); and
  - coarse sand (0.6mm to 2.0mm).

1.2.1.3. Physical soils data is available for the majority of the land within the Order Limits that will be disturbed. The Principal Contractor shall be responsible for identifying that the available data is adequate in scope and nature to meet the above requirements of a SRP. The Principal Contractor shall be responsible for collecting the data on organic matter content and major nutrients, and remedying any deficiencies identified in the spatial scope of the data on soil physical characteristics.

1.2.1.4. Where required, the data on the physical attributes (texture, depth and stone content) shall be collected at an observation density of one observation per hectare ('ha'). The data on organic matter content and major nutrients shall be collected at a density of one sample per 3ha or, if the land parcel is smaller than 3ha, one sample per land parcel.

1.2.1.5. The physical and nutrient data will be recorded on a GIS proforma (format to be agreed) to enable the Principal Contractor to identify the areas and volumes of different soil types within each land parcel.

1.2.2. SOIL HANDLING

1.2.2.1. As part of the SRP, the main works contractors shall prepare a Soil Handling Strategy for each phase of the Proposed Development where there is the potential for the significant disturbance of soil resource. There will be negligible disturbance of soils in Onshore Cable Route Sections 5, 8 and 10: a handling strategy is not required for these Sections.

1.2.2.2. Soils that are disturbed temporarily during the construction of the Proposed Development are associated with:

- site compounds and working areas;
- temporary haul roads;
- temporary roads; and
- topsoil and subsoil stockpiles.

1.2.2.3. All method statements will need to comply with the mitigation commitments made in Chapter 17 of the ES, namely:

- to ensure that topsoil and subsoil resources are kept separate and placed either side of the exposed cable route trenches;
- the void above within the cable ducts (within cement-bound sand) will be backfilled with the excavated soil; and
- full use will be made of the topsoil resource in the reinstatement of soils above the cable ducts: the surplus material will be subsoil.

1.2.2.4. For land parcels affected by temporary works, the Soil Handling Strategy shall set out detailed Method Statements for protecting the agricultural assets of the soil resource in each Onshore Cable Route Section during the construction period. This will be determined on a case-by-case basis and will depend on:

- the resilience of the existing topsoil and subsoil resources to the loads to be imposed by construction activities, which will depend on the depth, texture and structure of each soil horizon;

- the ability to restore land to its current condition following the removal of construction platforms and works.

1.2.2.5. For land parcels affected by temporary works, the detailed Method Statements shall identify (as relevant):

- the anticipated loads on the soils from construction activities;
- the methods to be used to return agricultural land to good agricultural condition following the removal of the construction platform;
- the area in each land parcel in which the topsoil and subsoil will be stripped and placed in store during the construction period;
- the working methods and plant to be used to strip topsoils and subsoils and place them in temporary stockpiles;
- the methods to be used to construct temporary soil stockpiles;
- the locations of temporary soil stockpiles;
- the methods to be used to maintain temporary stockpiles according to the length of time the soil is in storage; and
- the methods to be used to replace soils from the temporary stockpiles within each land parcel.

1.2.2.6. In all cases the Principal Contractor shall have regard to and comply with good practice guidance on stripping, handling and restoring soils.

1.2.2.7. Good practice guidance for stripping and handling topsoil and subsoil is contained in:

- BS 3882:2015, Annex A, A.1;
- BS 8601:2013, Clause 6, 6.1;
- Defra Construction Code of Practice for the Sustainable Use of Soils (Department of Environment, Food and Rural Affairs, 2009), sections 5.2 and 5.3; and
- MAFF Good Practice Guide for Handling Soils (MAFF, 2000), Sheet 1.

1.2.2.8. Good practice guidance on building topsoil and subsoil stockpiles, and maintaining soils in storage is contained in:

- BS 3882:2015, Annex A, A.2;
- BS 8601:2013, Clause 6, 6.2;
- Defra Construction Code of Practice for the Sustainable Use of Soils, section 5.4; and
- MAFF Good Practice Guide, Sheets 2 and 14.

1.2.2.9. Good practice guidance on excavating soils from stockpiles is contained in the MAFF Good Practice Guide, Sheet 3.

1.2.2.10. Good practice guidance on replacing topsoil and subsoil, including guidance on decompaction, is contained in:

- BS 3882:2015, Annex A, A.3 and A.4;
- BS 8601: 2013, Clause 6, 6.3, 6.4 and 6.5;
- Defra Construction Code of Practice for the Sustainable Use of Soils, section 6.1; and
- MAFF Good Practice Guide, Sheets 4, 15, 18 and 19.

1.2.2.11. The SRP will include provisions for topsoils and subsoils that are permanently displaced for the construction of the Proposed Development to be re-used within the Order Limits in reprofiling the landform and screening. Proposals will be set out for the most appropriate re-use of any surplus topsoil or subsoil. The topsoils and subsoils within the area of permanent works, in Section 1, are of moderate to poor quality and there is no requirement to import any topsoils or subsoils to the Proposed Development.

1.2.2.12. For land parcels affected by permanent works, the detailed Method Statements shall also identify:

- the working methods and plant to be used to strip topsoils and subsoils following the good practice guidance set out in paragraph 1.2.2.7;
- the volumes of soils that will be placed in temporary stockpiles or directly re-used within or outside the Order Limits;
- the locations of temporary stockpiles;
- the specification for each land use or design element within the Order Limits requiring topsoil and subsoil resources, in terms of soil texture, depth, organic matter content and nutrient status; and
- the working methods and plant to be used to place topsoils within the detailed design of the Proposed Development, following the good practice guidance set out in paragraph 1.2.2.10.

1.2.2.13. Where land is to be used temporarily and returned to the landowner, as will be required along the Onshore Cable Route in areas in which the cable will be laid in an excavated trench and subsequently backfilled, there shall be liaison with the relevant landowners on working methods and restoration. Site inspections shall be undertaken to monitor working practices and compliance of the contractors with their obligations to landowners and occupiers. Should remedial actions become necessary following soil reinstatement, these shall be undertaken as agreed prior to handover back to the landowner

REFERENCES

British Standards Institution. (2013). *BS 8601:2013 Specification for subsoil and requirements for use.*

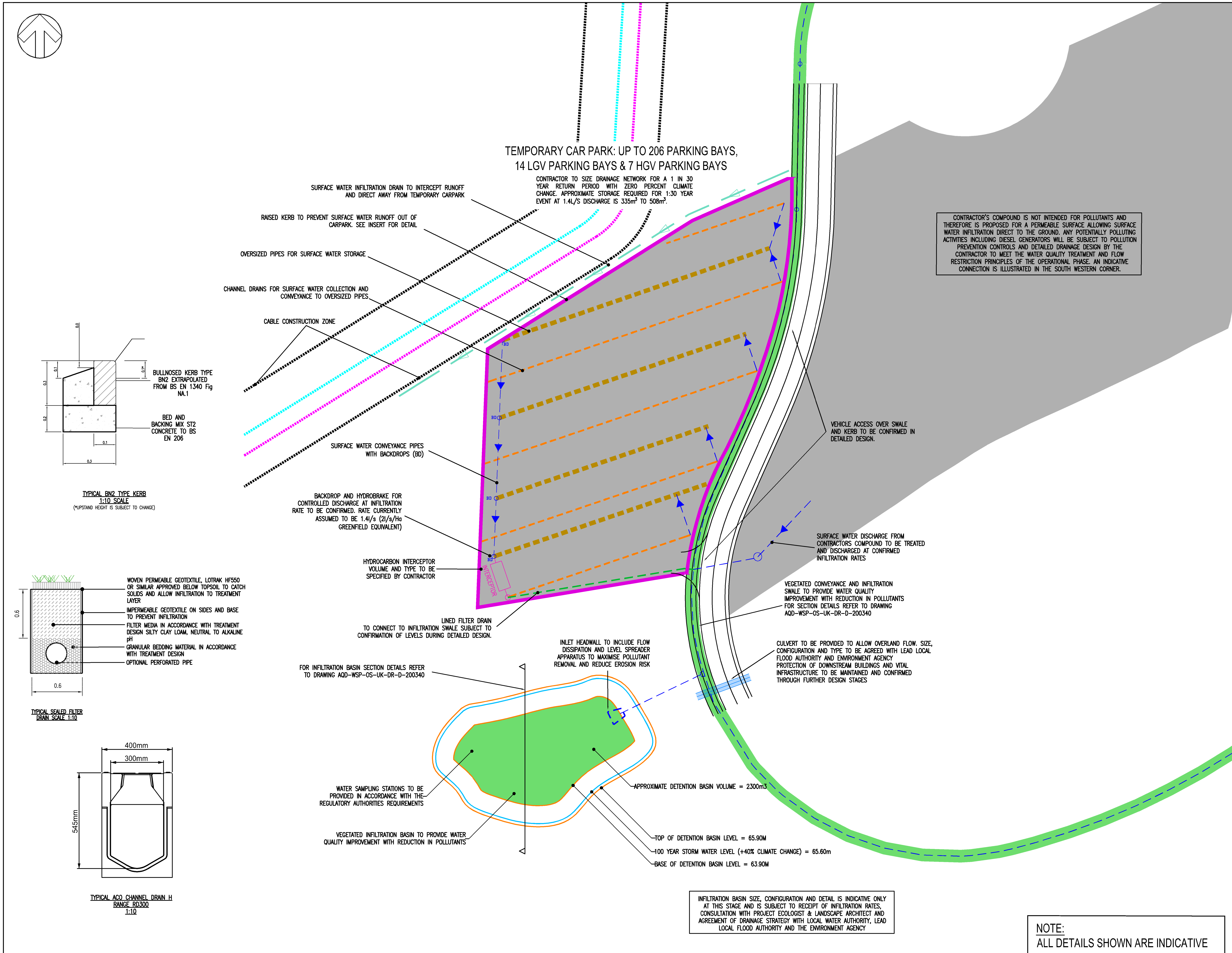
British Standards Institution. (2015). *BS 3882:2015 Specification for Topsoil.*

Department of Environment, Food and Rural Affairs. (2009). *Construction Code of Practice for the Sustainable Use of Soils on Construction Sites.*

MAFF. (2000). *Good practice guide for handling soils.* Retrieved from https://webarchive.nationalarchives.gov.uk/20090306103114/http:/www.defra.gov.uk/farm/environment/land-use/soilguid/index.htm.

Munsell Color. (2009). *Munsell Soil Color Chartss.*

Appendix 6 – Indicative Temporary Car Park and Compound Drainage Layout



CONTRACTOR'S COMPOUND IS NOT INTENDED FOR POLLUTANTS AND THEREFORE IS PROPOSED FOR A PERMEABLE SURFACE ALLOWING SURFACE WATER INFILTRATION DIRECT TO THE GROUND. ANY POTENTIALLY POLLUTING ACTIVITIES INCLUDING DIESEL GENERATORS WILL BE SUBJECT TO POLLUTION PREVENTION CONTROLS AND DETAILED DRAINAGE DESIGN BY THE CONTRACTOR TO MEET THE WATER QUALITY TREATMENT AND FLOW RESTRICTION PRINCIPLES OF THE OPERATIONAL PHASE. AN INDICATIVE CONNECTION IS ILLUSTRATED IN THE SOUTH WESTERN CORNER.

INFILTRATION BASIN SIZE, CONFIGURATION AND DETAIL IS INDICATIVE ONLY AT THIS STAGE AND IS SUBJECT TO RECEIPT OF INFILTRATION RATES, CONSULTATION WITH PROJECT ECOLOGIST & LANDSCAPE ARCHITECT AND AGREEMENT OF DRAINAGE STRATEGY WITH LOCAL WATER AUTHORITY, LEAD LOCAL FLOOD AUTHORITY AND THE ENVIRONMENT AGENCY

NOTE:
ALL DETAILS SHOWN ARE INDICATIVE AND SUBJECT TO FINAL DESIGN BY THE CONTRACTOR

REV	DATE	BY	DESCRIPTION	CHK	APP
P02	23/09/2020	JM	ADDITION OF ACO CHANNEL DRAIN CONSTRUCTION DETAIL AND REVISED LAYOUT	KR	MO
P01	04/08/2020	KR	FIRST ISSUE	NM / HM	MM

DRAWING STATUS: FOR INFORMATION

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wsp.com

CLIENT: AQUIND

PROJECT: AQUIND Interconnector

TITLE: INDICATIVE TEMPORARY CARPARK AND COMPOUND DRAINAGE LAYOUT

SCALE AT A1: 1:500	CHECKED: NM / HM	APPROVED: MM
PROJECT No: 62100616	DESIGNED: KR	DRAWN: KR	DATE: 04/08/2020

DRAWING No: AQ-ITT-UK-LAY-101 | REV: P01

Appendix 7 – Surface Water Drainage and Aquifer Contamination Mitigation Strategy

AQUIND Limited

AQUIND INTERCONNECTOR

Onshore Outline Construction Environmental Management Plan – Appendix 7 – Surface Water Drainage and Aquifer Contamination Mitigation Strategy

The Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 – Regulation 5(2)(a)

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

Document Ref: 6.9 (APP-360)

PINS Ref.: EN020022

AQUIND Limited

AQUIND INTERCONNECTOR

Onshore Outline Construction Environmental Management Plan – Appendix 7 – Surface Water Drainage and Aquifer Contamination Mitigation Strategy

PINS REF.: EN020022

DOCUMENT: 6.9 (APP-360)

DATE: 6 OCTOBER 2020

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DOCUMENT

Document	**Onshore Outline Construction Environmental Management Plan – Appendix 7 – Surface Water Drainage and Aquifer Contamination Mitigation Strategy**
Revision	002
Document Owner	WSP UK Limited
Prepared By	H. Mojtabavi, K. Rose, J. Kaufman
Date	01 October 2020
Approved By	S. Thite
Date	01 October 2020

CONTENTS

TABLES

PLATES

APPENDICES

1. APPENDIX 7 SURFACE WATER DRAINAGE AND AQUIFER CONTAMINATION STRATEGY

1.1. GENERAL

1.1.1. INTRODUCTION

1.1.1.1. The Converter Station Area is known to be underlain by a Principal Aquifer (chalk), Source Protection Zone 1 ('SPZ1') designation. The SPZ1 requires a considered approach to mitigate any potential contamination, turbidity or groundwater issues caused by infiltration of potentially contaminated water into the ground from Construction, Operation and Maintenance activities over the design life of the Proposed Development.

1.1.1.2. This document outlines only the strategy to mitigate the potential for contamination of aquifer during the operational life of the Converter Station, providing the minimum technical requirements for the design and construction of the drainage system relating to surface water, foul water and water susceptible to contamination from oil/fuel and glycol, so as to mitigate the potential for contamination of the Aquifer during the construction and the operational life of the Converter Station.

1.1.1.3. This report has been updated from a version submitted in November 2019, further to consultation with Environment Agency ('EA'), Portsmouth Water('PW') on 5th August 2020 and 10th September 2020 as well as in response to the Relevant Representations and Written Questions to provide further clarification relating to the aquifer contamination mitigation strategy.

1.1.1.4. The requirements of this strategy are required to be complied with as part of the construction environment management plan to be produced in relation to the works to construct the Converter Station, in consultation with PW and EA.

1.1.1.5. The appointed contractor with responsibility for the civil design and construction, will be required to ensure the Converter Station civil works meet relevant requirements of the employer, the Environment Agency and other relevant stakeholders and to identify and comply with all relevant Eurocodes, British Standards and other appropriate codes and guides highlighted within this report.

1.1.2. CONVERTER STATION AREA

1.1.2.1. The Converter Station Area is located within a rural landscape in Winchester, to the west of the outlying settlements of Lovedean and Horndean. The existing National Grid 400/132kV Lovedean Substation is located immediately east of the proposed Converter Station (Plate 1).

1.1.2.2. The site where the Converter Station is to be located (the 'Site') is on a hillside sloping downwards from north to south, with a natural ridge to the west and a valley to the east. The nearest watercourse and surface water feature identified on mapping is located approximately 1.8 km to the south, flowing away from the Site.

1.1.2.3. Existing geology of the Site comprises shallow topsoils overlying Tarrant Chalk bedrock, identified as a Principal Aquifer providing a water supply to Portsmouth.

Plate 1 - Converter Station Area Layout (Option B(i))

1.1.3. SITE FEATURES

Aquifer

1.1.3.1. The Converter Station Area is known to be underlain by a Principal Aquifer (chalk), SPZ1 designation. Therefore, the SPZ1 requires a considered approach to mitigate any potential contamination, turbidity or groundwater issues caused by construction and operation and maintenance activities over the operational lifetime of the Converter Station.

Karstic Features

1.1.3.2. Karstic terrain features are a product of dissolution of soluble rocks by groundwater and can be contributed to further by other geochemical processes. Commonly the rocks most affected by these processes are limestone, chalk, dolomite and gypsum. The formation of sinks, solution pipes, caves/voids, dolines (sinkholes propagated to surface), sink holes and stream sinks are some of the features than can occur in karstic terrains. These ground conditions can lead to the following geotechnical risks, which can impact ground stability and present constraints and risks to development on karstic ground:

- Differential / total settlement
- Soft spots
- Collapsible ground
- Groundwater control issues
- Sinkholes
- Variable depth to rockhead
- Groundwater features or movement through karsts

1.1.3.3. A conductivity and resistivity geophysical survey was undertaken to identify potential karstic features at the Converter Station Area. The potential karstic features are detailed in Plate 2 and Table 1.

Table 1 – Karst Features

Karstic Feature	Coordinates (Approximate Centre Point)	Geophysics Interpretation	CPT Probing
SD1 (Also referred to as Karstic Feature 1)	467359 E 113070 N Located south of proposed access track	A circular feature identified to be approximately 20.00m in diameter and extends to approximately 6.00m below ground level (bgl). Identified in ERT Line 6	Four CPTs were conducted in a north-south direction an east-west probing line was not feasible due to a 132kV power cable. The CPTs achieved between 1.70-4.30m bgl, where they encountered refusal (possible competent rock). Cross referencing with the geophysical report it appears the CPTs were refusing short of the top of the infilled karstic feature. The feature appears infilled approximately 20.00m wide and 6.00m in height, with the feature present from 4.00m bgl to 10.00m bgl.
SD2 (Also referred to as Karstic Feature 2)	467180 E 113479 N Located within proposed Converter Station option B(i) and B(ii)	A circular feature identified to be approximately 25.00m in diameter and extending to 6.00m bgl	Six CPTs were conducted in a cross pattern, approximately north-south and east-west. The CPTs achieved between 7.90-14.70m bgl, where they encountered refusal (possible competent rock). The feature appears infilled, approximately 20.00-25.00m wide and 5.00m in height, with the feature present from 4.00m bgl to 9.00m bgl.
SD3 (Also referred to as Karstic Feature 3)	467209 E 113656 N Located within proposed Converter Station option B(i) and B(ii)	The feature is identified to be circular. The full geometry is difficult to determine from the geophysics due to the feature being identified at the end of the ERT line.	Six CPTs were conducted in a cross pattern, approximately north-south and east-west. The CPTs achieved between 8.80-12.00m bgl, where refusal was encountered (possible competent rock). The feature appears infilled, approximately 10.00m wide and 6.00m in height, with the feature present between 3.00m bgl to 9.00m bgl.

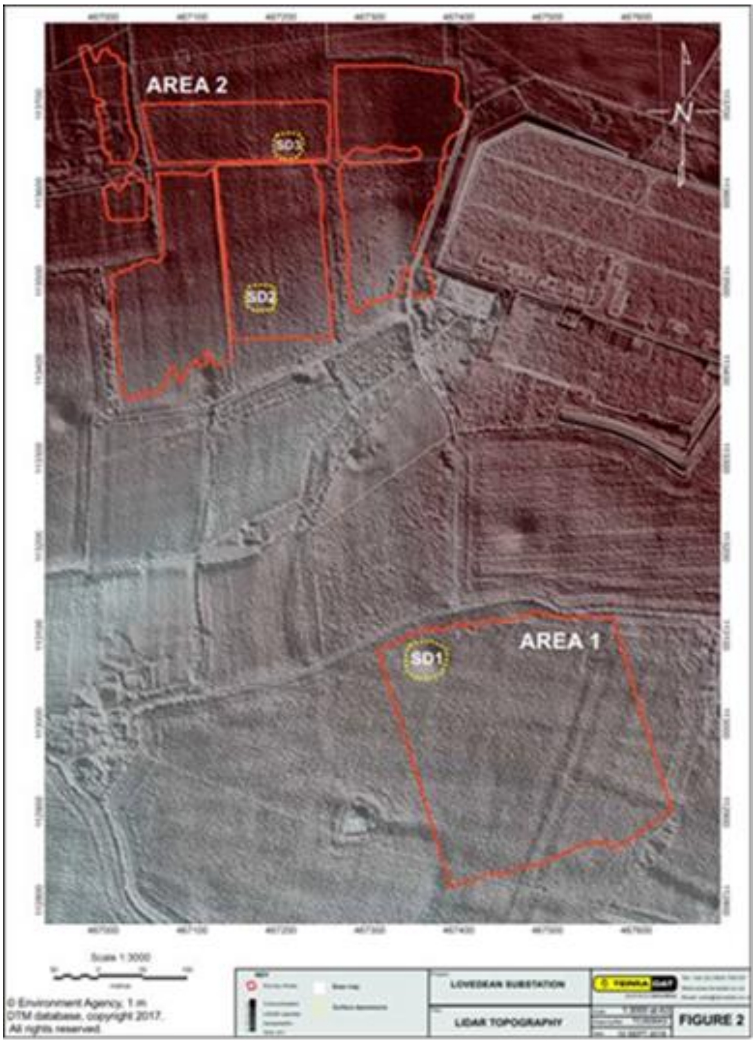


Plate 2 – Karst Features identified via Geophysical Surveys

1.1.3.4. The surveys located two potential karstic features denoted SD2 and SD3 at Converter Station Area as shown on Plate 3 and 4 for Converter Station Layout Option B(i) and Option B(ii).

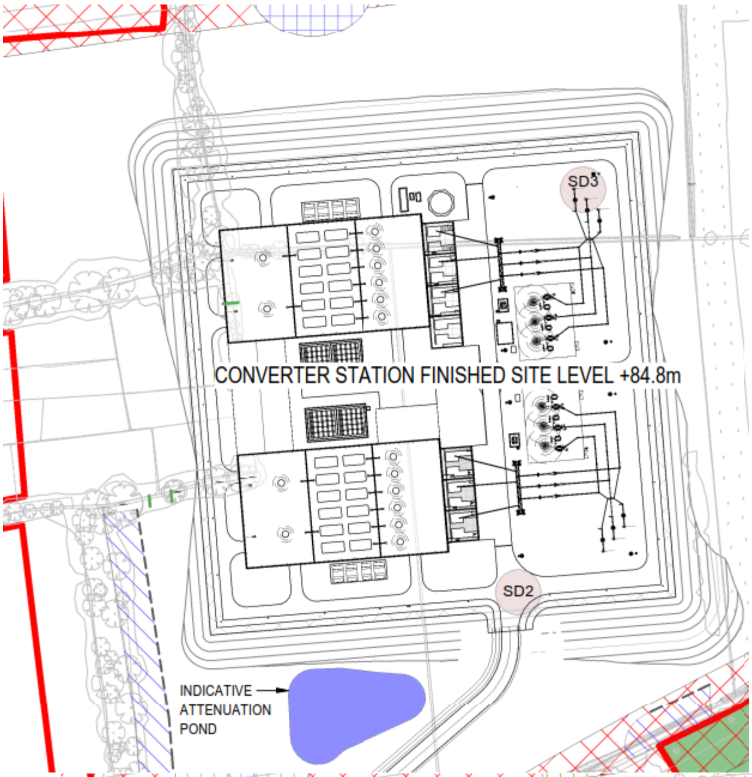


Plate 3 – Karst Features, Converter Station Layout Option B(i)
(Karst Features shown in pale red circles)

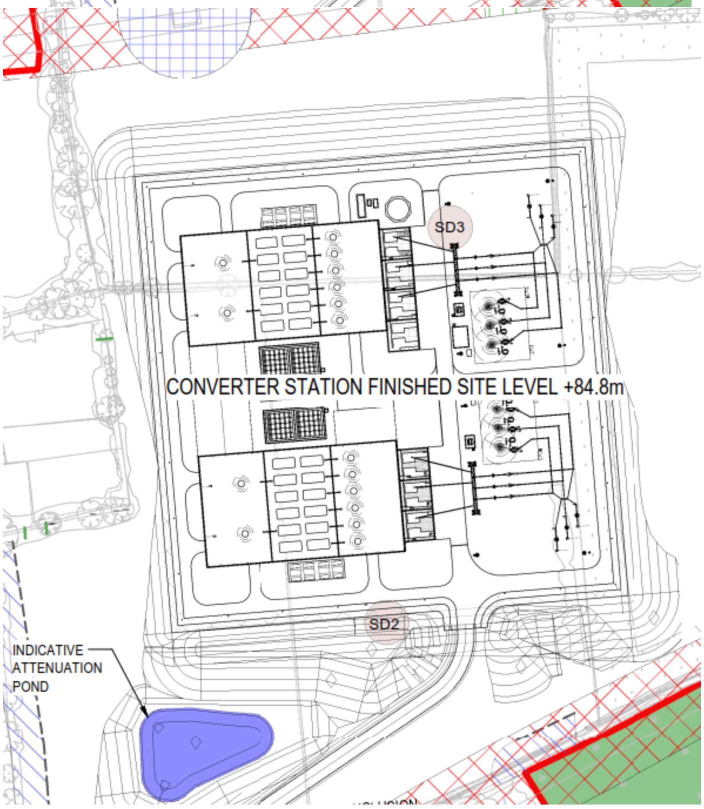


Plate 4 – Karst Features, Converter Station Layout Option B(ii)
(Karst Features shown in pale red circles)

1.1.3.5. Following the geophysical survey undertaken in 2018, the features were further investigated for infilling by cone penetration testing (CPT) (information in relation to which is included at Table 1 above). The CPT indicated the karstic features present to be (naturally) infilled with a Grade D Chalk.

1.1.3.6. The potential for perched water tables within the karstic features is highlighted within CIRIA C574, however, no perched water tables were observed during the ground investigation.

1.1.4. IDENTIFICATION OF POTENTIAL SOURCES OF CONTAMINATION AND RISK MANAGEMENT

1.1.4.1. The use of the following liquids or fuels is necessary in connection with the Converter Station, and there is a risk that these liquids or fuels can contaminate the aquifer if infiltrated directly/indirectly into the ground;

- Oil in Converter Transformers;
- Glycol (Antifreeze agent) in Valve Coolers;
- Diesel in Emergency Generators and above ground fuel tank;
- Effluent from kitchen/WC/Bathroom in Control Building;
- Oil contaminated water in oil dump tanks, oil interceptors, oil containment areas and related oil/oily water drainage systems; and
- Lubrication/cooling oil in vehicles, plant, HV switchgear and equipment.

1.1.4.2. During day to day operation of the Converter Station it is unlikely for the above identified liquids or fuels to contaminate the aquifer/watercourse, however to mitigate the risks associated with any accidental incident/spillage, appropriate provisions such as monolithic in-situ concrete bunds and drainage networks will be required to be designed and constructed to capture any water contaminated with the identified liquids or fuels. These networks will either direct the contaminated water to designated treatment facilities or contain it within a fully sealed area such as dump tank for manual removal under controlled conditions.

1.1.4.3. The following sections of this strategy provide further detail and information to clarify how the risk of contamination resulting from accidental incidents/spillage during the operation of the Converter Station will be dealt with in a safe and compliant manner.

1.1.5. GENERAL ASSUMPTIONS

1.1.5.1. Based on available existing underground services information and in lieu of any site-specific Ground Penetrating Radar ('GPR') survey, the following assumptions have been made in relation to drainage and water in the Converter Station Area;

- There is no existing foul drainage network within the Converter Station Area

- There is no existing surface water drainage network within the Converter Station Area.
- There is no existing land drainage system across the site except a shallow overland flow route as identified on the Environment Agency Long Term Flood Map for events with a return period of 100-1000 years

2. SURFACE WATER DRAINAGE

2.1. EXISTING SITE FEATURES

2.1.1.1. The Site is located within a rural landscape in Winchester, west of the outlying settlements of Lovedean and Horndean. The existing National Grid 400/132kV Lovedean Substation is located immediately east of the proposed converter station, which has operated since 1970's, which have a higher contamination risk than that associated with the new Convertor Station, which would be built adopting the latest design and construction methodology and practice.

2.1.1.2. The Site is located on a hillside sloping downwards from north to south, with a natural ridge to the west and a valley to the east. The nearest watercourse and surface water feature identified on mapping is located approximately 1.8 km to the south, flowing away from the site.

2.1.1.3. Existing geology of the Site comprises shallow top soils overlying Tarrant Chalk bedrock, identified as a Principal Aquifer providing a water supply to Portsmouth. As such, the site is located within a SPZ1.

2.2. CONVERTER STATION AREA

2.2.1.1. The Converter Station Area comprises a Converter Station; an access road; a Telecommunications Buildings compound; landscaping; and surface water drainage comprising conventional pipe networks and Sustainable Drainage Systems ('SuDS') features including filter drains, infiltration drains, infiltration swales, a detention basin, infiltration basin and soakaway.

2.3. POLICIES AND GUIDANCE DOCUMENTS

2.3.1.1. Surface water drainage within the Converter Station Area is to be designed in accordance with the following documents:

- Sewers for Adoption (SFA) 7th Edition;
- Local Authority Standards;
- Building Regulations Part H Drainage and Waste Disposal;
- CIRIA SuDS Manual (C753);
- HR Wallingford Greenfield Runoff Rate Estimation Tool (UKSuDS);
- SNIFFER UEUW01: Source control pollution in Sustainable Drainage (Final Report, February 2008);

- SNIFFER UEUW01: Source control pollution in Sustainable Drainage: Supplementary Report (Draft Report, September 2008);
- SNIFFER UEUW02: SuDS Pollution Degradation (Final Report, October 2008);
- Napier, F.; Jefferies, C; Heal, KV; Fogg, P; D'Arcy, BJ; Clarke, R. (2008) *Evidence of traffic-related pollutant control in soil-based Sustainable Urban Drainage Systems (SUDS)*. Edinburgh, Scotland. (Referenced below as Napier *et al* 2008a);
- Napier, F.; D'Arcy, B.J.; Jefferies, C.; Fogg, P.; Lowe, W.; Clarke, R.; (2008) *Oil and SUDS: managing a priority urban pollutant*. 12th International Conference on Integrated Diffuse Pollution Management, Khon Kaen University, Thailand. (Referenced below as Napier *et al* 2008b);
- Non-statutory technical standards for sustainable drainage systems;
- BS EN 752 2017 Drain and Sewer Systems Outside of Buildings (2017);
- BS EN 12056 Gravity drainage inside buildings;
- National Grid Technical Specification 2.10.01 Oil Containment;
- Discharges to surface water and groundwater environmental permits (EA guidance);
- Pollution prevention for businesses (EA guidance); and
- The Environment Agency's approach to groundwater protection.

2.4. SURFACE WATER DRAINAGE STRATEGY

2.4.1.1. Surface water shall be proposed for discharge in accordance with the Building Regulations 2010 Part H hierarchy, which states that surface water should be discharged, in order of priority to:

1. A soakaway or infiltration system; or where that is not reasonably practicable,
2. A watercourse; or where that is not reasonably practicable,
3. A sewer.

2.4.1.2. The proposal for surface water discharge from the Converter Station Area shall be in accordance with the first priority above, an infiltration system.

2.4.1.3. Discharge to the ground is restricted by existing ground infiltration rates and as such, surface water flood attenuation is to be provided by SuDS features including infiltration drains, filter drains, infiltration swales, a detention basin, infiltration basin and soakaway. Various SuDS features will independently serve separate parts of the Proposed Development within the Converter Station Area, which are the Converter Station and access road. Attenuation shall be designed and provided to prevent flooding or exceedance flows for events up to and including a 100-year return period plus 40% climate change.

2.4.1.4. Infiltration rates and maximum groundwater levels shall be determined following an appropriate infiltration survey. Hydraulic modelling shall be undertaken to confirm the size of drainage and attenuation features required, informing the detailed design. In addition, BRE365 Soakaway Design states that proposed basins require a 1m standoff between groundwater and the basin base and as such, this shall also be incorporated into the detailed design for the drainage and attenuation features. Refer to Appendix 1 for Indicative drainage proposal.

2.5. CONVERTER STATION DRAINAGE

2.5.1.1. The Converter Station has a development area of approximately 4.3 ha, which will comprise buildings, roads, external electrical switchgear and associated infrastructure. All the permanent roads, hardstanding and footpaths shall be of impervious construction laid to falls. Otherwise, the Converter Station finishes shall comprise of a minimum 75mm thick layer of surfacing (chipping) over a minimum thickness of 300mm unbound free-draining sub-base, complying with the requirement of series 800: Earthworks in Highway Agency's 'Specification for Highway Works'. The thickness of the unbound free-draining sub-base will be dependent on the result of the CBR test in compliance with EC7- part 2 and BS 1377:part 9 which shall be undertaken at the detailed design stage.

2.5.1.2. The Converter Station drainage network shall receive runoff from building roofs; parts of the road subject to 'oily water'; and oil containment areas including transformer bunds, valve cooler bunds, above ground fuel storage and diesel generator bunds and associated precast trenches and any other precast trenches within oil containment area. Treatment shall be provided by a proprietary oil separator and SuDS features prior to discharge to groundwater via a soakaway, or other infiltration features, subject to the detailed design to suit the Converter Station layout.

2.5.1.3. Based on the current indicative Converter Station layout, approximately 1.7 ha has been considered impermeable and positively drained via a typical gravity controlled below ground pipe and chamber network for the initial and indicative drainage study.

2.5.1.4. In addition to the positive drainage network, the Convertor Station contains significant permeable granular fill/chipping areas which shall be specified to act as a storage attenuation drainage area and shall control water discharges to the ground under the Site. These areas shall only receive runoff from low traffic roads within the Convertor Station that are not within the designated oil containment road and paving areas.

2.5.1.5. Drainage from oil containment and 'oily water' areas is outlined here and addressed in detail within Section 4 of this strategy. Oil containment areas shall be bunds designed to capture polluting material including oils, fuels, diesels and glycol coolant to valve coolers during a catastrophic equipment failure, but these areas will also be exposed to rainfall that will be separated and drained to the surface water network. To achieve this, the oil containment areas shall be designed to drain to a dump tank for the first stage of separation, and the bulk of pollutants shall be retained within the dump tank while the water is pumped to an oil separator for the second stage of separation. Discharge from the separator shall then be conveyed through a SuDS network for further removal of pollutants prior to discharge to groundwater.

2.5.1.6. 'Oily water' may be generated on roads adjacent to oil filled plant and equipment, which may be subject to spills or leaks that raise the pollutant loading in rainfall runoff. Runoff from oily water areas shall therefore be collected by channel drains and directed to the oil separator for treatment, bypassing the dump tank. Flow from the separator will then be conveyed through a SuDS network for further removal of pollutants prior to discharge to groundwater.

2.5.1.7. The separation of oily water and treatment by the separator is to be in accordance with the National Grid Technical Specification ('NGTS') 2.10.01 section 3.4.2, accepted by the Environment Agency, which identifies areas within substations which do, and do not, require treatment by an oil separator.

2.5.1.8. The SuDS network receiving flow from the oil separator will comprise flame trap, catchpits, pipes and detention basin then soakaway. The location of catchpit(s) chambers with silt traps will be determined at the detailed design stage and will consider maintenance and engineering requirements.

2.5.1.9. The benefit of catchpit chambers is the early removal of suspended solids into a more easily maintained system. In the absence of catchpits, the solids may build up in pipes or in the sustainable drainage systems (SuDS) which may require more complicated and costly maintenance including the flushing of pipes and/ or the dredging and restoration of the SuDS. The location and frequency of catchpits will be determined, with a need to balance the potential for increased removal of solids with each additional catchpit against over-engineering and unnecessary maintenance requirements. Finally, the use of catchpits for water quality protection within the construction phase will reviewed to ensure the provision of a clean and functional drainage system for the operational phase.

2.5.1.10. Maintenance of the SuDS systems will be in accordance with the CIRIA SuDS Manual (C753), the SNIFFER (UEUW01 & UEUW02, 2008) reports and Napier *et al* (2008), which form the basis of the SuDS treatment design.

2.5.1.11. Roof run-off will be collected by a positive drainage network which will include catchpit chambers with silt traps. The drainage network will discharge to the detention basin then soakaway, bypassing the dump tank and oil separator.

2.5.1.12. Gravel areas within the compound, but external to the buildings, will be designed to function as infiltration drains that will receive direct rainfall and road runoff, excluding the oily water area. Additional infiltration/cut off collector drains shall surround the converter station site to capture greenfield runoff from the embankment north of the site, in addition to road runoff. Surface water runoff treatment shall be provided through the infiltration drains prior to reaching the groundwater.

2.5.1.13. It is assumed that infiltration rates through the existing geology underlying the infiltration drains are sufficient to discharge runoff from events up to and including a 100-year return period plus 40% climate change, with additional surface water storage provided within the infiltration drains. Site surveys shall be undertaken to validate this assumption and to validate the proposed sitting for the ponds and soakaway system.

2.5.1.14. It is also assumed that the maximum groundwater levels are at least 1 m below the base of the infiltration drains. However, if infiltration rates or groundwater levels in combination with the detailed design and hydraulic modelling do not suit this design, then more capacity shall be provided by connecting the infiltration drains via underdrains, to the detention basin and soakaway.

2.5.1.15. The detention basin shall be able to overflow during extreme events to an infiltration basin further south, again providing additional surface water storage.

2.6. OVERLAND FLOW DRAINAGE

2.6.1.1. Overland flow and shallow subsurface runoff may be directed toward the Converter Station due to natural topography north of the Site. As such, a filter drain shall be designed and installed to intercept these flows prior to the northern embankment. The filter drain shall connect to the outermost infiltration drain surrounding the Converter Station for direct infiltration to the ground. It is expected that the volume of overland flow intercepted shall be limited by the high infiltration capacity of the chalk geology and that the greenfield runoff will not require treatment, although this will still be provided by the filter drain and infiltration drain. Site surveys shall be undertaken to validate this assumption and to validate the proposed sitting for the ponds and soakaway system.

2.6.1.2. A shallow overland flow route is identified on the Environment Agency Long Term Flood Map for events with a return period of 100-1000 years. The flow route intersects with the proposed access road and as such, culverts or other suitable infrastructure shall be proposed to allow this flow to continue southwest of the road on its existing course. The detailed design shall ensure that there will be no increase in the existing flood risk to local residences from these works.

2.7. ACCESS ROAD DRAINAGE

2.7.1.1. The proposed Access Road will approach the Converter Station from the southeast and will create an impermeable surface of approximately 1.7 ha. The road shall be designed with a cross fall to its south/west to direct runoff to an infiltration swale. The swale will be sized to store surface water and allow infiltration through an underlying infiltration drain, but shall also be able to convey exceedance flows to an infiltration basin if additional storage is required. Water quality treatment will be provided by the swale and vegetation, then subsequent infiltration through the underlying drain.

2.7.1.2. Refer to Appendix 1 for Indicative Drainage Proposal.

2.8. TELECOMMUNICATION COMPOUND DRAINAGE

2.8.1.1. It is proposed that two Telecommunication Buildings will be located on the south of the Converter Station and West of the access road, outside the main Converter Station Security fence.

2.8.1.2. Each Telecommunication Building will have a maximum footprint of 8m long x4m wide x3m high and will also have secure fencing with access with parking for up to two vehicles for maintenance purposes. It is currently anticipated that the compound for the for the Telecommunication Buildings would have a maximum size of 10mx30m with an anticipated layout illustrated in Plate 5.

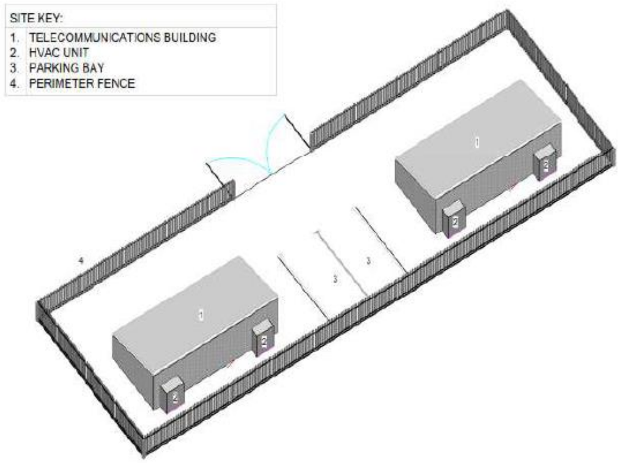


Plate 5 – Indicative Telecommunication Buildings Compound Layout

2.8.1.3. Roof run-off will be collected by a positive drainage network which will include catchpit chambers with silt traps. The drainage network will discharge to the swale on the west side of the access road which, will allow infiltration through an underlying infiltration drain, but will also be able to convey exceedance flows to an infiltration basin if additional storage is required. Water quality treatment will be provided by the swale and vegetation, then subsequent infiltration through the underlying drain.

2.8.1.4. Gravel areas within the compound, but external to the buildings, will be designed to function as infiltration drains that will receive direct rainfall and road runoff.

2.9. VALVE COOLERS

2.9.1.1. Glycol is used as an antifreeze agent in valve coolers. Total cooling liquid per pole is approximately 10,000 litres and 40% glycol that gives approximately 8000 litres with a small amount of about 500 litres in the make-up tanks, which is located inside the building. Valve coolers shall be located within monolithic in-situ reinforced concrete bunds. Bunds will be designed to BS EN 1992-3:2006 – Design of concrete structures for retaining liquids in compliance with the requirement of CIRIA C660 – Early age thermal crack control in concrete.

2.9.1.2. Under normal operational conditions, bunds only discharge run-off from rain water, which will accumulate in a sump within the bund. The sump will host a Bund Water Control Unit (‘BWCU’), which will pump water out into adjacent drainage system. BWCU shall be equipped with glycol detecting system, which will force stop the pump should any glycol be detected. When glycol is detected, an alarm will be activated and all glycol and any rain water entering the bund after alarm activation will be stored in the bund, until the bund is emptied by appropriately trained staff under controlled conditions. The contaminated liquid will be pumped to a designated tanker storage vehicle, which will transfer this off site to an appropriate waste facility.

2.9.1.3. The pump alarm shall be connected to the Converter Station Supervisory Control and Data Acquisition (‘SCADA’) system.

2.9.1.4. It is recommended by AQUASENTRY (BWCU supplier) that a minimum of an annual service is performed, but six monthly servicing is the practical norm within the industry. This recommendation has been given by a supplier which may not be the supplier of the system. Therefore, the final maintenance requirement shall be confirmed during detailed design in-line with the supplier recommendation.

2.10. DIESEL GENERATOR AND FUEL TANK

2.10.1.1. The diesel generator and the fuel tank shall be located within monolithic in-situ reinforced concrete bunds. Binds will be designed to BS EN 1992-3:2006 – Design of concrete structures for retaining liquids in compliance with the requirement of CIRIA C660 – Early age thermal crack control in concrete. The piping between the fuel tank and diesel generator shall be also installed inside a fully sealed precast or in-situ concrete trench that is connected to the oily water drainage system.

2.10.1.2. Under normal operational conditions, bunds will only discharge run-off from rain water, which will accumulate in a sump within the bund into to oily water drainage system. The sump shall host a BWCU, which will pump water out into adjacent oily water drainage system. BWCU will force stop the pump should any diesel be detected. In that case, bund will need to be cleaned manually. The pump will be alarmed and connected to the Converter Station SCADA system.

2.10.1.3. Refer to Appendix 5 for the typical fuel tank bund details.

3. FOUL WATER DRAINAGE

3.1.1.1. The Converter Station and Telecommunication Buildings are typically unmanned. The very limited foul water flows generated from kitchen and toilets in the control building in the Converter Station and welfare facility in the Telecommunication Buildings when the facilities are occupied for routine maintenance, shall be routed via below ground drains to a fully sealed cess tank. The design of the system shall be in accordance with Building Regulations Part H and BS EN 752:2017.

3.1.1.2. All drains shall be provided with suitable gradients to ensure self-cleansing in accordance with Building Regulations Part H and Sewers for Adoption version 7.

3.1.1.3. The cess tank shall be an underground fully sealed container with a minimum of 9000L capacity in an accessible location on site to facilitate future maintenance and emptying. The cess pool shall be double lined i.e. tanker cased in concrete and shall be fitted with a float switch and high-level alarm system connected to the SCADA system.

3.1.1.4. Some equipment on site will contain Sulphur Hexafluoride (‘SF6’). SF6 is an inorganic, colourless, odourless, non-flammable, heavy gas that is widely used in electrical substations because of it is an excellent electrical insulator. Although SF6 is inert during normal use, highly toxic by-products are produced that pose a serious threat to the workers who come into contact with them when electrical discharge occurs during the maintenance of some of the electrical equipment (only in an unlikely accidental event) within converter station that are contained SF6.

3.1.1.5. Discharge from the SF6 shower/wash-down area that is usually located in the control building and will be used only in an emergency, will be also connected to the fully sealed underground cess tank.

3.1.1.6. Refer to Appendix 3 for the typical cess tank details.

4. OIL CONTAINMENT AND OILY WATER DRAINAGE

4.1. INTRODUCTION

4.1.1.1. Oily water is classified as rainwater runoff and/or surface wash down which may potentially contain small amounts of low hydrocarbon concentrates that can be treated directly by the oil separator.

4.1.1.2. All areas where rainwater runoff may potentially contain small amounts of oil (e.g. resulting from leaks or spillages) shall be drained off site through an oil separator; this drainage is referred to as the oily water drainage. Areas to be drained via the oil separator are:

- Oil handling areas and test areas for oil containing equipment;
- Roads or areas that are designated for the siting of plant/vehicles for servicing of oil containing plant or storage tanks; and
- Skidways and Transformer bunds.

4.1.1.3. The Converter Station will contain six working transformers and a spare transformer which will be kept empty of any oil. Transformer bunds shall be connected into a remote underground containment facility (dump tank); this is referred to as the oil drainage.

4.1.1.4. An Emergency Oil Containment and Water Management Plan shall be prepared as well as an Operating Manual to aid maintenance and to enable the emergency services to deal effectively with an incident involving accidental spillage of oil. The documents shall be prepared in compliance with Environment Agency GPP21.

4.1.1.5. The following areas in the Converter Station Area have been deemed not to typically require drainage via an oil separator;

- Roads and car parking outside the oil containment area which shall drain to the adjacent stone surfacing; and Open areas outside oil containment surfaces by gravel.

4.2. OIL DRAINAGE

4.2.1. TRANSFORMERS

4.2.1.1. Transformers shall be located in a fully reinforced concrete liquid retaining bunds which shall be linked to underground dump tank/s. Subject to the site fire assessment and through discussion with local fire authority a fire active suppression system may be designed and installed on site. The size of the bund shall be determined based on volume of oil, volume of water (for active fire suppression system) as well as an appropriate factor of safety and shall be designed to BS EN 1992 - liquid retaining structures.

4.2.1.2. To ensure that all oil is contained in case of a catastrophic equipment failure the clear horizontal distance between the internal face of the oil retaining area walls and transformer shall be a minimum of 2.0m. The adoption of the compliant underground containment oil design philosophy will prevent flame or burning liquid being transferred into elements of the work outside the bund structure and will limit the fire pool to a defined perimeter in relation to the footprint of the oil containment area.

4.2.1.3. Rain water or other surface water will permeate through a flame trap. Each oil containment area shall have an outlet into the oil drainage system; this shall contain a cast in ductile iron (or an appropriate alternative material) U-bend syphon flame trap (to contain fire to bund area only) and rectangular in-situ manhole chamber housing an isolation gate valve to isolate the bund in an emergency. The isolation gate valve, downstream of the flame trap, in the outlet chamber is to allow the bund to be isolated if required.

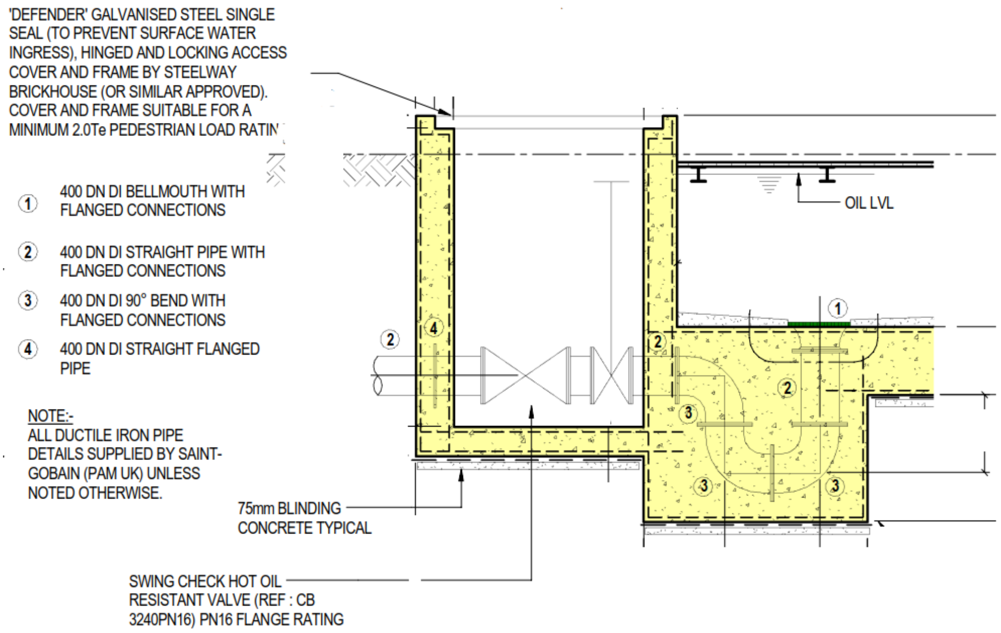


Plate 6 – Typical U-bend Syphon Flame Trap

4.2.1.4. In the event of a catastrophic equipment failure, oil from one bund is prevented from entering an adjacent bund by having independent trenches and pipe outlets and no penetrations through the bund dividing walls. Backing up of oil from one bund into another via the oil pipework is prevented as the oil pipework system is designed to have the capacity to drain away oil flows from the affected bund pipework without backing up.

4.2.1.5. All bunds, following construction, will be subject to a water retention test in accordance with requirements of BS EN 1992 - liquid retaining structures by temporarily sealing the fire trap outlet.

4.2.1.6. Following completion and commissioning of the system it is considered unlikely that any maintenance of the 400 mm diameter pipework would be required.

4.2.1.7. For maintenance and inspection of the oil pipework, should it be required, any personnel entry into the manholes would be regarded as entering confined space and therefore requiring accompanied inspection and necessary monitoring. In the unlikely event of sudden transformer oil discharge occurring during this event sufficient warning/time should be available to vacate the manhole.

4.2.1.8. Should it be necessary to maintain any bund, risk of backflow from adjacent bunds shall be eliminated by the use of appropriate plugs inserted into the pipework.

4.2.1.9. It was requested by PW and EA during a workshop on 18th July 2019 to explore the possibility of enclosures/hard cover to the transformers to collect rain water run-off via an enclosure roof to mitigate potential low hydrocarbon run-off from bunds. In response it is confirmed that usually the radiators and conservator would sit outside any enclosure, as these require cool outside air to blow through them and often fans attach to the bottom of the radiators to encourage that flow of air and therefore a four-sided enclosure (3 sides and the roof) may impact the air circulation and negatively impact the transformer performance. Considering the SuDS and water quality management system that was discussed and is explained in chapter 5 of this strategy, an appropriate system will be designed and constructed which will provide appropriate levels of protection against contamination of the Aquifer without enclosures/hard cover to the transformers.

4.2.1.10. Refer to appendix 2 for the indicative oil containment layout and the typical transformer bund details.

4.2.2. OIL DRAINAGE PIPEWORK

4.2.2.1. The flame traps, manholes and pipes forming the interconnecting drainage system, between the transformers oil retaining areas and the dump tank, is a closed free flowing gravity system capable of accommodating oil and water at temperatures of 80°C at a rate of 7000 litres per minute (117 litres per second)

4.2.2.2. Once the Converter Station site layout has been developed, a detailed and comprehensive fire risk assessment and fire strategy report for the Converter Station including buildings and all site infrastructure/assets will be undertaken. This will include determination of fire compartmentation, fire suppression requirements, fire detention and appropriate fire rating of all buildings and equipment on site. The Contractor shall be required to interface with and seek the approval of the local fire authority, relevant statutory authorities, third parties and local authorities in relation to fire risk and mitigation and will comply with all relevant legislation and building regulation requirements. Subject to the outcome of the detailed fire risk assessment a fire active suppression system may be designed and installed on site. The size of the transformer bund will be determined based on volume of the oil in transformer and water from active fire suppression system as well as appropriate factors of safety. In the event of a catastrophic failure, oil and potential water from the active fire suppression system will permeate through a flame trap into the oil drainage system through a cast in ductile iron (or an appropriate alternative material) U-bend syphon flame trap into underground oil containment, where the oil and water will be stored and emptied manually when it is safe to do so.

4.2.2.3. All the pipework shall be sized to discharge the calculated flow rate (oil and water) into the underground oil containment dump tank without accumulation of fluid in the oil retaining area.

4.2.2.4. The flame trap, manholes and pipes forming the interconnecting drainage system between the transformer bunds and the dump tank will be a closed free flowing gravity system capable of accommodating oil and water at temperature of 80°C at a rate of 7000 litres per minute.

4.2.2.5. The design of pipework between transformers and dump tank/s shall ensure:

- Each individual pipe run is capable of taking the suitable design flow rate and,
- Minor head losses that occur in the longest pipe route (from furthest flame trap to the dump tank) do not reduce flow rate and velocity below the designed minimum acceptable to meet design requirements.

4.2.2.6. The route of the pipework shall be continuous, closed system with the shortest possible length with minimal vertical and horizontal deviation.

4.2.2.7. Four hours fire resistance shall be provided to all pipework within the defined fire damage zone. This will generally be best achieved by direct burring.

4.2.3. UNDERGROUND OIL CONTAINMENT (DUMP TANK)

4.2.3.1. The tank shall be sized to accommodate the maximum volume from a catastrophic failure of the largest oil containing equipment on site including associated active fire protection system.

4.2.3.2. The dump tank construction shall be of Glass Reinforced Polymer ('GRP') with a chemical resistant liner (or reinforced in-situ/precast water and oil tight concrete) resistant to all types of oil at 80°C. Clean water shall be pumped out of the Dump tank via a bund water control pump to a manhole at appropriate discharge rate (to be calculated at detailed design stage), before flowing by gravity to an oil separator prior to be being discharged into the surface water drainage system.

4.2.3.3. The pipework shall incorporate a penstock valve immediately before the dump tank to allow the tank to be isolated during any necessary maintenance.

4.2.3.4. The dump tank shall be double lined i.e. tanker cased in concrete and shall be fitted with a high-level alarm system connected to the SCADA system.

4.2.3.5. Following PW and EA request, the possibility of an above ground dump tank was explored. The proposed drainage system is a gravity system. The raising of the dump tank above ground will require the installation of a pump chambers below ground, which is considered likely to negate any benefits and to introduce additional risk. For example, introducing pumps will introduce the risk of pump failure, which would potentially result in untreated pollutants flooding from the pump chambers to the existing ground. Therefore, a dump tank above ground is likely to add complexity and associated risks to the drainage design and infrastructure with no real benefit

4.3. OILY WATER DRAINAGE

4.3.1. INTERNAL ROADWAYS (OIL CONTAINMENT ROAD AREAS)

4.3.1.1. The main Access Road and skidways immediately adjacent to the transformers shall be fitted with raised sealed kerbs, linear drainage channels, gullies and an associated gravity drainage system which connected to the oil separator. This is to ensure that any minor oil spillages during transformer maintenance work are effectively contained and discharged through the oily water drainage system in accordance with standard supplier's operational protocols.

4.3.2. OIL SEPARATOR

4.3.2.1. The oil separator shall be a Class 1 full retention unit to BS EN 858-1 incorporating a coalescer automatic closure device and high oil level alarm and rated to suit a hard-standing area to cater for the rainfall intensity in accordance with the EA's Pollution Prevention Guideline (PPG3).

4.3.2.2. A minimum oil storage volume to suit catchment area shall be provided by the separator and the separator shall be fully capable of isolating all upstream oil flow if the high-level oil alarm is activated.

4.3.2.3. Oil resistant nitrile rubber seals shall be employed throughout the oil & oily water drainage systems. The oil separator shall be vented in accordance with the manufacturer's recommendations, with vents located clear of all site operating areas, a minimum 2000 mm above ground level. Vent pipes shall be suitably supported and protected from vehicular traffic by means of spaced concrete bollards.

4.3.2.4. The oil separator shall follow the requirement of EA's PPG3 and shall be designed to European Standard BS EN 858-1: Separator systems for light liquids (e.g. oil and petrol)

4.3.2.5. The separated water shall discharge directly into the surface water drainage system, as the treated water.

4.3.2.6. The oily water drainage shall incorporate a penstock to close off the system in accordance with Environmental Agency requirements, to prevent discharge off site in the unlikely event of an environmental incident on site coinciding with a fault of the oil/oily water system separator/dump tank.

4.3.2.7. The interceptor shall be double lined i.e. tanker cased in concrete and will be fitted with float switch and high-level alarm system and shall be connected to the SCADA system.

4.3.2.8. During meeting with PW and EA it was advised that there is a preference for design development of a system with an above ground interceptor. It is considered that raising of the dump tank and interceptor above ground will require the installation of a pump chambers below ground, which is considered likely to negate any benefits and to introduce additional risk. For example, introducing pumps will introduce the risk of pump failure, which would potentially result in untreated pollutants flooding from the pump chambers to the existing ground. Finally, there is limited space above ground, so to raise the infrastructure would require detailed changes to the compound boundary and layout. Therefore, an interceptor tank above ground is likely to add complexity and associated risks to the drainage design and infrastructure with no real benefit.

5. SUDS AND WATER QUALITY SYSTEM

5.1.1.1. Surface water from oil containment areas and oily water areas shall be directed through the proprietary system of an oil separator. A manufacturer SPEL has provided specifications for their 'Puraceptor' which advises that, for all units tested, the discharge water has an average hydrocarbon concentration of 1.22mg/litre. The Environment Agency has advised that the

> '…*former drinking water standard (still used by most water companies) is 0.01 mg/l. As well as this, in line with the permitting regulations, hydrocarbons must not enter groundwater at detectable quantities.'*

5.1.1.2. Therefore, it is proposed to use SuDS to further reduce the hydrocarbon concentration of water discharged from the oil separator, prior to discharge via a soakaway to groundwater.

5.1.1.3. The principles of treatment below present existing research into the removal of TPH (total petroleum hydrocarbons), PAH (polycyclic aromatic hydrocarbons) and heavy metals, from water by SuDS. Included in the research is soil selection, effect of environmental parameters and design recommendations, as well as data to demonstrate the subsequent pollutant removal by SuDS.

5.2. PRINCIPLES OF TREATMENT

5.2.1.1. The principles of treatment are based on the SNIFFER (UEUW01 & UEUW02, 2008) reports and Napier *et al* (2008) articles identified in Section 2.3 and which also support the CIRIA C753 SuDS Manual. This series of documents were produced by dual projects researching the water quality treatment provided by infiltration SuDS receiving carriageway runoff that contained Total Petroleum Hydrocarbons') ('TPH'), Polycyclic Aromatic Hydrocarbons ('PAH') and heavy metals. The research was undertaken in laboratory and field experiments. Within the laboratory, experiments used soil core lysimeters to which pollutants were applied and their discharge concentration measured, before destructive sampling of the soils; in addition, degradation studies were undertaken to assess the effect of varying parameters upon the degradation of organic pollutants within soil. Within the field, researchers measured pollutant concentration in the soils and pore water of SuDS that have been operational for approximately 10 years (UEUW02, 2008 pp.20).

5.2.1.2. The studies identified a two-stage process for pollutant removal; the first stage is removal of TPH, PAH and heavy metals from water by infiltrating it through soils; the second stage is removal of the TPH and PAH from the soils by 'degradation', which removes these organic pollutants from the SuDS system. UEUW01 (2008) identified that the process of degradation may involve biotransformation of TPH and PAH to daughter products or smaller molecules 'before the compound could be said to be completely degraded or mineralised' (pp. 22). While Napier *et al* (2008b) confirms that it is only the organic compounds, TPH and PAH that will be degraded, as the heavy metals will remain within the soils.

5.3. SOIL SELECTION, LYSIMETER AND DEGRADATION STUDIES

5.3.1.1. To inform soil selection, the lysimeter study investigated loamy sand (HOST class 3 (Hydrology of Soil Type), clay loam (HOST class 21), silty clay loam (HOST class 18) and a constructed SuD lysimeter of gravel, sand and a top layer of biologically active topsoil. The lysimeter study applied a single dose of pollutants in solution, to the surface of the soil cores and irrigated these for 135 days, measuring the pollutant concentrations within the discharging drainage water. At the end of the irrigation period destructive sampling of the soil cores was undertaken.

5.3.1.2. The separate degradation study investigated the effects upon pollutant degradation of moisture, temperature, pollutant concentration and bioactivity (microbial activity) by destructive sampling of loamy sand lysimeters. This degradation study was undertaken for 2 months and reported in UEUW01 (2008), then extended to 6 months being reported in UEUW02 (2008) to give further results for TPH degradation. Napier *et al* (2008 b) identifies that heavy metals will be retained within the soils, but not degraded and as such, high loadings may eventually require removal and appropriate disposal.

5.3.1.3. UEUW02, (2008; pp. 30 Fig. 21) recommends 'loamy soil' as most suitable for pollutant removal and the study results demonstrate that the silty clay loam (HOST class 18) achieves the most desirable results (Table 2 to 4 below). UEUW02 (2008) further explains that sandy soil can be unsuitable as it allows more rapid flow thereby reducing the treatment provided, while clayey soil may crack under dry conditions allowing rapid flow, or can prevent flow when the clay is saturated also reducing the treatment provided. As such it is recommended that a silty clay loam is used as the SuDS filtration media in the Converter Station Area.

5.3.1.4. To maintain water quality at the area within Order Limits as suitable to the underlying chalk, the pH of the silty clay loam filter media selected should be neutral or alkaline, while an acidic soil should not be used.

5.3.1.5. SNIFFER UEUW02 (2008) also identified the influence of nutrient levels, particularly nitrogen to support microbial activity. However, the study recognised that fertiliser would not typically be added to SuDS and as such did not use it to artificially enhance microbial degradation in the experiments. The nitrogen concentration of the soils used in the study was reported as 'within the range of reported concentrations (2.5mg/kg – 29.8 mg/kg)' (pp.4) which may be suitable for a comparative range if it is of concern during construction. However, addition of nitrogen to the Converter Station Area is not recommended.

5.4. TPH AND PAH DEGRADATION

5.4.1.1. The SNIFFER and Napier *et al* (2008) studies highlight the importance of degradation to remove TPH and PAH pollutants from the soils and therefore from the SuDS system. Microbial degradation was identified as 'the main method of hydrocarbon degradation in soils and sediments' (UEUW02, 2008 pp.3). While the environmental parameters relevant to SuDS which can further affect or compliment microbial degradation are changes in temperature, soil moisture and pollutant loading.

5.4.1.2. It is worthwhile noting that changes in these parameters was not reported as affecting the removal of TPH and PAH from water into the soils, but rather as slowing the rate of organic pollutant degradation within the soils for overall removal from the SuDS. UEUW02 (2008) also suggests that the breakdown of organic pollutants may experience seasonal variation, particularly with regard to temperature with 'rapid breakdown in summer temperatures and slower rates in winter' (2008, pp.3). Therefore, it is expected that warmer seasons will allow for the degradation of pollutants retained within soils.

5.4.1.3. Soil moisture is reported in the SNIFFER and Napier *et al* (2008) documents as strongly affecting organic pollutant degradation. As part of the field study, ponds under permanently saturated conditions were found to contain high concentrations of pollutants that have been captured by the soils, but not degraded. It was considered likely that the permanent saturation had resulted in low oxygen conditions which prevented the aerobic microbial degradation (UEUW02, 2008 pp.22). Whereas, the basins subject to a wet/dry cycle experienced aerobic conditions that resulted in organic pollutant degradation. As such, this cycle is recommended by SNIFFER and Napier *et al* (2008) to achieve removal of organic pollutants from SuDS. Therefore, a wet/dry cycle is also recommended for the design of SuDS at the Converter Station Area.

5.4.1.4. Pollutant loading was reported as resulting in higher residual pollutant concentrations within the soils, which had not been degraded. However, at the Converter Station, discharge from the oil separator is advised by the manufacturer SPEL as providing an average hydrocarbon concentration of 1.22 mg/l (The unit does work at a discharge rate of <5mg of oil per litre - 5 parts per million when discharging to surface water). As such, high concentrations or extreme fluctuation of discharged organic pollutant is not expected. In addition, runoff from roads discharging to infiltration drains and not to the separator, is expected to contain comparatively low pollutant loads due to the low traffic levels.

5.5. POLLUTANT REMOVAL

5.5.1.1. The UEUW01 Final Report (2008) demonstrates through the lysimeter studies that greater than 99.9% of TPH and PAH was removed by soils, leaving less than 0.068%

of pollutants to potentially reach the groundwater. Of the >99.9% organic pollutants removed by the soils, the silty clay loam achieved the highest degradation with 76.06% TPH and 68.10% PAH removed from the soils.

	SUD	Sand	Silt	Clay
% leached	0.003	0.003	0.005	0.056
% retained	64.00	64.90	31.89	54.56
% degraded	35.99	35.10	68.10	45.38

% retained included any PAH present in the soil prior to treatment.

Plate 7 - PAH mass balance for SUD, sand, silt and clay lysimeters (UEUW01, 2008, Final Report Tb 6)

	SUD	Sand	Silt	Clay
% leached	0.005	0.011	0.012	0.068
% retained	19.30	70.70	23.93	29.39
% degraded	80.69	29.29	76.06	70.54

% retained included any TPH present in the soil prior to treatment.

Plate 8 - TPH mass balance for SUD, sand, silt and clay lysimeters (UEUW01, 2008, Final Report Tb 7)

5.5.1.2. The lysimeter studies also demonstrate that greater than 99.84% of heavy metals were removed by the silty clay loam, leaving only 0.16% to 0.04% of the heavy metals to potentially reach the groundwater. Napier *et al* (2008b) do identify however, that heavy metals are not degraded and will therefore remain within the soils which may require disposal if high concentrations accumulate.

	SUD	Sand	Silt	Clay
Cadmium	0.05	0.25	0.16	0.23
Copper	0.19	0.11	0.13	0.45
Zinc	0.03	0.02	0.04	0.31

Plate 9 - Percentage of applied metals measured in drainage water (UEUW01, 2008, Final Report Tb 8)

5.5.1.3. The UEUW01 Final Report (2008) also took soil water samples to a depth of 0.9m at the inlet of an existing SuDS basin receiving carriageway runoff containing TPH, PAH and heavy metals. The design of the basin (29A) also resulted in the majority of pollutants being removed at its inlet. Therefore, measurement of pollutants within soil water samples at this location is measuring the worst-case scenario.

Sampling date	Cd mg l^{-1}	Cu mg l^{-1}	Pb mg l^{-1}	Ni mg l^{-1}	Zn mg l^{-1}	pH	TPH mg l^{-1}	Total PAH µg l^{-1}
23/03/07	*	0.001	*	0.003	*	ns	*	0.33
31/03/07	*	0.009	0.002	0.003	0.010	7.6	0.2	0.99
11/05/07	*	0.013	0.001	0.003	0.010	7.7	*	0.16
29/06/07	*	0.009	0.002	0.211	0.020	8.2	0.1	ns

Plate 10 - Summary of pollutant concentration in soil water (UEUW01, 2008, Final Report, Tb 17, measurements from Basin 29A)

5.5.1.4. The results demonstrate that the Total PAH concentrations in soil water were a maximum of 0.00099 mg/l (0.99µg/l) while the TPH concentrations 'either remained or very quickly fell to below the analytical reporting limit' (UEUW01, 2008 pp.15) for aqueous samples, as confirmed by the reporting limits included in the UEUW01 (2008) (Table 6 below).

Determinand	Reporting limit Aqueous	Reporting limit Soil/sediment
Cadmium	0.0001 mg l^{-1}	0.1mg kg^{-1}
Copper	0.001mg l^{-1}	0.5mg kg^{-1}
Lead	0.001mg l^{-1}	0.5mg kg^{-1}
Nickel	0.001mg l^{-1}	0.5mg kg^{-1}
Zinc	0.002mg l^{-1}	3mg kg^{-1}
TPH	0.1mg l^{-1}	10mg kg^{-1}
Total PAH	0.01ug l^{-1}	1.28mg kg^{-1}
Nitrate N	0.3mg l^{-1}	5mg kg^{-1}
Ammoniacal N	0.01mg l^{-1}	0.5mg kg^{-1}
Total N		0.30%
Available P		0.1mg l^{-1}
Dissolved P	0.3mg l^{-1}	
Phosphate	0.01mg l^{-1}	
Total P	0.3mg l^{-1}	30mg kg^{-1}
TOC		
FOC	0.1mg l^{-1}	0.02%

Plate 11 - Analytical reporting Limits (UEUW01, 2008, Final Report Tb 25)

5.6. POLLUTANT SOIL RETENTION DEPTH

5.6.1.1. The soil core lysimeters producing the results above, had a depth of 0.6m and the SNIFFER and Napier *et al* (2008) studies identify that TPH, PAH and heavy metal pollutant retention is concentrated within the top 100 mm of soil with limited migration to 300 mm depth.

5.6.1.2. UEUW01 (2008, pp.16) reports that below the top 100 mm of soil, no soil samples showed PAH concentrations above the analytical reporting limits. This result was reported for all soil types, except the clay, however it is the silty clay loam that is recommended for the Converter Station Area. In addition, UEUW01 (2008) concludes that the minimum percentage removal for all pollutants and all soils in the lysimeter study was '99.55% within a 300mm deep column of soil' (pp. 45).

5.6.1.3. It has been agreed with PW that as a precautionary measure, an infiltration layer of 0.6 m depth will be implemented at the Converter Station Area for treatment of water discharging from the oil separator, in accordance with the lysimeter studies.

5.7. ADDITIONAL DESIGN FEATURES

5.7.1.1. In addition to the research results above, the SNIFFER and Napier *et al* (2008) documents identified design features that further enhanced pollutant removal.

5.7.1.2. Napier *et al* (2008a) best explain the effect of inlet design on the pattern of pollutant removal within a basin (or other SuDS feature) and identify that an inlet where 'inflow velocity quickly dissipates' (pp. 6) will result in the majority of pollutants being deposited near to the inlet; whereas a long narrow inlet channel which maintains inflow velocity will transport pollutants further.

5.7.1.3. In line with the above, SNIFFER and Napier *et al* (2008) recommend that basin design should be 'wide and shallow' rather than 'narrow and deep' (Napier *et al*.; 2008a; pp. 9). UEUW02 (2008) further advises that a small and deep area is the poorest option, but that a long and more narrow design such as a low flow channel, can be a good compromise due to the extended contact provided.

5.7.1.4. These features have been considered in the SuDS design described below.

5.8. SPECIFICATION FOR SUDS COMPONENTS

The water quality treatment features recommended for inclusion in the SuDS design at the Converter Station Area are summarised in this section. While the design of each individual SuDS feature, that must be suitable for surface water flood attenuation as well as water quality treatment, will be described in more detail in section 5.11 and shown on drawing AQD-WSP-OS-UK-DR-D-200340 in appendix 1, infiltration has been identified as the primary process for removal of TPH, PAH and heavy metals from water and as such, SuDS shall be designed to allow infiltration through filter media that will be specified at the detailed design stage by the

Contractor. Infiltration basins and drains will then be able to continue the infiltration to groundwater, whereas detention basins and filter drains that are not intended for direct infiltration to groundwater, shall be designed to collect water in underdrains below the filter media, then convey this water further along the surface water drainage system.

5.8.1.1. The soil type recommended is the silty clay loam (HOST class 18), with a neutral or alkaline pH. Please note, an acidic soil is not suitable and shall not be used. Although Nitrogen shall not be added to the SuDS or treatment filter media, the naturally occurring nitrogen concentration of the selected silty clay loam, can be compared to the study's reported ranges of 2.5 mg/kg – 29.8 mg/kg if required.

5.8.1.2. The depth of treatment filter media downstream of the oil interceptor shall be minimum of 0.6m, as agreed with PW to replicate the lysimeter studies and as a precautionary approach. If this depth is to be altered in other locations, the treatment filter media shall be no less than 0.3 m in accordance with recommendations in the SNIFFER reports (UEUW01, 2008 pp.45; UEUW02, 2008 pp.30). In the event that other filter media is required for hydraulic performance, this shall be in addition to the 0.6m or 0.3m of treatment media and shall not replace the material, unless its water quality benefits have been demonstrated.

5.8.1.3. The inlets to basins and swales shall incorporate flow dissipation apparatus to enhance pollutant deposition near the inlet. The beds of basins and swales shall also be maintained as shallow and wide as possible to maximise pollutant treatment and spreading of water. In the case of the detention basin, a wide low flow channel shall be proposed to utilise the full length of the basin and maximise retention time for infiltration and pollutant removal. Without the channel, there is potential for flow routes to 'short circuit' the basin and flow directly from the inlet to the outlet. The low flow channel width shall be a minimum 2m and the depth shall be a maximum 200 mm, allowing higher flow rates to overtop and spread over the rest of the basin, avoiding erosion into a deep narrow channel.

5.8.1.4. A wet/dry cycle has been identified as essential for degradation of the organic pollutants TPH and PAH and as such, features shall be designed so that complete drainage is possible, creating aerobic conditions within sediments. Where features are designed to permanently hold water, these should be located in areas receiving the lowest pollutant concentrations possible, such as away from the inlet.

5.9. OIL CONTAINMENT AND OILY WATER AREAS

5.9.1.1. As described in section 4, oil containment areas shall drain to the dump tank and then the oil separator; whereas the oily water areas will drain runoff directly to the oil separator. The oil separator will be discharging surface water with an averaged hydrocarbon concentration of 1.22 mg/l (based on information provided by SPEL) which shall be conveyed to the detention basin for additional treatment.

5.10. ROOF RUNOFF AND CATCHPITS

5.10.1.1. Roof runoff shall be directed through the conventional drainage network to the detention basin bypassing the dump tank and hydrocarbon interceptor. The CIRIA C753 Simple Index Method identifies roof runoff from commercial/industrial roofs as having a ‘low’ pollution hazard level which will be suitably treated by any SuDS feature and as such, treatment within the detention basin is considered satisfactory. However, additional pre-treatment for removal of suspended solids shall be provided by catchpit chambers with silt traps that will require maintenance for removal and disposal of sediment and other pollutants.

5.11. DETENTION BASIN

5.11.1.1. The detention basin shall be lined and impermeable, but shall contain a layer of added filter media to allow treatment by infiltration. The basin will be designed for the dual purpose of water quality treatment and surface water attenuation upstream of the soakaway.

5.11.1.2. The basin shall be vegetated, with a maximum bank gradient of 1:3 and a maximum depth to bed level of 2 m which includes 0.3 m freeboard. Underlying the bed shall be a 0.6 m deep layer of treatment filter media (silty clay loam, neutral to alkaline pH). The base of the filter media shall be impermeable to prevent infiltration to groundwater and as such, underdrains placed at the base of the infiltration layer shall collect and convey treated water to the soakaway. If required, treated water will pass through a flow control to ensure discharge at agreed rates, however this is not expected to be a requirement. During large rainfall events the basin will start to fill as the discharge rate will be limited by the infiltration rate of the filter media. In the event that inlet rates are higher than the infiltration and discharge rates, water will be able to pass through a ‘high level overflow’ to the soakaway.

5.11.1.3. The basin shall drain completely and remain dry between rainfall events, due to the need to infiltrate water through the treatment filter media which requires aerobic conditions.

5.11.1.4. The basin inlet shall include a level spreader and flow dissipation apparatus to reduce flow rates and maximise pollutant removal and infiltration near the inlet. A low flow channel, of 2 m width and maximum 0.2 m depth will help spread water through the basin and increase residency time, ensuring that flows don’t hydraulically short-circuit through the basin. As flows increase, water will overtop the channel and spread over the basin bed for more uniform infiltration.

5.11.1.5. In the event that erosion protection of the low flow channel is required, then ‘rock rolls’ such as those provided by Salix could be suitable. The use of coir should be investigated before use, to determine potential effects on nutrients, pH or plant growth.

5.11.1.6. The required volume of surface water storage will be determined by the infiltration rate of the existing substrate surrounding the soakaway, which is yet to be confirmed. In the absence of this information, the current basin design provides 2300m^3 of surface water storage based on a Microdrainage Quickstorage Estimate of between 1700m^3 - 2400m^3 for an event with a 1:100 year return period plus 40% Climate Change and a discharge rate of 3.4 l/s. This discharge rate was calculated from 2l/s/ha of impermeable area generating the runoff, as advised within the HR Wallingford Greenfield Runoff Rate Estimation Tool (UKSuDS, 2018).

5.11.1.7. The treatment filter media underlying the basin has not been included in surface water storage estimate.

5.11.1.8. The detailed design and hydraulic modelling is required which will take account of chalk and filter media infiltration rates and maximum groundwater levels. In the event that this demonstrates a need for additional surface water storage, this can be provided by extending the current footprint of the basin or geocellular soakaway, as well as by use of an overflow from the detention basin to the infiltration basin further south. In the event that modelling demonstrates that a smaller volume of surface water storage is required, then the basin should be made shallower with a larger bed, then the bank gradients reduced.

5.11.1.9. It is expected that the detention basin will be subject to vegetation management, such as litter & debris collection and an annual cut and rake, but this will confirm upon detailed design and with further consultation with the project ecologist and landscape architect. In addition, removal of sediment build-up may be required. Refer to the Outline Landscape and Biodiversity Strategy (APP-506) for further information.

5.12. SOAKAWAY

5.12.1.1. A geocellular soakaway is proposed to allow infiltration of surface water to ground. The infiltration rate is yet to be confirmed by field testing, which will determine the final size of the feature. The soakaway has also been selected at this stage based on the available information, as it provides flexibility to suit the site gradients and to maximise the discharge volumes.

5.12.1.2. The final water quality treatment stage is proposed by lining the soakaway with a geotextile membrane and surrounding the base and sides with a layer of treatment filter media (silty clay loam, neutral to alkaline pH). A depth/width of 0.3m, is recommended in accordance with recommendations by SNIFFER and Napier *et al* (2008). Based on the studies, it is expected that pollutant concentrations discharging from the detention basin will be very low, at or near analytical reporting limits and as such the additional 0.3 m filter media on the soakaway is precautionary and meets the reports' recommendations. However, should the 0.6 m be required this can be accommodated.

5.12.1.3. Prior to the surface water infiltrating through the soakaway into the underlying Chalk bedrock it will undergo treatment which will increase its carbonate concentration (hardening). This could be in the form of a layer of chalk gravel in the soakaway which the water would pass through before infiltrating. The intention of including this treatment would be to prevent the soakaway from itself becoming a karst dissolution feature gradually over time as rainfall and surface runoff (which would have a low carbonate content) infiltrates into the Chalk. The carbonate treatment system will require long-term maintenance which will be considered at detailed design.

5.13. GRAVEL AREA AND INFILTRATION DRAINS

5.13.1.1. Gravel areas are located within the compound and external to buildings, in locations that are not roads, but may contain infrastructure. In accordance with the National Grid TS 2.10.01 section 3.4.2, these gravel areas will receive direct rainfall and runoff from roads, excluding the oily water areas. As such, the gravel areas will be implemented as infiltration drains.

5.13.1.2. It is expected that traffic within the compound during operation will be low and as such, this has been equated to the CIRIA C753 Simple Index Method land use of 'individual property driveways, residential car parks, low traffic roads and non-residential car parking with infrequent change i.e. <300 traffic movements/day' with a 'low' hazard index.

5.13.1.3. The CIRIA guide identifies that an infiltration trench, with specific design and filtration media requirements, is sufficient to provide treatment to metals and hydrocarbon for this land use. The infiltration trench will also provide the majority of treatment required for total suspended solids, however a permeable geotextile membrane in the upper layers of the media will be required for removal of grit and sediments from filtration water. This layer will require maintenance to remove the trapped sediments and ensure the ongoing function of the infiltration drain.

5.13.1.4. The treatment filter media will be silty clay loam with a neutral to alkaline pH and a depth of 0.3 m. A second permeable geotextile membrane should underlie the filter media to ensure it does not enter the chalk. The 0.3 m depth of treatment filter media is in accordance with recommendations by SNIFFER and Napier *et al* (2008) for treatment of runoff from heavily trafficked roads and is therefore considered suitable for treatment of runoff from the low traffic roads within the compound that are not subject to 'oily water' nor the oil containment areas.

5.13.1.5. The detailed design and hydraulic modelling is required which will take account of chalk and filter media infiltration rates and maximum groundwater levels. In the event that this demonstrates a need for additional surface water storage, underdrains can be installed at the base of the gravel areas to collect and convey surface water to the detention basin.

5.14. INFILTRATION SWALE AND ACCESS ROAD RUNOFF

5.14.1.1. An infiltration swale is proposed for capture, infiltration and conveyance of surface water runoff from the Access Road to the Converter Station. The swale is currently proposed for a depth of 0.4 m, a base width of 0.6 m and banks with a 1:3 gradient, giving a total width of 3 m. Underlying the swale will be an infiltration trench and both the trench and swale will be underlain by 0.3 m of infiltration treatment media (silty clay loam, neutral to alkaline pH).

5.14.1.2. Water quality treatment will be provided by the swale and the infiltration trench sufficient for the pollutants expected to runoff from the access road. Low levels of traffic are expected during operation will be low and as such, this has been equated to the CIRIA C753 Simple Index Method land use of 'individual property driveways, residential car parks, low traffic roads and non-residential car parking with infrequent change i.e. <300 traffic movements/day'.

5.14.1.3. CIRIA C753 identifies that a swale is sufficient to treat the pollutant loading from this land use and as such, the treatment provided by the infiltration trench is an additional benefit, and is to be designed in accordance with the C753 guidance and this report. As such, the 0.3 m depth of treatment filter media is considered sufficient and in accordance with recommendations by SNIFFER and Napier *et al* (2008) for treatment of runoff from heavily trafficked roads and is therefore considered suitable for treatment of runoff from what is expected to be low traffic roads. However, the depth of treatment filter media will be increased up to 0.6m as a precautionary measure in accordance with the lysimeter study reported by SNIFFER and Napier *et al* (2008).

5.14.1.4. Maintenance will be required for the removal of sediments captured by the swale in accordance with SuDS Manual, CIRIA 753. Refer to 5.16.1.2 for further information.

5.14.1.5. Surface water storage will be provided within the swale and within the underlying infiltration drain. Should additional surface water storage be required, the swales will be designed to convey exceedance flows to an infiltration basin. An underdrain can also be added to the infiltration drain if additional conveyance is required. The storage requirements will be confirmed in the final design subject to hydraulic modelling and confirmation of infiltration rates.

5.14.1.6. There is also potential for the infiltration swale to convey exceedance flows from the detention basin in the north, to the infiltration basin further south if additional surface water storage is required. However, this is subject to receipt of infiltration rates and hydraulic modelling and is only expected to occur during extreme events.

5.15. INFILTRATION BASIN

5.15.1.1. The infiltration basin is proposed for the southwest extent of the development and at a low point in the existing topography. This will allow runoff from the Access Road to be conveyed along infiltration swales from the north and east.

5.15.1.2. The size and outline design of the infiltration basin is the same as the detention basin further north, providing 2300 m^3 of surface water storage with a maximum bank gradient of 1:3 and a maximum depth of 2 m which includes a 0.3 m freeboard.

5.15.1.3. Underlying the bed, a 0.3 m deep layer of treatment filter media (silty clay loam, neutral to alkaline pH) will be implemented to provide water quality treatment. The 0.3 m depth of treatment filter media is in accordance with recommendations by SNIFFER and Napier *et al* (2008) for treatment of runoff from heavily trafficked roads and is considered sufficient for the infiltration basin that is receiving surface water from a low traffic road, and which has previously been provided treatment by the infiltration swale. However, the depth of treatment filter media can be increased up to 0.6 m as a precautionary measure in accordance with the lysimeter study reported by SNIFFER and Napier *et al* (2008), if required.

5.15.1.4. Like the detention basin, the infiltration basin is proposed for an inlet design that will include flow dissipation and a level spreader apparatus to maximise pollutant removal near the inlet and to help reduce erosion. However, a low flow channel is not proposed, as the bed area should be maximised for infiltration over its full extent and there is no opportunity for the water to short-circuit to an outlet.

5.15.1.5. The 2300 m^3 of surface water storage provided by the infiltration basin has been based on the impermeable area of 1.7 ha created by the access road. Microdrainage provides a Quickstorage Estimate of 1700 m^3 - 2400m^3 storage for an event with a 1:100 year return period plus 40% Climate Change and a discharge rate of 3.4l/s. This discharge rate was calculated from 2l/s/ha of impermeable area generating the runoff, as advised within the HR Wallingford Greenfield Runoff Estimation Tool.

5.15.1.6. The final volume of the infiltration basin will be determined by the infiltration capacity of the underlying chalk and treatment filter media, in addition to the maximum groundwater levels, which is still to be confirmed. In the event that greater storage is required, it is anticipated that the surface area of the basin can be increased, but the basin depth and bank gradient should not be increased. Potential exceedance flows from the detention basin in the north may also be accommodated within the infiltration basin and may require an increase in basin storage.

5.15.1.7. Should infiltration rates or the final design allow the volume of surface water storage to be reduced, then the basin should first be made shallower, then bank gradients reduced, in order to maximise the bed area. This is to maximise the infiltration through a larger bed, maximise the water quality treatment benefits from a larger bed, and to maximise the vegetated margins of most benefit to wetland ecology.

5.15.1.8. It is expected that the detention basin will be subject to some vegetation management, such as an annual cut and rake, but this should be confirmed with the ecologist and landscape architect. In addition, removal of sediment build-up may be required. Refer to the Outline Landscape and Biodiversity Strategy (APP-506) for further information.

5.16. SUDS MAINTENANCE

5.16.1.1. Sustainable drainage systems should be designed in accordance with this Strategy and preliminary design drawings in appendix 1 , as well as the policies and guidance identified in Section 2.3 including the CIRIA C753 SuDS Manual, to ensure their suitability for surface water storage and water quality treatment.

5.16.1.2. A SuDS maintenance plan shall be developed to outline requirements for vegetation, removal of potential pollutants, and the carbonate treatment system to ensure the long-term function of the SuDS features. Development of the maintenance plan must include a review of requirements within the CIRIA C753 SuDS Manual, the SNIFFER (UEUW01 & UEUW02, 2008) reports and Napier *et al* (2008) which form the basis of the SuDS treatment design.

5.17. CONCLUSION

5.17.1.1. Surface water is proposed for infiltration to ground and features shall be designed to ensure no exceedance flows for an event with a return period of 100 years + 40% climate change. The size and design of the drainage network and SuDS features is subject to confirmation of infiltration rates, maximum groundwater levels and detailed hydraulic modelling and as such, are currently designed to allow a discharge rate of 2l/s/ha of impermeable surface area producing the runoff.

5.17.1.2. The drainage strategy proposes water quality treatment through a series of proprietary and SuDS systems. Water from the oil containment areas is proposed for the highest level of treatment through a dump tank then oil separator; while runoff from the oily water areas is proposed for treatment through the oil separator. Flow from the oil separator is expected to contain an average hydrocarbon concentration of 1.22mg/l and therefore will pass through SuDS features for additional water quality treatment.

5.17.1.3. The studies by SNIFFER (2008) and Napier *et al* (2008), demonstrate that properly designed SuDS are capable of removing TPH, PAH and heavy metals from infiltrating water, prior to degradation of the organic pollutants for removal from the SuDS system. The results of the lysimeter studies demonstrate that greater than 99.9% of TPH and PAH, and greater 99.84% of heavy metals were removed from the infiltrating water by silty clay loam, proposed to be the treatment filter media for the Aquind UK site. In addition, field studies of functional SuDS demonstrated that soil water at a depth of 0.9m contained a maximum of 0.00099 mg/l (0.99µg/l) of Total PAH, while the TPH concentrations 'either remained or very quickly fell to below the analytical reporting limit' (presented in section 2.10.4). As such, the SuDS design for the Converter Station Area has been informed by the SNIFFER and Napier *et al*

(2008) studies in order to provide water quality treatment and protection of groundwater.

5.17.1.4. The SuDS system will receive discharge from the oil separator which will combine with roof runoff at the detention basin. Roof runoff is proposed for pre-treatment through catch pit chambers with silt traps. At the basin, runoff shall be provided additional treatment prior to discharge via a soakaway.

5.17.1.5. Runoff from low traffic roads within the Converter Station will discharge to gravel areas installed as infiltration drains; while runoff from the site access road will pass to an infiltration swale that has the potential to convey high flows to the southern infiltration basin during extreme events.

5.17.1.6. Basins shall be designed with inlets to dissipate the flow, protect from erosion and maximise pollutant treatment by concentrating this near the basin inlet and allowing any remaining low levels of pollutants to be treated within the remaining basin. The detention basin shall be underlain by minimum of 0.6m of treatment filter media to allow infiltration to an impervious base and underdrains that will convey flow to the soakaway. All other features will allow infiltration to ground and shall be underlain by a minimum of 0.3m of treatment filter media to provide water quality treatment prior to infiltration through the chalk to groundwater. The detailed design of these features shall be developed in accordance with the description provided in this strategy and drawings AQD-WSP-OS-UK-DR-D-200140-141 and AQD-WSP-OS-UK-DR-D-200140-141in Appendix 1.

5.17.1.7. In the event that smaller volumes of storage are required, the basins should be first made shallower, then gradients reduced in order to maximise the bed area and maximise the water quality treatment, ecological benefits and vegetated margins, as well as increased infiltration. The minimum depth of treatment filter media however should remain as specified in this report.

5.17.1.8. Final design of features is to be undertaken in consultation with the ecology and landscape architect in order to maximise benefits of the feature.

5.17.1.9. The above outline strategy shall be subject to the discussion and agreement with PW and EA and will be subjected to a full hydrological risk assessment by the Contractor to ensure no unacceptable risk to the natural environment and sensitive receptors.

6. SCADA SYSTEM

6.1.1.1. The Converter Station control room will have a SCADA system to remotely control and supervise the Interconnector. Part of the functionality of this system is for the system operators to receive and send information that is sent through from the Converter Stations to the appropriate recipients. This information includes (but is not limited to) major alarms, measurements, indications and minor alarms. Within the maintenance and repair plan for the project there will be personnel on standby to respond to any situations that arise.

6.1.1.2. Depending on the type of alarm, for example, a major alarm, it may result in actions ranging from a repair or investigation at the next scheduled maintenance outage or an immediate site visit within a pre-agreed time frame

6.1.1.3. The interval between an alarm being triggered by the control and protection system shall be sent directly to the SCADA and setup interface such as the standby maintenance and repair personnel happens within milliseconds. Which means that there can be a person on site within the agreed time frame.

7. OUTLINE FOUNDATION SOLUTION

7.1.1.1. The Converter Station Area was found to be directly underlain by Head Deposits consist predominantly of gravelly Clays; sometimes becoming clayey Gravel. Generally underlying the Head Deposits was Structureless Grade D Chalk predominately described as Grade Dm with occasional interbedded layers of Dc. Below the Structureless Grade D Chalk, Chalk quality and grade broadly improved with depth becoming Structure Chalk Grades C to A.

Table 2 - Converter Station West Preliminary Ground Model

Strata	Ground model (m AOD) (unit thickness (m))	Description
Head Deposits	85.00-84.20 (0.80)	Firm to stiff red brown CLAY with gravel and cobble content. Occasionally gravel content becomes such it is clayey GRAVEL.
Structureless Chalk (Grade D)	84.20-76.90 (7.30)	Consisting of both Grade Dm and DC Chalk, interbedded throughout with no distinguishable boundary or profiling.
Structured Chalk (Grade C – A)	76.90-55.00 (21.90+)	Very low to medium density, density increasing with depth. Flint bands were noted during drilling, theses were often thin (0.10-0.30m thick) and occurred between change of grades. There were six notable grade changes. Zones of core loss were recorded within BH29 and BH30, this is considered to be due to flint bands marking the transition from Grade B to C Chalk, with the flint causing loss of recovery. Grade A was noted between 79.06-74.56m AOD and 64.06-58.06m AOD.
Groundwater	40.00-30.00m AOD Informed by Portsmouth Water	The groundwater depth was informed by the Portsmouth Water representatives, who have a monitoring well within 1.00km of the site and detailed groundwater mapping records.

Strata	Ground model (m AOD) (unit thickness (m))	Description
		Groundwater is known to become shallower from north to south.

7.1.1.2. The majority of the potential fill material will consist of Grade D chalk and head deposits. On-site reworked fill is unlikely to be suitable for shallow foundations above 75KPa as it would not be able to achieve bearing resistance greater than this or the 25mm long term settlement. Where bearing resistance and/or settlement and differential settlement requirements are not met for shallow foundations, deep foundation options such as piles shall be considered. Total and differential settlement limits shall be confirmed by the switchgear and plant manufacturer.

Table 3 – Classification of Chalk by Discontinuity Spacing

Grade	Description
D	Structureless or remoulded mélange.
C	Typical Discontinuity aperture >3 mm
B	Typical Discontinuity aperture <3 mm
A	Discontinuities closed.

7.1.1.3. The presence of the identified karstic features can accelerate water permeation from surface to the aquifer. CIRIA C574 Engineering in Chalk identifies the following treatment strategies for dissolution/karstic features:

- Excavation and replacement with compacted suitable material.
- Bridging.
- Ground stabilisation by grouting.
- Ground treatment by grouting.
- Piling.
- Control of drainage.

7.1.1.4. Groundwater and groundwater flow has a fundamental influence on bedrock dissolution and the formation of karstic features. As such, it was identified that the control of surface water drainage, drainage within the ground and the foundation solution will therefore need to be carefully considered during the detailed design of the Converter Station to avoid increasing the risk of dissolution .

7.1.1.5. It was confirmed by PW and EA that karst stabilisation and treatment by grouting will be their preferred solution. The grouting of the karst features to be carried out as part of the earthworks activity to create the Converter Station platform. In-line with CIRIA C574, to minimise influence of grouting on the SPZ1, a grout mix that is of suitable composition, control and cure time to is required to be proposed to PW and EA for their review and comment.

7.1.1.6. A suitable approach to mitigate karstic risk to the foundations will be piling. This will be reviewed at detailed design when foundation locations and Converter Station layout plans are available. Where possible, access track, cable routes, structures and drainage infrastructure will be moved to avoid known dissolution features. Where this is not possible, the appropriate treatment, or risk management, will be determined and at detailed design.

7.1.1.7. The preliminary Piling Works Risk Assessment ('PWRA') in Appendix 6 has been prepared based on pre-cast driven piles as this was discussed with PW and EA at a meeting on 18 July 2019 and considered to have the lowest impact on the chalk aquifer and conditions set by Portsmouth Water around SPZ1 designation. The indicated pre-cast piles can be up to 15m long from the Converter station proposed formation level (formation level is usually about 1.0m below finished converter station level of 84.80m AOD). This is subject to the detailed design.

7.1.1.8. The PWRA will ensure that piling operations do not form a pathway for the migration of contamination at the surface (either existing contaminants, those that form part of the pilling process or those that might be introduced during the operation of the Converter Station) to the aquifer.

7.1.1.9. A piling specialist shall be required to be employed to prepare a project specific piling risk assessment. The risk assessment shall be shared with PW and EA for review and comments in advance of the procurement and construction.

8. MAINTENANCE STRATEGY

8.1.1.1. Civil and building infrastructure in its entirely shall be designed to meet the functional requirements for a minimum of 40 years. The design and construction detail shall be such that future inspection and maintenance is minimised.

8.1.1.2. An Installation, Operation and Maintenance manual shall be prepared prior to commissioning and handover.

8.1.1.3. The Converter Station shall have access roads that provide vehicular access adequate for the safe operation, maintenance and replacement of the entire Converter Station (equipment and civil infrastructure).

8.1.1.4. The Converter Station shall be designed to ensure the Mobile Elevating Work Platform ('MEWP') access can be taken, over both access roads and the general compound, to all applicable outdoor equipment for maintenance purposes.

8.1.1.5. The main access road and skidways immediately adjacent to the transformers and oil filled reactor shall be fitted with kerbs and gullies and an associated gravity drainage system which shall be connected to the oil separator. This is to ensure any minor spillage during transformer maintenance work are effectively contained and discharged through the oily drainage system.

8.1.1.6. Oil Separators and septic tanks, cess pools shall be sited adjacent or close to roads to facilitate access for maintenance vehicles.

8.1.1.7. Oil-Petrol Separator shall be full retention class 1 separators with integral silt collection and quality of discharge sampling facilities, together with integral coalescing and automatic closure mechanisms to prevent the flow through the unit in case of excessive oil levels. The Coalescer units shall comprise oil resistant fire-retardant material and be cable of removal for maintenance or replacement.

8.1.1.8. SuDS features are likely to have a more frequent inspection and maintenance regime than traditional drainage system. The Contractor shall prepare SuDS operation and maintenance strategy in compliance with CIRIA C753 and issue to the Employer for review and comment.

8.1.1.9. A project specific Civil Asset Management plan shall be prepared. The plan shall incorporate a Drainage Management section which shall, as a minimum, provide details of all drainage infrastructure, highlight any critical exceptional infrastructure and shall include details of the inspections and maintenance regime required for each element of the infrastructure.

8.1.1.10. The minimum maintenance timescales to the equipment within table 8-1 is likely to be as indicated. This is subject to further development by the Contractor at the detailed design stage in consultation with the equipment providers.

Table 4 - Indicative Maintenance Schedule

Item	Activity	Time Scales*
Bund Water Control Units	Clean/Inspect	Annually
Oil Separator and Alarms	Clean/Inspect	Annually
Lighting (LED)	Clean/Inspect	On bulb failure/every years
HVAC	Clean/Inspect	Every year/In attendance with MEP O&M manual
Site Drainage	Clean	Annually
Septic Tanks/Cess Tank	Clean	When required
EOT Cranes	Clean/inspect	Annually
Building Cladding	Inspect/Localised repair	Annually
Electrified External fence	Inspect	Annually
Deluge system (if necessary for the project)	Test	To be agreed
SuDS	Clean/Inspect	In compliance with CIRIA C753

***Indicated time scales are indicative and are subject to review and confirmation by the equipment supplier at the detailed design stage.

9. CONSTRUCTION SURFACE WATER MANAGEMENT

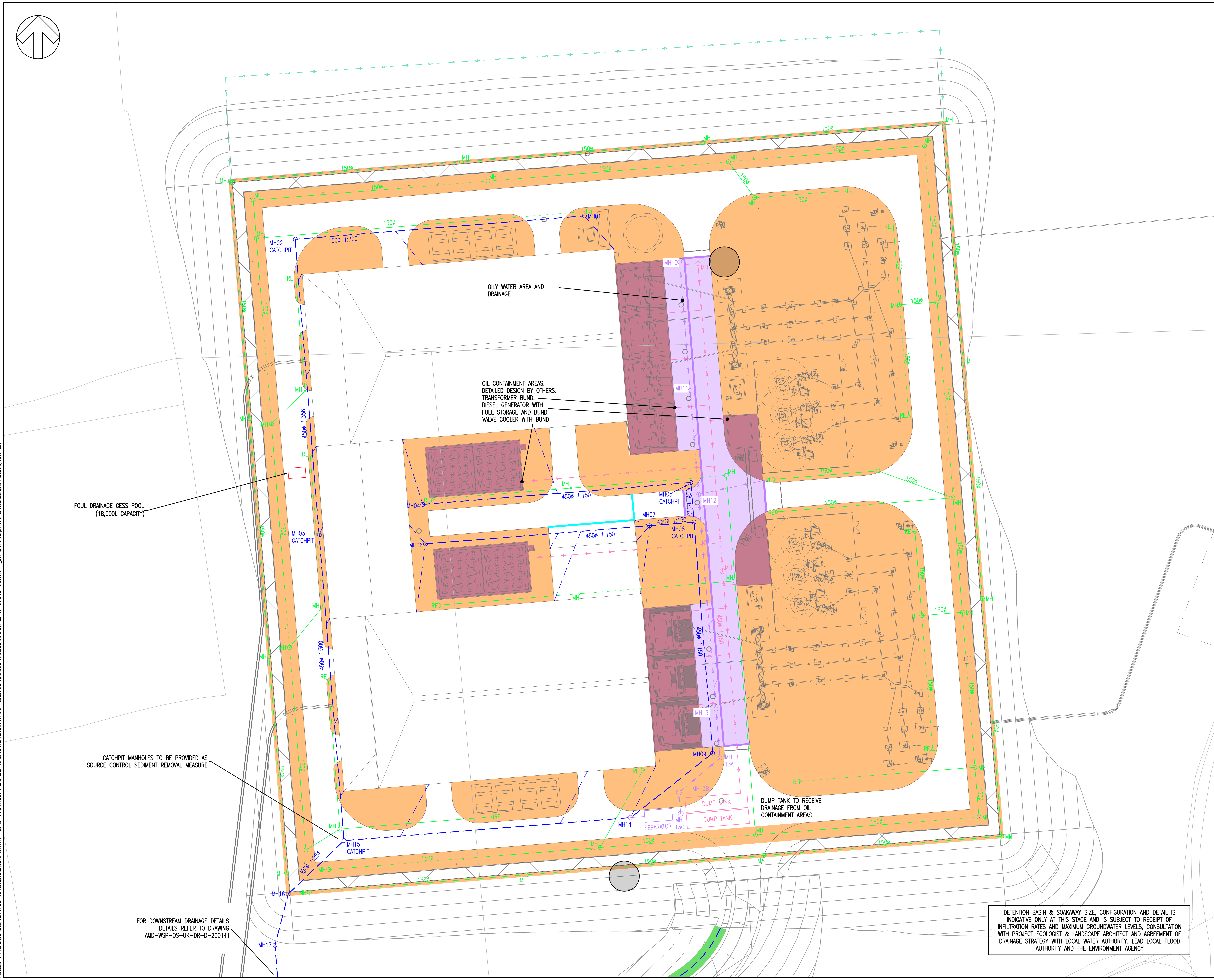
9.1.1.1. For construction surface water management, refer to section 6.3.5 of the Onshore Outline Construction Environmental Management Plan (‘OOCEMP’).

10. REFERENCES

- National Grid Technical Specification 2.10.01- Issue 1 – April 2017 : Oil Containment
- National Grid technical Specification 2.10.09 – Issue 1 – April 2017 : Site Drainage
- Environment Agency (2001a) PPG1 General Guide to the Prevention of Pollution.
- Environment Agency (2011a) PPG2 Above Ground Oil Storage Tanks.
- Environment Agency (2006) PPG3 Use and design of oil separators in surface water drainage systems.
- Environment Agency (2007a) PPG5 Works and Maintenance In or Near Water.
- Environment Agency (2010) PPG6 Working at Construction and Demolition Sites.
- Environment Agency (2011) PPG7 The safe operation of refuelling facilities.
- Environment Agency (2004) PPG8 Safe Storage and Disposal of Used Oils.
- Environment Agency (2007b) PPG13 Vehicle Washing and Cleaning.
- Environment Agency (2000) PPG18 Managing fire water and major spillages.
- Environment Agency (2009) GPP21 Pollution incident response planning.
- Environment Agency (2011c) PPG22 Dealing with Spills.
- Environment Agency (2001) PPG25 Development and Flood Risk.
- Environment Agency (2011) PPG26 Storage and handling of drums and intermediate bulk containers.
- Environment Agency (2011d) PPG27 Installation, decommissioning and removal of underground storage tanks.
- Discharges to surface water and groundwater environmental permits (EA guidance)
- Pollution prevention for businesses (EA guidance)
- The Environment Agency's approach to groundwater protection
- British Standard BS 10175 (2011) Investigation of Potentially Contaminated Sites
- Department for Environment, Food and Rural Affairs (Defra) (2012) Environmental Protection Act 1990: Part 2A- Contaminated land Statutory Guidance

- Environment Agency (2012) Groundwater Protection: Principles and Practice (GP3)
- Environment Agency (2004) Contaminated Land Report 11
- BS EN 752 2008 Drain and Sewer Systems Outside of Buildings (2017)
- BS EN 12056 Gravity drainage inside buildings
- CIRIA C532 Control of water Pollution from Construction Sites. Construction
- Industries Research Association;
- CIRIA C502 Environmental Good Practice on Site. Construction Industries
- CIRIA C697 The SuDS manual.
- CIRIA C650 Control of Water Pollution in form Construction Sites – Guidance for Consultants and Contractors
- CIRIA C753 SuDS Manual
- Sewers for Adoption (SFA) 7th Edition
- Local Authority Standards
- Building Regulations Part H Drainage and Waste Disposal
- SNIFFER UEUW01: Source control pollution in Sustainable Drainage (Final Report, February 2008)
- SNIFFER UEUW01: Source control pollution in Sustainable Drainage: Supplementary Report (Draft Report, September 2008)
- SNIFFER UEUW02: SuDS Pollution Degradation (Final Report, October 2008)
- Napier, , F; Jefferies, C; Heal, KV; Fogg, P; D'Arcy, BJ; Clarke, R. (2008) Evidence of traffic-related pollutant control in soil-based Sustainable Urban Drainage Systems (SUDS). Edinburgh, Scotland. (Referenced below as Napier et al 2008a)
- Napier, F.; D'Arcy, B.J.; Jefferies, C.; Fogg, P.; Lowe, W.; Clarke, R.; (2008) Oil and SUDS: managing a priority urban pollutant. 12th International Conference on Integrated Diffuse Pollution Management, Khon Kaen University, Thailand. (Referenced below as Napier et al 2008b)
- Non-statutory technical standards for sustainable drainage systems

Appendix 1 – Proposed Surface Water Drainage (DRAFT)



DETENTION BASIN & SOAKAWAY SIZE, CONFIGURATION AND DETAIL IS INDICATIVE ONLY AT THIS STAGE AND IS SUBJECT TO RECEIPT OF INFILTRATION RATES AND MAXIMUM GROUNDWATER LEVELS, CONSULTATION WITH PROJECT ECOLOGIST & LANDSCAPE ARCHITECT AND AGREEMENT OF DRAINAGE STRATEGY WITH LOCAL WATER AUTHORITY, LEAD LOCAL FLOOD AUTHORITY AND THE ENVIRONMENT AGENCY

DO NOT SCALE

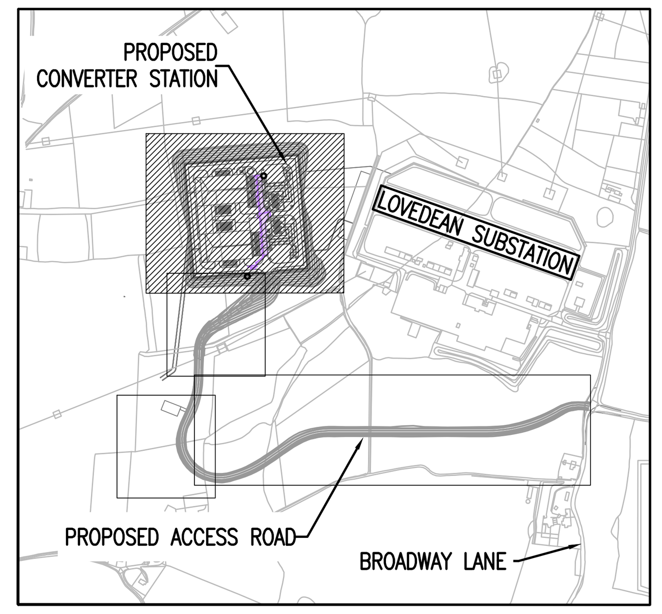
NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS, SCHEDULES AND SPECIFICATIONS INCLUDING:
   - AQD-WSP-OS-UK-RP-D-200001 AQUIND UK AQUIFER CONTAMINATION PREVENTION STRATEGY
   - AQD-WSP-OS-UK-DR-D-200141 BELOW GROUND DRAINAGE LAYOUT (SHEET 2 of 2)
   - AQD-WSP-OS-UK-DR-D-200340 BELOW GROUND DRAINAGE TYPICAL DETAIILS

KEY:

- SURFACE WATER DRAINAGE
- SURFACE WATER FILTER DRAIN (SITE)
- SURFACE WATER FILTER DRAIN (EARTHWORKS)
- SURFACE WATER DRAINAGE CHANNEL
- DRAINAGE FROM OIL CONTAINMENT AREA
- OIL CONTAINMENT AREA (BUND)
- OILY WATER DRAINAGE
- OILY WATER DRAINAGE CHANNEL
- OILY WATER DRAINAGE AREAS
- GRAVEL SURFACE AREAS
- SuDS – SWALE
- SUDS – DETENSION BASIN
- SUDS – INFILTRATION BASIN
- SUDS – SOAKAWAY
- KARST FEATURES

LOCATION PLAN:



REV	DATE	BY	DESCRIPTION	CHK	APP
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P01	10/07/2019	KR	FIRST ISSUE	MD	PW

DRAWING STATUS:

S2 - FOR INFORMATION

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CLIENT: AQUIND

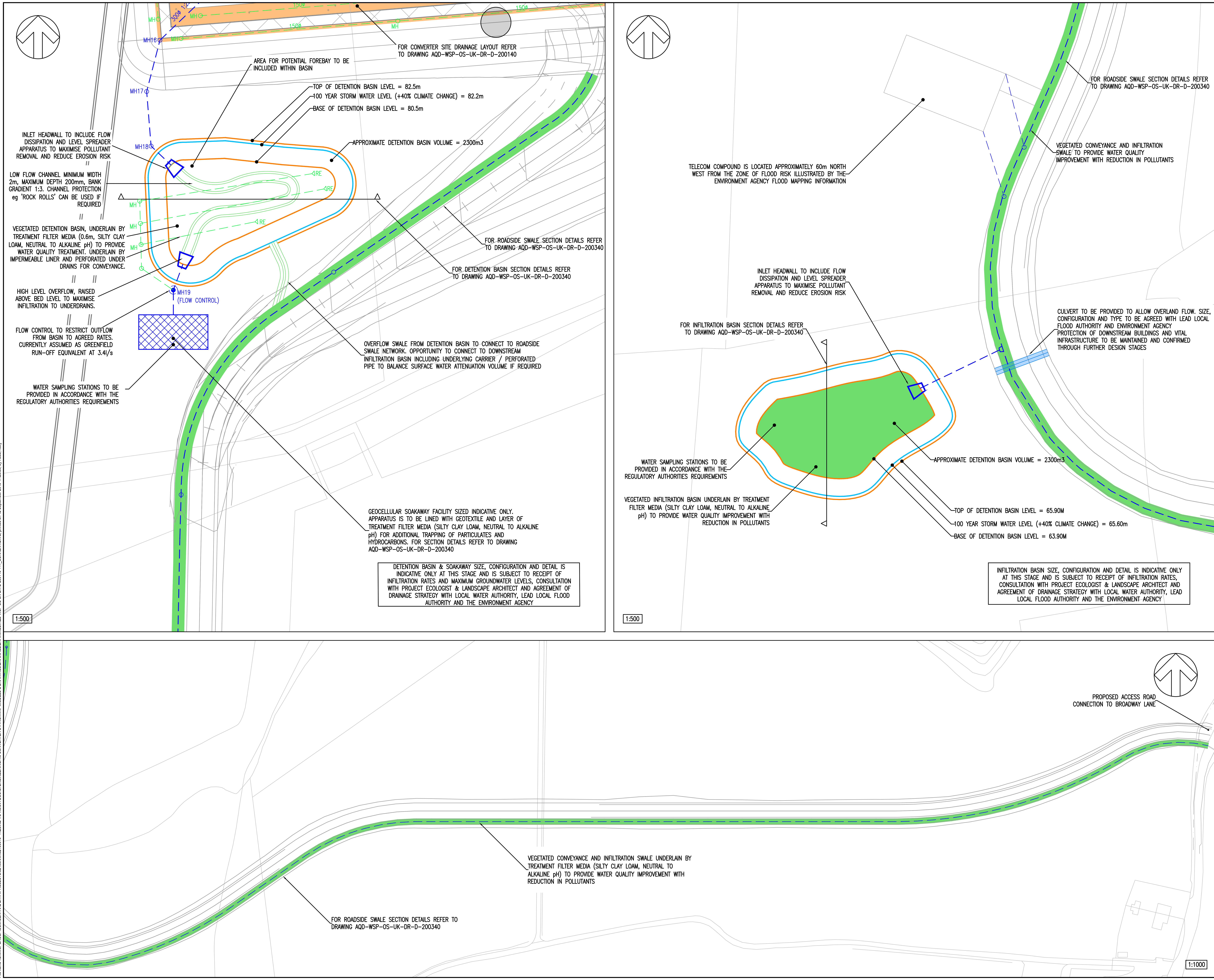
ARCHITECT: -

SITE/PROJECT: AQUIND HVDC INTERCONNECTOR

TITLE: BELOW GROUND DRAINAGE LAYOUT (SHEET 1 OF 2)

SCALE @ A1:	CHECKED:		APPROVED:
1:500m	MD		PWW
PROJECT NO:	DESIGNED:	DRAWN:	DATE:
62100616	KR / PWW	KR	September 19

DRAWING No: AQD-WSP-OS-UK-DR-D-200140 REV: P01



DO NOT SCALE

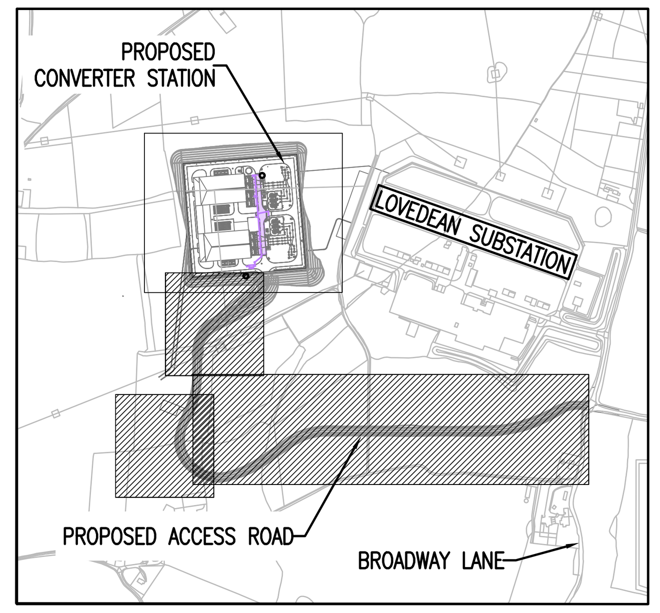
NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS, SCHEDULES AND SPECIFICATIONS INCLUDING:
   - AQD-WSP-OS-UK-RP-D-200001 AQUIND UK AQUIFER CONTAMINATION PREVENTION STRATEGY
   - AQD-WSP-OS-UK-DR-D-200140 BELOW GROUND DRAINAGE LAYOUT (SHEET 1 of 2)
   - AQD-WSP-OS-UK-DR-D-200340 BELOW GROUND DRAINAGE TYPICAL DETAILS

KEY:

- SURFACE WATER DRAINAGE
- SURFACE WATER FILTER DRAIN (SITE)
- SURFACE WATER FILTER DRAIN (EARTHWORKS)
- SURFACE WATER DRAINAGE CHANNEL
- DRAINAGE FROM OIL CONTAINMENT AREA
- OIL CONTAINMENT AREA (BUND)
- OILY WATER DRAINAGE
- OILY WATER DRAINAGE CHANNEL
- OILY WATER DRAINAGE AREAS
- GRAVEL SURFACE AREAS
- SuDS - SWALE
- SUDS - DETENSION BASIN
- SUDS - INFILTRATION BASIN
- SUDS - SOAKAWAY
- KARST FEATURES

LOCATION PLAN:



REV	DATE	BY	DESCRIPTION	CHK	APP
P02	12/09/2019	KR	UPDATED BASIN WITH UNDERDRAINS AND OTHER SUDS TO INCLUDE TREATMENT FILTER MEDIA. UPDATED OILY WATER AND OIL CONTAINMENT AREAS WITH SEPARATE DRAINAGE. UPDATED GRAVEL AREAS WITH UNDERDRAIN.	PW	NM
P01	10/07/2019	KR	FIRST ISSUE	MD	PW

DRAWING STATUS: S2 - FOR INFORMATION

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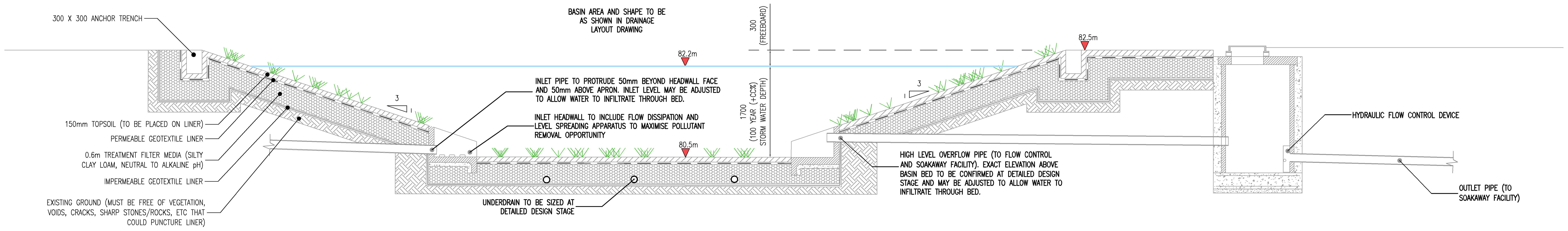
TITLE: BELOW GROUND DRAINAGE LAYOUT (SHEET 2 OF 2)

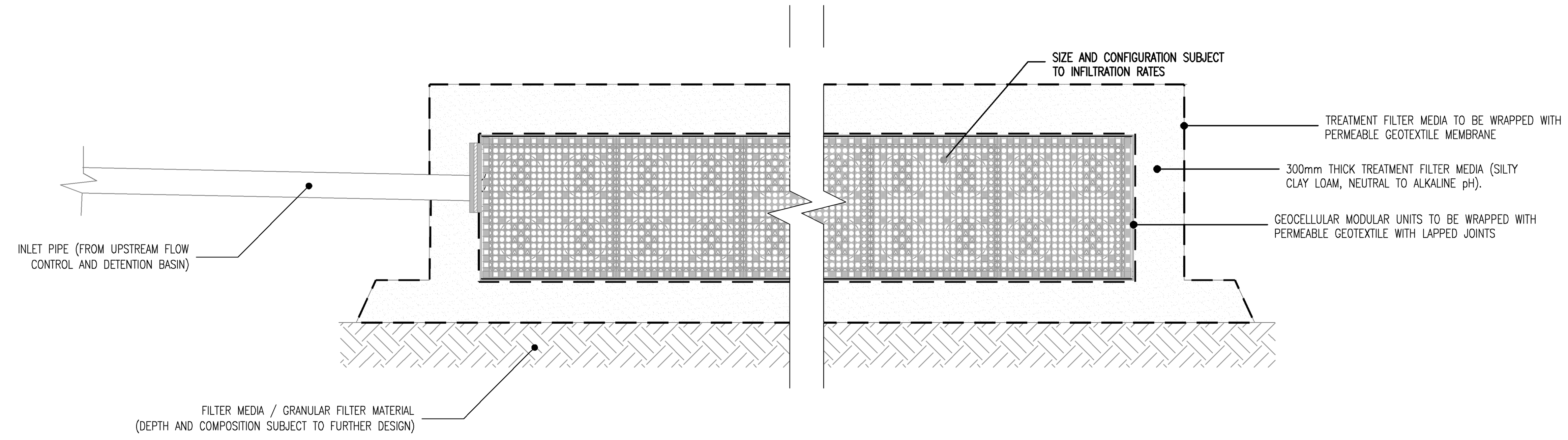
SCALE @ A1: AS SHOWN	CHECKED: MD		APPROVED: PWW
PROJECT NO: 62100616	DESIGNED: KR / PWW	DRAWN: KR	DATE: September 19

DRAWING No: AQD-WSP-OS-UK-DR-D-200141 — REV: P01

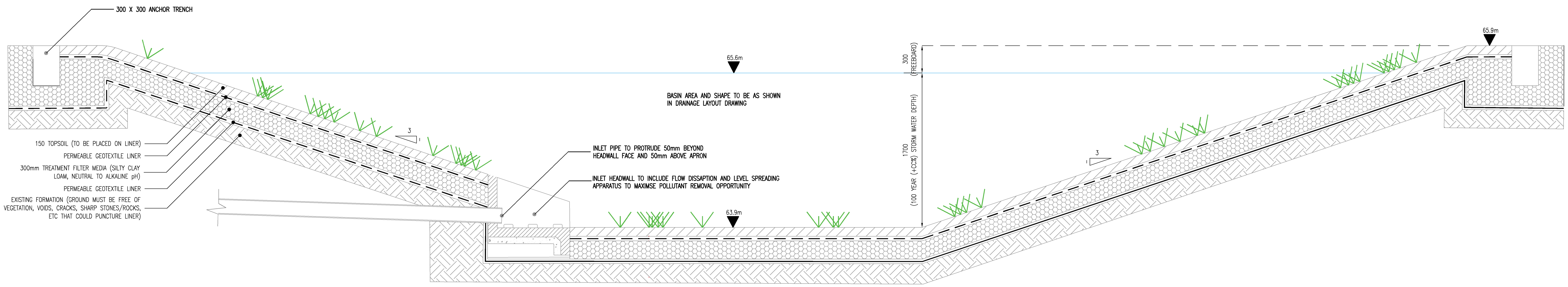
File name: \\UK.WSPGROUP.COM\CENTRAL DATA\PROJECTS\62100XXX\62100616 - AQUIND WO NO.3\A DCAC ENGINEERING\4.0 CONVERTER STATION\WIP\MODELS & DRAWINGS\DRAINAGE\DRAWINGS\AQD-WSP-OS-UK-DR-D-200140-141_CURRENT.DWG, printed on 12 September 2019 17:26:39, by Rose, Kelly



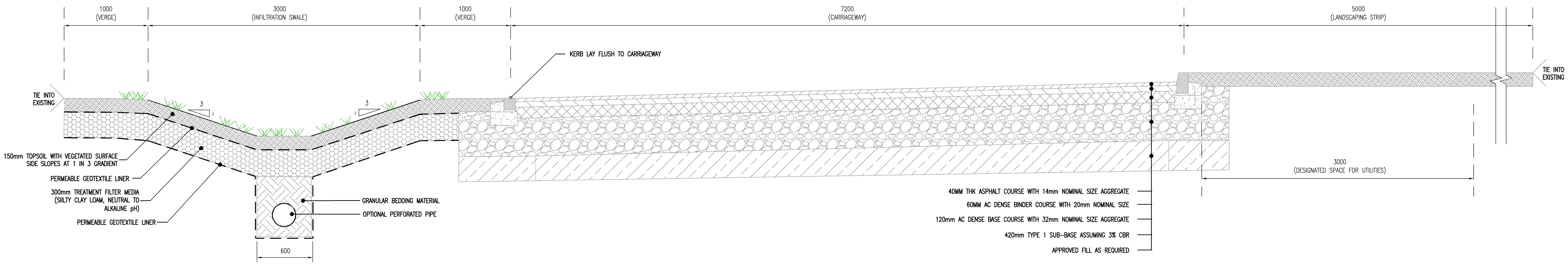
DETENTION BASIN
(NTS)



GEOCELLULAR SOAKAWAY
(NTS)



INFILTRATION BASIN
(NTS)



ACCESS ROAD WITH INFILTRATION SWALE
(NTS)

DO NOT SCALE

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS, SCHEDULES AND SPECIFICATIONS INCLUDING:
   - AQD-WSP-OS-UK-RP-D-200001 AQUIND UK AQUIFER CONTAMINATION PREVENTION STRATEGY
   - AQD-WSP-OS-UK-DR-D-200140 BELOW GROUND DRAINAGE LAYOUT (SHEET 1 OF 2)
   - AQD-WSP-OS-UK-DR-D-200141 BELOW GROUND DRAINAGE LAYOUT (SHEET 2 OF 2)
2. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
3. FOR ACCESS ROAD CONSTRUCTION IT IS ASSUMED THAT THESE ROADWAYS WILL BE REGULARLY USED BY HEAVY VEHICLES.

   DETAIL PROVIDED IS APPLICABLE FOR SUBGRADE CBR VALUES OF 3.0%. ADVICE TO BE SOUGHT IF SUBGRADE IS FOUND TO BE WEAKER THAN 3.0%.

   ACCESS ROAD IS NOT TO BE USED BY CONSTRUCTION TRAFFIC ACCESSING THE SITE WHILST IN A TEMPORARY STATE UNTIL THE DENSE BINDER CAUSE IS APPLIED TO THE ROAD CONSTRUCTION.
4. FINAL DESIGN, SELECTION OF MATERIAL AND CONSTRUCTION IS TO BE IN ACCORDANCE WITH CIRIA C753 GUIDANCE AND DESIGN REQUIREMENTS FOR WATER QUALITY TREATMENT (CHAPTER 26) AND MAINTENANCE:

   TREATMENT FILTER MEDIA TO BE AS SPECIFIED IN AQD-WSP-OS-UK-RP-D-200001 AQUIND UK AQUIFER CONTAMINATION PREVENTION STRATEGY: SILTY CLAY LOAM (HOST CLASS 18), WITH A NEUTRAL OR ALKALINE pH. ACIDIC SOIL IS NOT SUITABLE AND SHOULD NOT BE USED. NITROGEN OR OTHER SUBSTANCES SHOULD NOT BE ADDED TO THE SUDS OR THE TREATMENT FILTER MEDIA. THE DEPTH AND TYPE OF TREATMENT FILTER MEDIA SHOULD BE AS SPECIFIED AND NOT REDUCED OR CHANGED WITHOUT AGREEMENT FROM WSP, PORTSMOUTH WATER AND THE ENVIRONMENT AGENCY. SHOULD ANOTHER TYPE OF FILTER MEDIA BE REQUIRED THIS SHOULD BE IN ADDITION TO THE TREATMENT FILTER MEDIA AND SHOULD NOT REPLACE THE MATERIAL.

REV	DATE	BY	DESCRIPTION	CHK	APP
P02	12/09/19	KR	SPECIFIED DEPTH AND TYPE OF TREATMENT FILTER MEDIA AND GEOTEXTILE MEMBRANES	PWW	NM
P01	10/07/19	RF	FIRST ISSUE	MD	PWW

DRAWING STATUS: S2 - FOR INFORMATION

wsp

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T+ 44 (0) 191 226 2000, F+ 44 (0) 191 226 2104
wsp.com

CLIENT: AQUIND

ARCHITECT: -

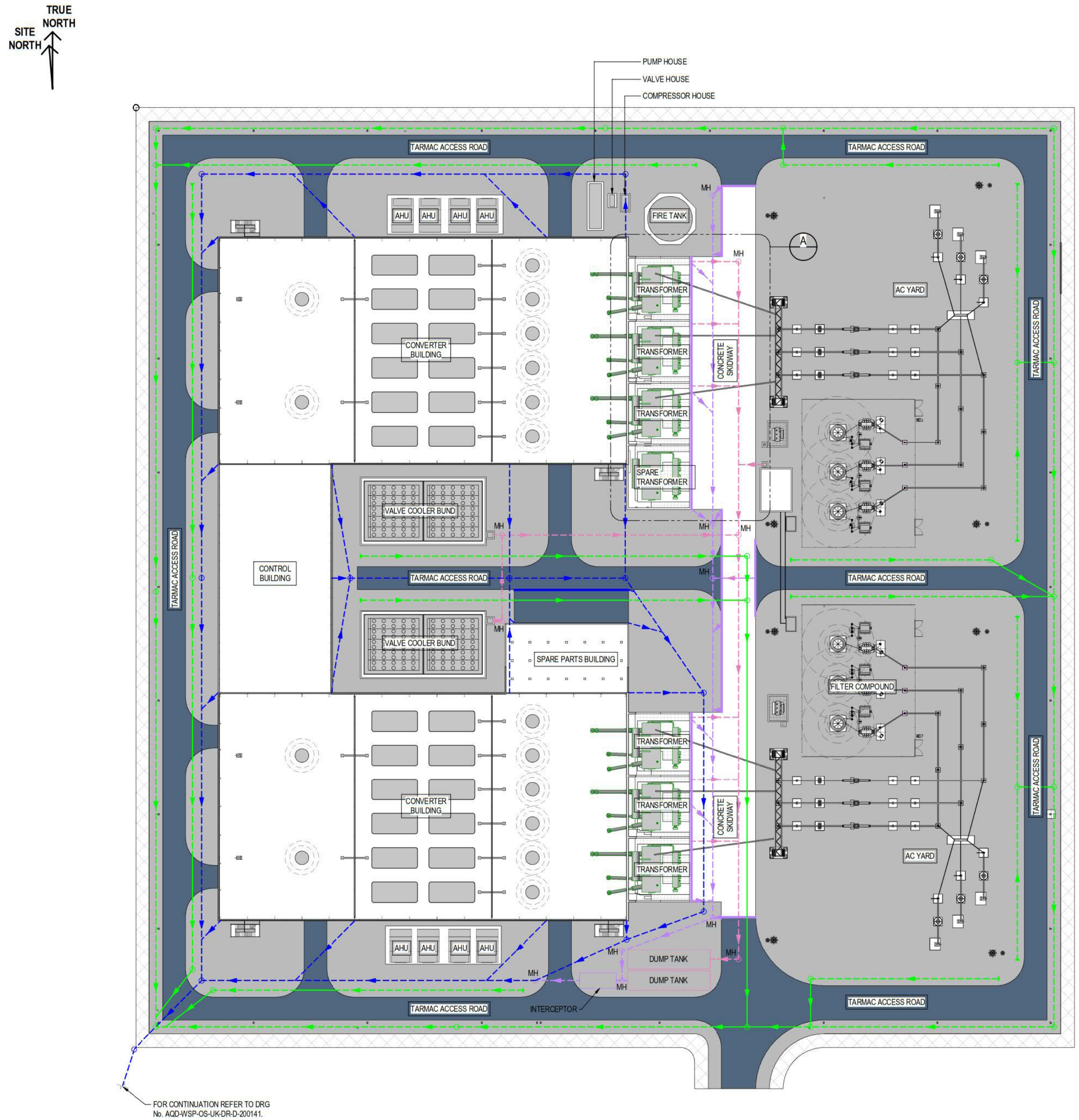
SITE/PROJECT: AQUIND HVDC INTERCONNECTOR

TITLE: BELOW GROUND DRAINAGE TYPICAL DETAILS

SCALE @ A1: NTS	CHECKED: MD		APPROVED: PWW
PROJECT NO: 62100616	DESIGNED: KR / PWW	DRAWN: RF	DATE: September 19

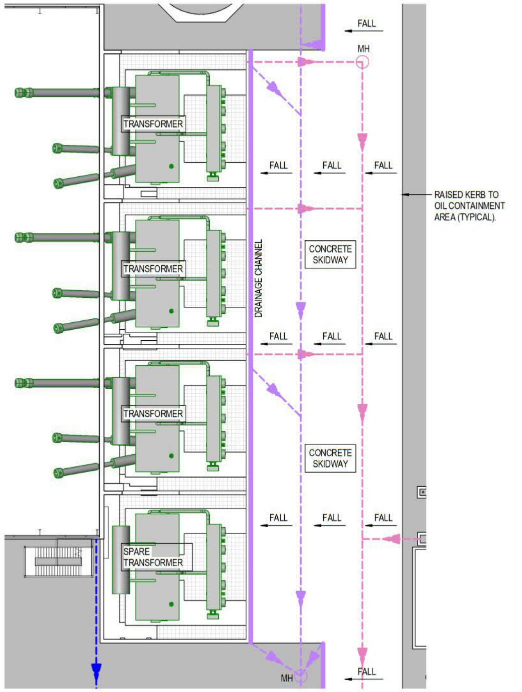
DRAWING No: AQD-WSP-OS-UK-DR-D-200340 — REV: P02

Appendix 2 – Typical Oil Containment Details



INDICATIVE OIL CONTAINMENT AREA

1 : 500



DETAIL A - TYPICAL ENLARGED TRANSFORMER SKIDWAY DETAILS

1 : 250

NOTES:-

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, SERVICES AND ENGINEERS DRAWINGS TOGETHER WITH RELEVANT SPECIFICATIONS.
2. DIMENSIONS ARE NOT TO BE SCALED FROM THIS DRAWING.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH BELOW GROUND DRAINAGE LAYOUTS SHOWN ON DRG No's. AQD-WSP-OS-UK-DR-D-200140 (SHEET 1) AND AQD-WSP-OS-UK-DR-D-200141 (SHEET 2).

LEGEND:-

- OIL CONTAINMENT DRAINAGE
- OILY WATER DRAINAGE
- OILY WATER DRAINAGE CHANNEL
- SURFACE WATER DRAINAGE
- SURFACE WATER DRAINAGE CHANNEL
- LAND DRAINAGE
- MH — MANHOLE

REV	DATE	BY	DESCRIPTION	CHK	APP
00	01.07.20	PB	ISSUED FOR INFORMATION	HM	MM

DRAWING STATUS:

INFORMATION

WSP House, 70 Chancery Lane, London WC2A 1AF
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http://www.wsp.com

CLIENT:

AQUIND

PROJECT:

AQUIND INTERCONNECTOR
2 x 1000MW HVDC MONOPOLE
LOVEDEAN UK

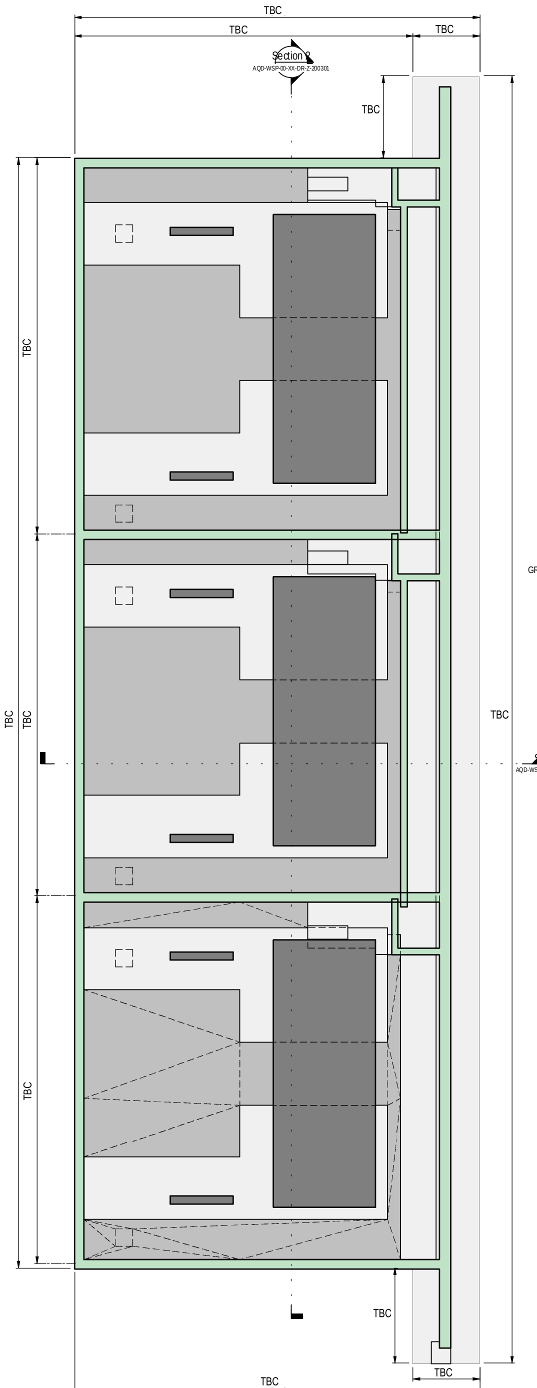
TITLE:

INDICATIVE OIL CONTAINMENT LAYOUT

SCALE AT A1:	CHECKED:	APPROVED:
AS NOTED	HM	MM
PROJECT No: 62100616	DESIGNED: DRAWN: PB	DATE: JUNE 2020
DRAWING No: AQ-WSP-UK-CS-DR-Z-200807		REV: P01

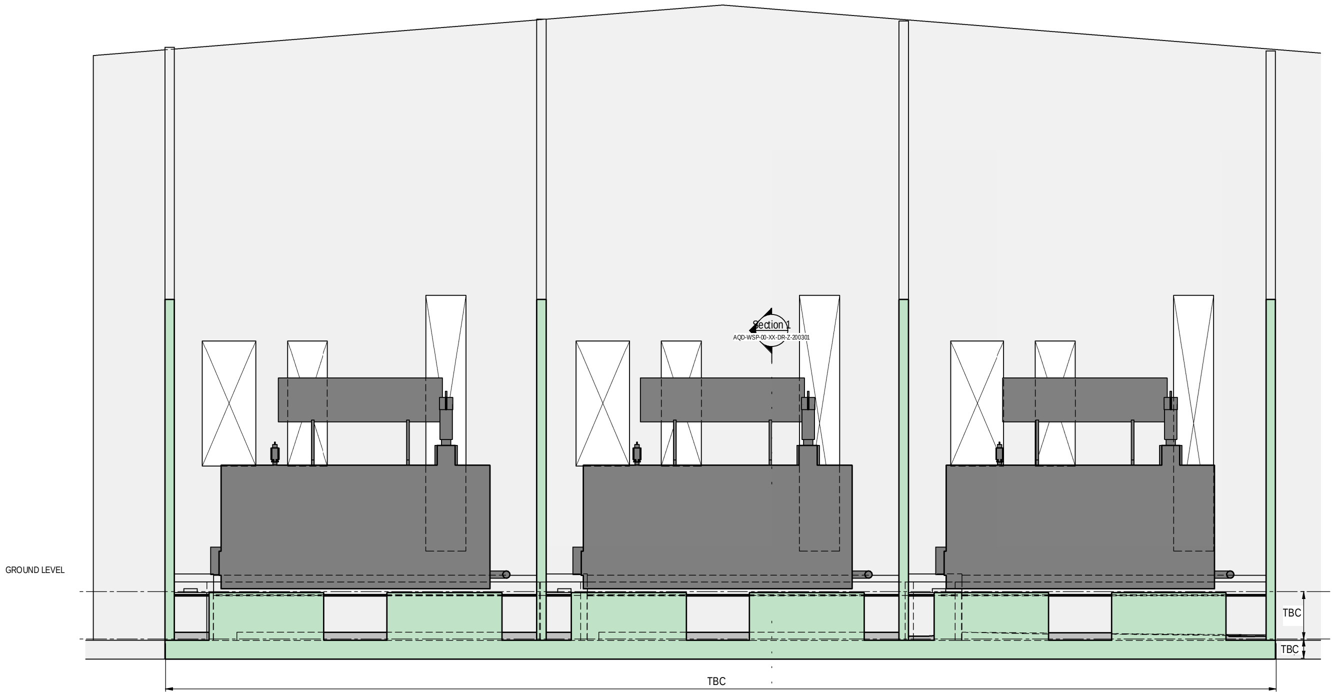
NOTE:-

ALL DETAILS SHOWN ARE INDICATIVE AND WILL SUBJECT TO FINAL DESIGN BY THE CONTRACTOR.



GROUND LEVEL

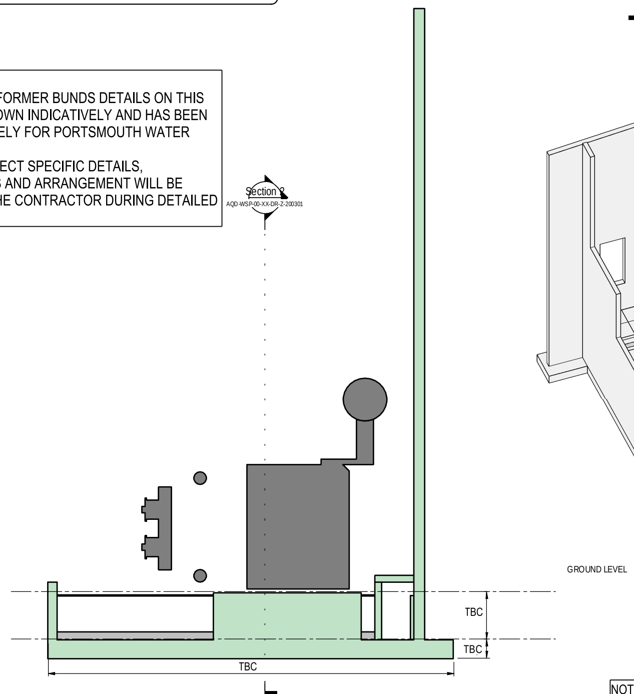
1 : 100



Section 2

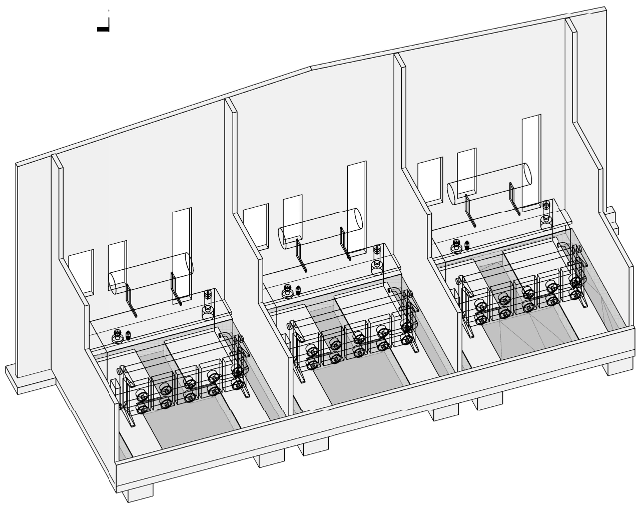
1 : 100

NOTE:
TYPICAL TRANSFORMER BUNDS DETAILS ON THIS DRAWING IS SHOWN INDICATIVELY AND HAS BEEN PRODUCED SOLELY FOR PORTSMOUTH WATER INFORMATION.
FINAL AND PROJECT SPECIFIC DETAILS, SPECIFICATIONS AND ARRANGEMENT WILL BE PROVIDED BY THE CONTRACTOR DURING DETAILED DESIGN STAGE.



Section 1

1 : 100



NOTE:
ALL DETAILS SHOWN ARE INDICATIVE AND WILL SUBJECT TO FINAL DESIGN BY THE CONTRACOTR

NOTES:

1. DRAWING IS FOR PRELIMINRY PURPOSES ONLY.
2. FOUNDATION SIZES INDICATED ARE SHOWN INDICATIVELY
3. MAXIMUM PERMISSIBLE DIFFERENTIAL SETTILEMENT TO BE NO GREATER THAN 25mm SUBJECT TO CONFIRMATION FROM ELECTRICAL EQUIPMENT PROVIDER.

Infrastructure Planning (Applications: Prescribed Forms & Procedure) Regulations 2009 - Regulation 5(2)(i)

REV	DATE	BY	DESCRIPTION	CHK	APP
P01	01.07.20	PB	ISSUED FOR INFORMATION	HM	MM

DRAWING STATUS: INFORMATION

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http://www.wsp.com

CLIENT: AQUIND

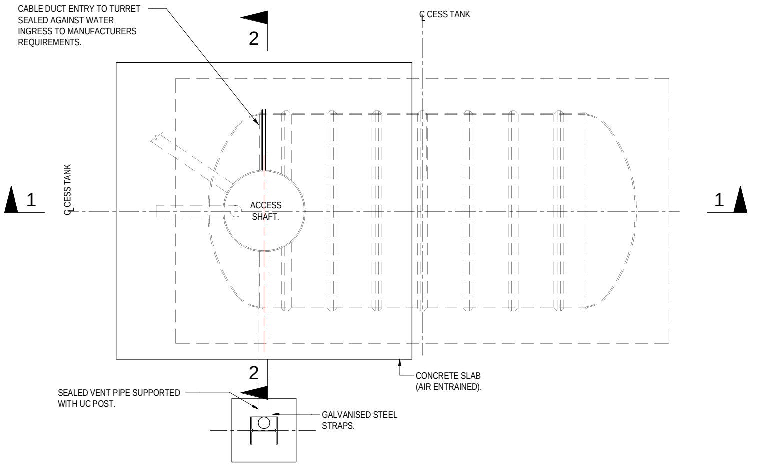
PROJECT:
AQUIND INTERCONNECTOR
2X1000MW HVDC MONOPOLE
LOVEDEAN UK

TITLE:
TYPICAL TRANSFORMER BUND INDICATIVE ARRANGEMENT

SCALE AT A1:	CHECKED:		APPROVED:
1:100	HM		MM
PROJECT No:	DESIGNED:	DRAWN:	DATE:
EN020022		PT	SEPTEMBER 2018

DRAWING No: AQ-WSP-UK-CS-DR-Z-200301 REV: P01

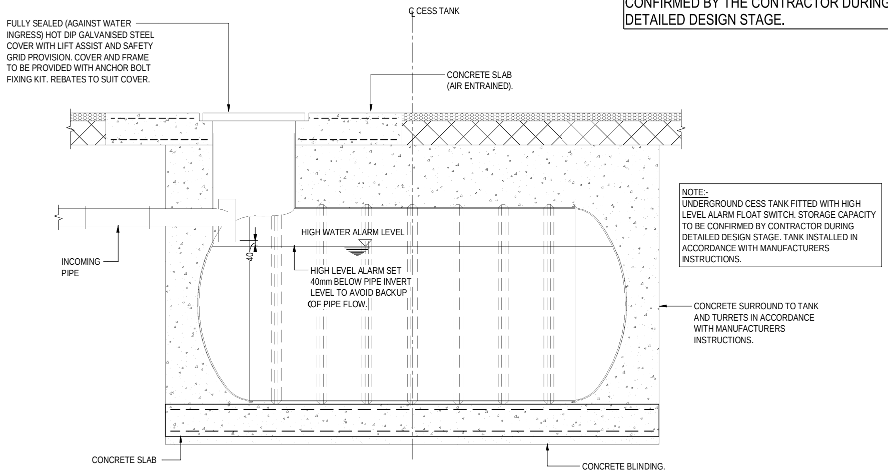
Appendix 3 – Typical Cess tank Details



PLAN ON CESS TANK

(SCALE 1:25)

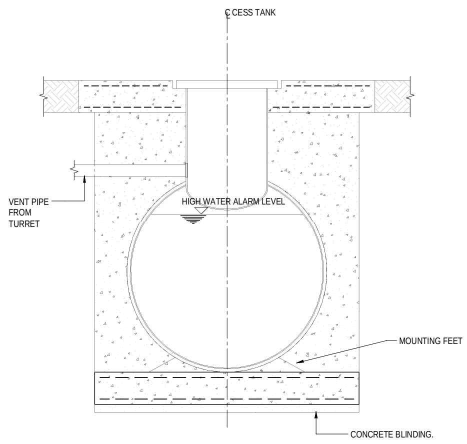
NOTE:
TYPICAL CESS TANK DETAILS ON THIS DRAWING IS SHOWN INDICATIVELY AND HAS BEEN PRODUCED SOLELY FOR PORTSMOUTH WATER INFORMATION. FINAL AND PROJECT SPECIFIC DETAILS, SPECIFICATIONS AND SETTING OUT WILL BE CONFIRMED BY THE CONTRACTOR DURING DETAILED DESIGN STAGE.



NOTE:-
UNDERGROUND CESS TANK FITTED WITH HIGH LEVEL ALARM FLOAT SWITCH. STORAGE CAPACITY TO BE CONFIRMED BY CONTRACTOR DURING DETAILED DESIGN STAGE. TANK INSTALLED IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.

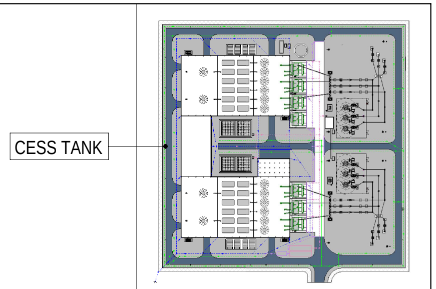
SECTION 1-1

(SCALE 1:25)



SECTION 2-2

(SCALE 1:25)



PLAN ON AQUIND CONVERTER STATION

Infrastructure Planning (Applications: Prescribed Forms & Procedure) Regulations 2009 - Regulation 5(2)(i)

REV	DATE	BY	DESCRIPTION	CHK	APP
P01	01.07.20	PB	ISSUED FOR INFORMATION	HM	MM

DRAWING STATUS: INFORMATION

wsp

WSP House, 70 Chancery Lane, London WC2A 1AF
Tel: +44 20 7314 5000 Fax: +44 20 7314 5111
http://www.wsp.com

CLIENT: AQUIND

PROJECT: AQUIND INTERCONNECTOR
2X1000MW HVDC MONOPOLE
LOVEDEAN UK

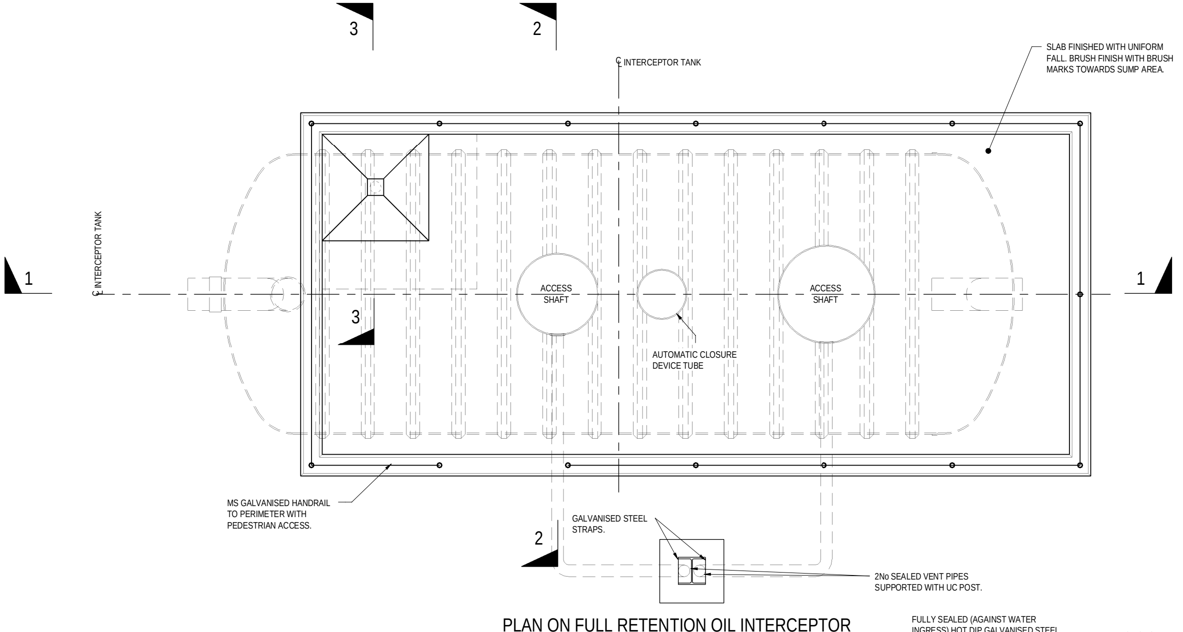
TITLE: TYPICAL CESS TANK DETAILS

SCALE AT A1:	CHECKED:		APPROVED:
AS NOTED	HM		MM
PROJECT No:	DESIGNED:	DRAWN:	DATE:
EN020022		PB	OCT 2019

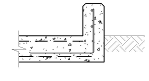
DRAWING No: AQ-WSP-UK-CS-DR-Z-200803 REV: P01

NOTE:
ALL DETAILS SHOWN ARE INDICATIVE AND WILL SUBJECT TO FINAL DESIGN BY THE CONTRACOTR

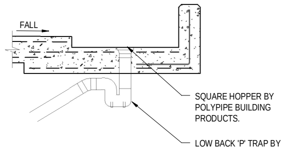
Appendix 4 – Typical Interceptor Details



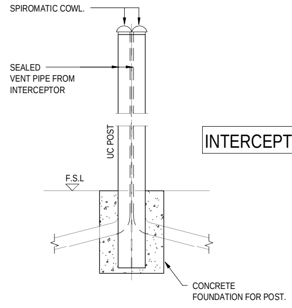
PLAN ON FULL RETENTION OIL INTERCEPTOR
(SCALE 1:25)



DETAIL 'A'
(SCALE 1:25)

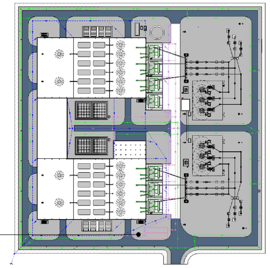


SECTION 3-3
(SCALE 1:25)



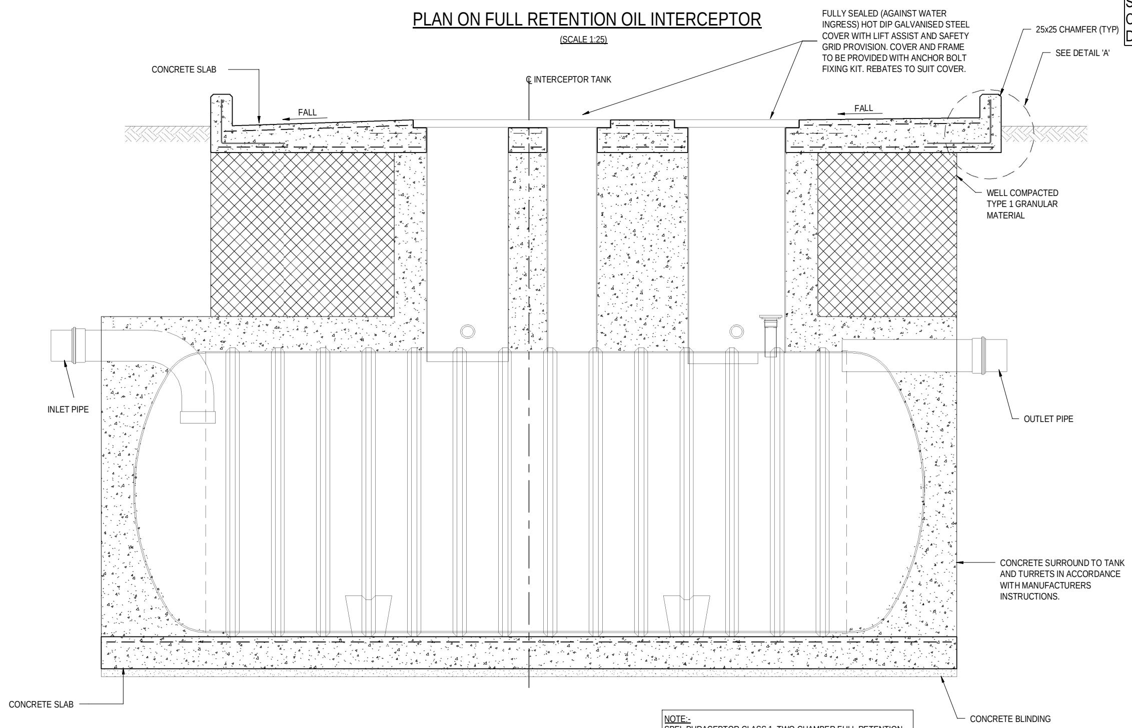
TYPICAL VENT PIPE DETAIL
(SCALE 1:25)

INTERCEPTOR



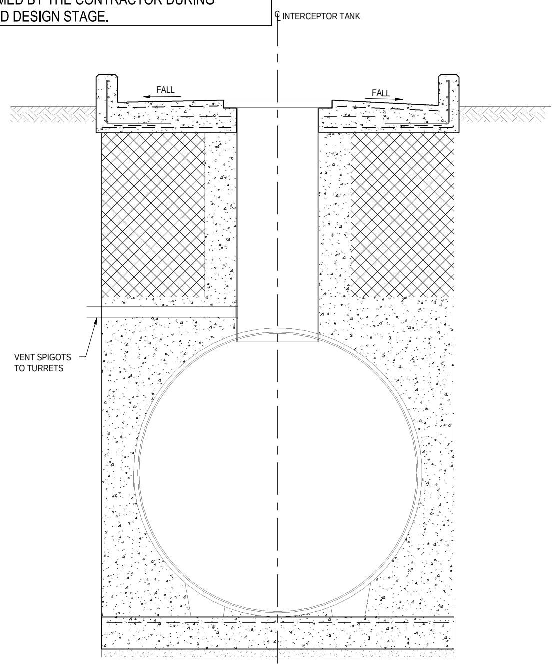
PLAN ON AQUIND CONVERTER STATION

NOTE:
TYPICAL INTERCEPTOR DETAILS ON THIS DRAWING IS SHOWN INDICATIVELY AND HAS BEEN PRODUCED SOLELY FOR PORTSMOUTH WATER INFORMATION. FINAL AND PROJECT SPECIFIC DETAILS, SPECIFICATIONS AND SETTING OUT WILL BE CONFIRMED BY THE CONTRACTOR DURING DETAILED DESIGN STAGE.



SECTION 1-1
(SCALE 1:25)

NOTE:-
SPEL PURACEPTOR CLASS 1, TWO CHAMBER FULL RETENTION SEPERATOR TO EUROPEAN STANDARD BS EN858-1 COMPLETE WITH AUTOMATIC CLOSURE DEVICE, COALESCING FILTER AND FUEL / OIL LEVEL ALARM PROBE AND CONTROL UNIT. STORAGE CAPACITY TO BE CONFIRMED BY CONTRACTOR DURING DETAILED DESIGN STAGE. TANK INSTALLED IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.



SECTION 2-2
(SCALE 1:25)

NOTE:
ALL DETAILS SHOWN ARE INDICATIVE AND WILL SUBJECT TO FINAL DESIGN BY THE CONTRACOTR

Infrastructure Planning (Applications: Prescribed Forms & Procedure) Regulations 2009 - Regulation 5(2)(i)

REV	DATE	BY	DESCRIPTION	CHK	APP
P01	01.07.20	PB	ISSUED FOR INFORMATION	HM	MM

DRAWING STATUS:
INFORMATION

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Tel: +44 (0)20 7314 5000 Fax: +44 (0)20 7314 5001
http://www.wsp.com

CLIENT:
AQUIND

PROJECT:
AQUIND INTERCONNECTOR
2X1000MW HVDC MONOPOLE
LOVEDEAN UK

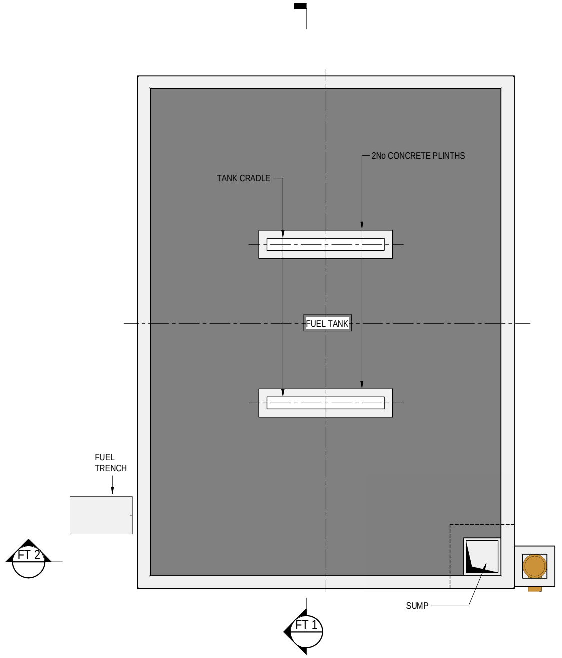
TITLE:
TYPICAL INTERCEPTOR DETAILS

SCALE AT A1:	CHECKED:	APPROVED:
AS NOTED	HM	MM

PROJECT No:	DESIGNED:	DRAWN:	DATE:
EN020022		PB	OCT 2019

DRAWING No:	REV:
AQ-WSP-UK-CS-DR-Z-200801	P01

Appendix 5 – Typical Fuel Tank Details

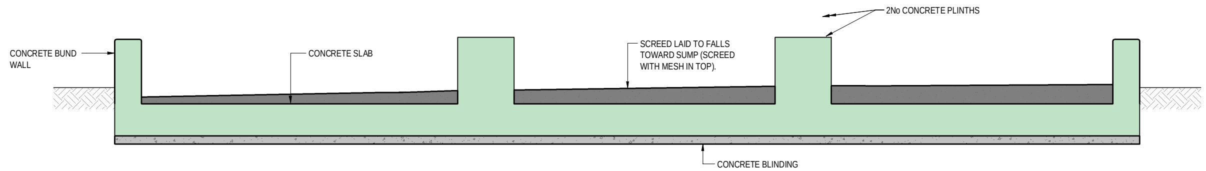


1 TYPICAL FUEL TANK BUND

1 : 50

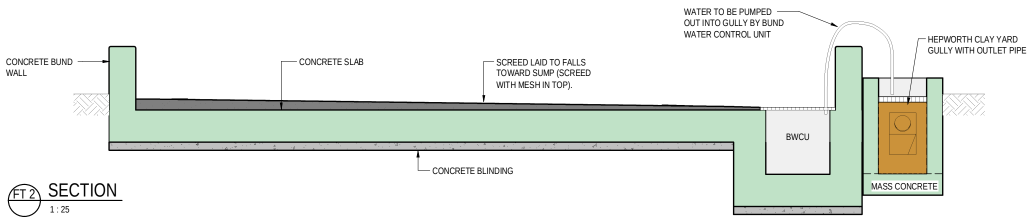
BUND DETAILS SHOWN ON THIS DRAWING ARE ALSO TYPICAL TO DIESEL GENERATOR BUND.

NOTE:
TYPICAL FUEL TANK BUND ON THIS DRAWING IS SHOWN INDICATIVELY AND HAS BEEN PRODUCED SOLELY FOR PORTSMOUTH WATER INFORMATION. FINAL AND PROJECT SPECIFIC DETAILS, SPECIFICATIONS AND SETTING OUT WILL BE CONFIRMED BY THE CONTRACTOR DURING DETAILED DESIGN STAGE.



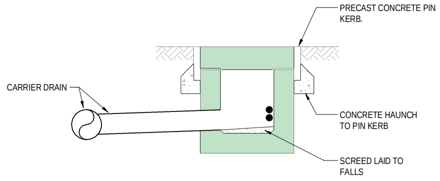
FT 1 SECTION

1 : 25



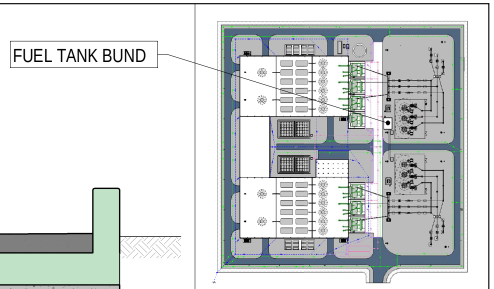
FT 2 SECTION

1 : 25



TYPICAL SECTION THROUGH FUEL TRENCH
SHOWING RAINWATER OUTFALL TO DRAINAGE PIPE

(SCALE 1:20)



PLAN ON AQUIND CONVERTER STATION

Infrastructure Planning (Applications: Prescribed Forms & Procedure) Regulations 2009 - Regulation 5(2)(i)

REV	DATE	BY	DESCRIPTION	CHK	APP
P01	01.07.20	PB	ISSUED FOR INFORMATION	HM	MM

DRAWING STATUS: INFORMATION

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WSP House, 70 Chancery Lane, LONDON WC2A 1AF
Tel: +44 (0)20 7314 5000 Fax: +44 (0)20 7314 5001
http://www.wsp.com

CLIENT: AQUIND

PROJECT: AQUIND INTERCONNECTOR 2X1000MW HVDC MONOPOLE LOVEDEAN UK

TITLE: TYPICAL FUEL TANK & DIESEL GENERATOR BUND DETAILS

SCALE AT A1: AS NOTED	CHECKED: HM		APPROVED: HM
PROJECT No: EN020022	DESIGNED:	DRAWN: PB	DATE: OCT 2019
DRAWING No: AQ-WSP-UK-CS-DR-Z-200804			REV: P01

NOTE:
ALL DETAILS SHOWN ARE INDICATIVE AND WILL SUBJECT TO FINAL DESIGN BY THE CONTRACOTR

Appendix 6 – Preliminary Piling Risk Assessment

AQUIND Limited

PRELIMINARY PILING RISK ASSESSMENT

UK Converter Station

AQUIND Limited

AQUIND INTERCONNECTOR

Preliminary Piling Risk Assessment

DATE: 01 JULY 2020

WSP

WSP House

70 Chancery Lane

London

WC2A 1AF

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www.wsp.com

DOCUMENT

Document	Supplementary Karst Report
Revision	001
Report Number	AQ-ITT-UK-REP-100
Document Owner	Aquind Limited
Prepared By	Joshua Kaufmann
Date	01/07/2020
Approved By	Tristan Morgan
Date	01/07/2020

CONTENTS

TABLES

PLATES

LIMITATIONS OF REPORT

WSP has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed and outlined in the body of the report. This report has been prepared under WSP standard Terms and Conditions, as included within our proposal to the Client.

The report needs to be considered in the light of the WSP proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report. The report is only valid for its originally intended purpose as set out in either our report or the proposal.

The opinions given in this report have been dictated by the finite data on which they are based and are relevant only for the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, WSP reserves the right to review such information and, if warranted, to modify the opinions accordingly.

It should be noted that any risks identified in this report are a combination of actual and perceived risks based on the information reviewed.

WSP does not warrant data or work undertaken or provided by others.

1. INTRODUCTION

1.1. AUTHORISATION AND CONTEXT

Following meetings with key stake holders (Portsmouth Water and Environment Agency) WSP has prepared a piling risk assessment for the UK Converter Station West. This Preliminary Pilling Risk Assessment is to support the Development Consent Order process, it is envisaged the detailed designer/piling contractor will provide a final/detailed design piling risk assessment.

This report provides the context for piling within the source protection zone 1 (SPZ1), the preliminary choice of piling methodology for the proposed development and mitigation measures to be adopted (if required).

The limitations of the report are identified before the contents page, the limitations should be understood before using or interpreting this report.

1.2. OBJECTIVES

This report has been prepared to provide information on the following:

- Background of the site setting and contamination;
- Summary of the Conceptual Site Model;
- Details of the proposed development and the preliminary foundation methodology;
- A preliminary piling risk assessment in accordance with Environment Agency Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention ref NC/99/73 (Ref (1)); and
- Justification of preliminary foundation methodology selection and measures required to mitigate against associated risks.

1.3. INFORMATION SOURCES

This report has been prepared with reference to the following reports:

Initial desk study reviewing of various cable routes, landfalls and Converter Station locations.

- Report No 20170202-TJM-AQUIND-UK Cable Route Desk Study Report – Issued V0, February 2017. (Ref (2))

Detailed desk study reviewing Route 3 including Converter Station locations, this report also details the proposed targeted ground investigation works and should be read in conjunction with this report.

- Report No 20170622-TJM-AQUIND-UK Cable Route Detailed Desk Study-Report-Issued V0, June 2018. (Ref (3))

Converter Station Optioneering and Constructability reports were used to build preliminary design assumptions for Converter Station sizes, locations, cuttings, embankments, earthwork volumes and foundation platform levels.

- Aquind Interconnector - UK Converter Station Constructability Addendum, WSP, 62100616, January 2019. (Ref (4))
- Aquind Interconnector - UK Converter Station Optioneering Report, WSP, 62100616, November 2018. (Ref (5))

Ground investigation Factual Reports.

- Geotechnics Ltd, 2018, UK - France HVDC Interconnector Onshore Work Package 1 (Option South), PE181480, Ref (6)
- Geotechnics Ltd, 2018, UK - France HVDC Interconnector Onshore Work Package 1A (Option West and Access Track), PE181477, Ref (7)

Environmental impacts due to the scheme proposal were reviewed within the Preliminary Environmental Information Report and the Environmental Statement.

- Preliminary Environmental Information Report, WSP, PINS Ref: EN020022, 2019. (Ref (8))
- Environmental Statement – Appendix 18.1 Preliminary Risk Assessment and Generic Quantitative Risk Assessment, WSP, PINS Ref: EN020022, 2019. (Ref (9))

The findings of the ground investigation undertaken at the proposed convertor station locations is discussed in the GIDDR for Route Section 1 (Converter Station).

- Converter Station Geotechnical Interpretative Design Development Report, WSP, 70019402-GIDDR, 2019. (Ref (10))

2. THE SITE

2.1. SITE LOCATION

The site is located near Lovedean, Hampshire, England. The site currently consists of predominately agricultural fields. The land is gently sloping from north to south, with the central area approximately 85.4m above ordnance datum. The centre of the site is located at approximately the National Grid Reference 467149 (Easting) 113488 (Northing). An aerial photograph of the site is shown in Plate 2-1.

Plate 2-1 - Approximate Site Boundary and location for the proposed UK Converter Station (Image: Google Earth, 2018 Ref (11))

2.2. SITE DESCRIPTION AND BOUNDARIES

The site predominantly consists of fields and hedgerows, the majority of the fields are used for agriculture; both animals and crops were present during site visits. The east the site is bounded by the National Grid (NG) Lovedean Substation and other land owned and maintained by NG. Access to the site is currently by the public right of way from Broadway Lane.

The northern boundary can be approximately marked by the overhead lines crossing west to east. The southern boundary is broadly categorised by the ancient woodland and the western boundary by the field hedgerows.

The southern and northern boundaries encounter overhead lines in close proximity. Subsurface drainage for the Lovedean Substation is also considered likely within the site. A series of hedgerows and treelines are present within the site, these are reviewed within the Preliminary Environmental Information Report (Ref (8)).

2.3. SITE HISTORY

In summary, the site of the proposed Converter Station has undergone limited changes over time, remaining predominantly as agricultural land. However, several historical Chalk pits (subsequently backfilled) were noted around the area during the desk study.

Lovedean Substation was first shown on the 1969 historical map with a series of associated overhead electrical lines also shown.

Table 2-1 - Chalk pits in close vicinity to the Converter Station and within Route Section 1

Historical Chalk Pit	Dates of Mapping	Position Relation to Cable Route
Denmead Farm Chalk Pit	1868 to 1932	On route
Lovedean Substation	1979 to present	On route
Stonemere Copse Chalk Pit Old Chalk Pit	1868 to 1932 1932 to present	Adjacent

2.4. SITE GEOLOGY

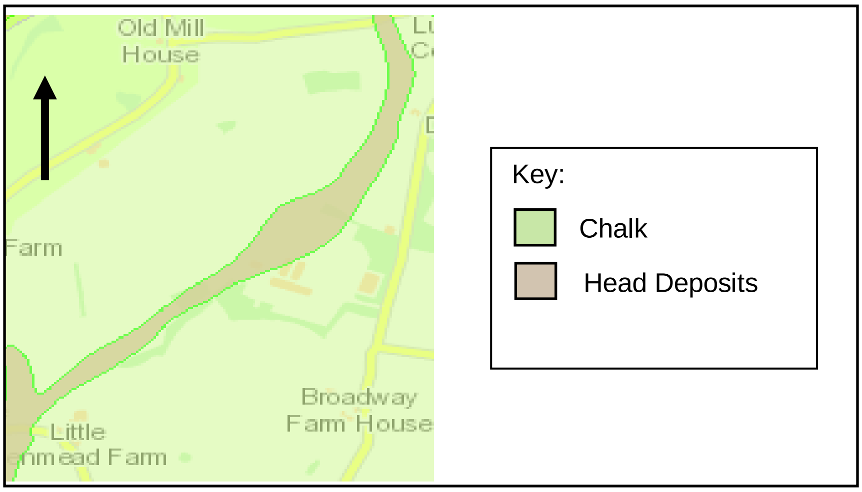
The published geological information was reviewed in detail as part of the desk study report (Ref (3)). As summarised in the desk study, the Converter Station location is characterised by a thin layer of Head Deposits overlaying Upper and Middle Chalk (Undivided) (Ref (11)). The GeoIndex mapping in **Error! Reference s ource not found.** indicates Head Deposits are only present in an isolated band.

The desk study report also highlighted potential ground risks at the proposed Converter Station location. These risks included potential dissolution features (also known as karstic features).

Summary plans of the geological information are included in the Detailed Desk Study Report for Route 3D (Ref (3)).

In addition to the above the desk study also highlighted that the proposed Converter Station sites were located within an aquifer protection zone associated with the Chalk and the area has been designated as a groundwater source protection **zone (SPZ1).**

Plate 2-2 - BGS GeoIndex Geological Map (Ref (12))



The ground investigation found the Converter Station West site area is directly underlain by Head Deposits consisting predominantly of gravelly Clays; sometimes becoming clayey Gravel. Generally, underlying the Head Deposits was Structureless Grade D Chalk predominately described as Grade Dm (matrix-dominated) with occasional interbedded layers of Dc (clast-dominated). Below the Structureless Grade D Chalk, Chalk quality and grade broadly improved with depth becoming Structured Chalk Grades C to A. Two Karstic features were identified within the potential location of the Converter Station, as identified in Plate 2-3, both are indicated to be infilled from CPT testing.

Table 2-2 - Converter Station West Ground Model

Strata	Ground model (m AOD) (unit average thickness (m))	Description based on preliminary ground investigation findings
Head Deposits	85.00-84.20 (0.80)	Firm to stiff red brown CLAY with gravel and cobble content. Occasionally gravel content becomes such it is clayey GRAVEL.
Structureless Chalk (Grade D)	84.20-76.90 (7.30)	Consisting of both Grade Dm and DC Chalk, interbedded throughout with no distinguishable boundary or profiling.
Structured Chalk (Grade C – A)	76.90-55.00 (21.90+)	Very low to medium density, density increasing with depth. Flint bands were noted during drilling, these were often thin (0.10-0.30m thick) and occurred between change of grades. There were six notable grade changes. Zones of core loss were recorded within BH29 and BH30, this is considered to be due to flint bands marking the transition from Grade B to C Chalk, with the flint causing loss of recovery. Grade A was noted between 79.06-74.56m AOD and 64.06-58.06m AOD.
Groundwater	40.00-30.00m AOD Informed by Portsmouth Water	The groundwater depth was informed by the Portsmouth Water representatives, who have a monitoring well within 1.00km of the site and detailed groundwater mapping records. Groundwater is known to become shallower from north to south.

Table 2-3 - Converter Station West Identified Potential Karstic Features via Geophysical Techniques

Karstic Feature	Coordinates **(Approximate Centre Point)**	Geophysics Interpretation **(Geophysical Report available within GIDDR1 (Ref.** (10)**))**	CPT Probing
SD2 **(Also referred to as Karstic Feature 2)** **Identified in cross section in Figure A3-7 of the GIDDR1 (Ref.** (10)**).**	467180 E 113479 N Located in option west	A circular feature identified to be approximately 25.00m in diameter and extending to 6.00m bgl Identified in ERT Line 7 and 8.	Six CPTs were conducted in a cross pattern, approximately north-south and east-west. The CPTs achieved between 7.90-14.70m bgl, where they encountered refusal (possible competent rock). The feature appears infilled, approximately 20.00-25.00m wide and 5.00m in height, with the feature present from 4.00m bgl to 9.00m bgl.
SD3 **(Also referred to as Karstic Feature 3)** **Identified in cross section in Figure A3-6 the GIDDR1 (Ref.** (10)**).**	467209 E 113656 N Located in option west	The feature is identified to be circular. The full geometry is difficult to determine from the geophysics due to the feature being identified at the end of the ERT line. Identified in ERT Line 9.	Six CPTs were conducted in a cross pattern, approximately north-south and east-west. The CPTs achieved between 8.80-12.00m bgl, where refusal was encountered (possible competent rock). The feature appears infilled, approximately 10.00m wide and 6.00m in height, with the feature present between 3.00m bgl to 9.00m bgl.

Table 2-3 is an extract from the Converter Station Geotechnical Design Development Note (GIDDR) (Ref (10)), below is an extract from the geophysical reports available in the Factual Reports (Ref (6) & (7)).

Plate 2-3 - Karstic Features identified via Geophysical Surveys (Extract from Factual Reports (Ref (6) & (7))

467000
467100
467200
467300
467400
467500
467600
113700
113600
113500
113400
113300
113200
113100
113000
112900
112800
AREA 2
AREA 1
SD1
SD2
SD3
N
Scale 1:3000
50 0 50 100
metres
© Environment Agency, 1 m
DTM database, copyright 2017.
All rights reserved.
KEY
Base map
Surface depressions
LOVEDEAN SUBSTATION
LIDAR TOPOGRAPHY
TERRA DAT
1:3000 at A3
TC/6084/2
FIGURE

A site constraints map is available in Appendix A; and shows the locations of the karstic features, infilled pits, exploratory hole locations and other site features.

2.5. HYDROGEOLOGY

It should be noted that the underlying shallow Chalk bedrock, approximately between ground surface and two metres depth to the top depth, is defined as a Source Protection Zone (SPZ1) Class A aquifer with the groundwater table at approximately 45m bgl (below ground level). Therefore, the SPZ1 requires a considered approach to mitigate any potential contamination, turbidity or groundwater issues caused by construction and final design. Proposed developments will need to be approved by local and national statutory bodies (including Portsmouth Water and the Environment Agency) due to the regional importance of the aquifer.

2.6. HYDROLOGY

Hydrological features are identified within the Detailed Desk Study; in summary there is no surface water mapped on site.

Groundwater is located at approximately 45m bgl, informed by Portsmouth Water.

2.7. CONTAMINATION

There were no significant sources of contamination noted during the desk study phase, besides the site being agricultural land, which can incur chemical and hydrocarbon contamination. The potential for Chalk pits to be infilled with Made Ground which potentially contains contaminants was also noted.

During a site walkover with Portsmouth Water a historical hydrocarbon spill (between the two-potential Converter Station locations on the northern border of the ancient woodland) was noted - see area ringed red in Plate 2-4. This is not located within any planned Aquind development areas.

Fly-tipping and old farming plant was noted in the ancient woodland between the two potential Converter Stations, also shown (orange ring) in Plate 2-4.

Plate 2-4 - Site Walkover Identification of Potential Contamination (Image: Google, 2018 Ref (11))

2.8. GROUND GAS

No potential sources of ground gas were identified during the desk study or ground investigation.

2.9. SUMMARY OF THE CONCEPTUAL SITE MODEL

The plausible pollutant linkages of significance to piling works have been preliminarily assessed in Table 2-4.

Receptors of potential contamination were identified including:

Human Health

- Workers during construction and maintenance; and
- Surrounding general public during construction and maintenance.

Controlled Waters

- Groundwater within identified Principal, Secondary (A) and Secondary (Undifferentiated) Aquifers; and
- Identified surface water features.

Below Ground Services

- The cable itself;
- Buried concrete; and
- Potable water supply pipes.

Plausible contaminant pathways were identified including:

- Human health (Pathway 1):
  - Dermal contact;
  - Direct ingestion;
  - Direct exposure to impacted shallow groundwater and/or surface water; and
  - Consumption of home-grown produce.
- Human health (Pathway 2)
  - Inhalation of particulates/fibres and/or soil/water derived vapours; and
  - Asphyxiation by accumulation of ground gases in internal/confined spaces.
- Groundwater (Pathway 3)
  - Leaching of contaminants through the unsaturated zone and subsequent impact on groundwater; and
  - Lateral migration of impacted groundwater.
- Surface water features/ecologically sensitive areas (Pathway 4)
- Solution/karstic features rapidly transmitting groundwater (Pathway 5)
  - Surface water runoff; and
  - Migration of immiscible contaminants.
- Below ground services (Pathway 6):
  - Direct contact with corrosive substances (e.g. sulphates and hydrocarbons) in the soil and shallow groundwater.

Table 2-4 - Section 1 (Convertor Station) Conceptual Site Model

Source	Potential Contaminants	Pathways	Comment on Hazard Realisation	Risk Rating
Infilled Land	PAHs, cyanide, metals, hydrocarbons, VOCs, SVOCs, asbestos, PCBs, sulphates, phenols and ground gases.	1-6	There are numerous identified historical mineral extraction sites on-route or within the surrounding area of the Convertor Station, the infilled material is unknown. There is the potential for these to be infilled with Made Ground. However only five are on the proposed route. it is unlikely that the proposed route will directly disturb these, therefore the infilled land is unlikely to pose a significant risk. There are no surface water receptors within 500m of the area. The FOC infrastructure is likely to be above ground therefore no significant risk. No exceedances were identified in the soil or groundwater samples.	LOW

Historical and current agricultural land uses	Pesticides	1-6	It is unknown what chemicals the farmers use or have used. Inorganic pesticides (e.g. containing arsenic) could have been used, however, this is unlikely to cause a significant risk. No exceedances were identified in the soil or groundwater samples.	LOW
Pollution incidents to controlled waters (oil leak)	PAHs, VOCs, SVOCs, and hydrocarbons	1-6	The pollution incident occurred in 1998 therefore unlikely to pose a significant risk.	LOW

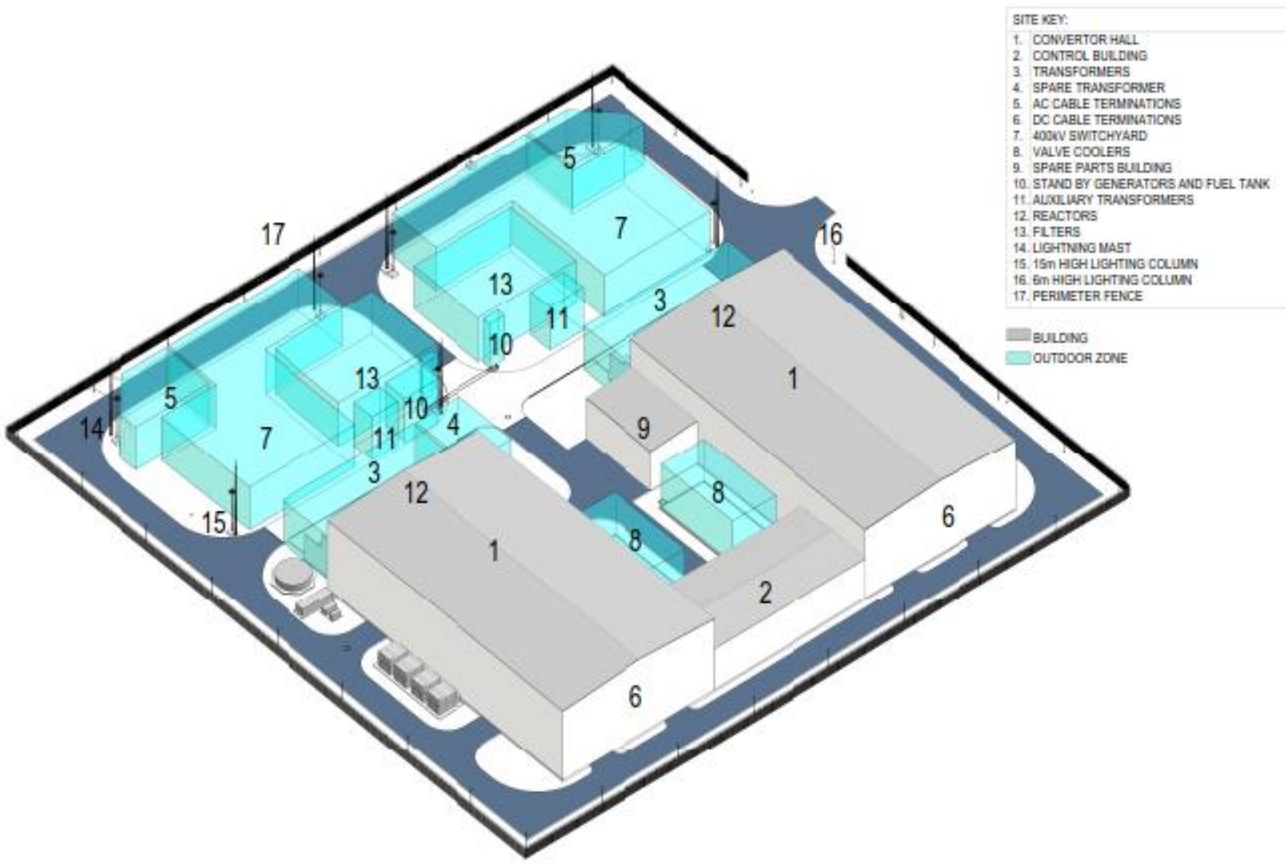
3. PROPOSED DEVELOPMENT

3.1. PROPOSED DEVELOPMENT DESCRIPTION

The proposed development at the of the Converter Station is over a 200 m x 200 m area (approximately 4 ha) and would be within a securely fenced compound. The proposed access to the Converter Station for Construction and Operational Stages will be taken from Broadway Lane in the vicinity of Day Lane. The access track is not envisaged to require piled foundations. The access road to the Converter Station will be approximately 1.2 km in length, and is expected to be a standard width of 7.3 m.

The Converter Station layout is not confirmed as it will be subject to the contractor and detailed designer input, however the components are to be similar the typical Converter Station presented in Plate 3-1.

Plate 3-1 - Indicative Converter Station Layout



The outdoor equipment, which forms part of the proposed Converter Station, will be similar to the equipment that is found within typical electrical substations, such as the adjacent Lovedean Substation. The 400 kV switchyard (item 7 in Plate 3-1), transformers (item 3 in Plate 3-1)) and AC/DC filters (item 13 in Plate 3-1)) will be located outdoors.

Power electronics are required to convert the power between AC and DC or vice versa. This equipment is housed indoors, within the two converter hall buildings (item 1 in Plate 3-1)), each of which will measure approximately 90 m in length, 50 m in width and 22 m in height. The maximum height of the building may be increased to up to 26 m, dependent on the preferred architectural and roof design solution.

A control building (item 2 in Plate 3-1)) is also required. This would be at a reduced height compared to the converter hall buildings and is likely to be a two-storey arrangement. The spares building (item 9 in Plate 3-1)) would be a similar height.

The lightning masts, which could be up to 4 m taller than the tallest building, are tall, narrow structures, with catenary wiring potentially strung between them to shield the outdoor equipment from direct lightning strikes.

Lighting columns, approximately 6m and 15m high (see items 15 and 16 in Plate 3-1)) are proposed to illuminate the outdoor areas of the Converter Station during emergency situations, such as an intruder or unplanned maintenance work. The lights will not be used during normal operation.

Auxiliary power supplies will be provided in the event of a power failure at the Converter Station to ensure continuity of operation. Back-up sources such as standby diesel generators will be only used if other sources of auxiliary supply are unavailable during construction and operational timescales.

Cooling systems will be required to remove heat generated within the Converter Station building. These systems will be located outside the Converter Station building.

Up to two Telecommunication buildings associated with the FOC (potentially one for each circuit) are anticipated to be located outside the main Converter Station security fence and within Converter Station Area, so that they can be accessed by third parties. Further details regarding this infrastructure are set out in section 3.3.6 of the Preliminary Environmental Information Report (Ref (8)). This infrastructure is anticipated to be located outside the 4ha area indicated for the Converter Station footprint, although is likely to be immediately adjoining it.

3.2. FEASIBILITY STAGE PILING METHODOLOGY

The final foundation design solution, sequencing and depths will be determined by the detailed designer/piling contractor. A full review of piling techniques will need to be conducted by the contractor/designer, with consultation with statutory bodies. Protection to and consideration of the SPZ1 aquifer will be a contractual requirement of the detailed designer/piling contractor. Therefore, it is envisaged that the final foundation solution will be of equal or lesser impact than proposed in this report.

Precast Driven Piles

Pre-cast driven piles are currently envisaged as they are of relatively minimal or equal impact, compared to other techniques, in relation to the turbidity and other potential impacts on the SPZ1 aquifer within the Chalk bedrock. Limiting the pile lengths to 10m clearance from the groundwater table is advised; the groundwater table is approximately 45m bgl to 55m bgl (informed by Portsmouth Water), however a review of the unsaturated zone of influence should be conducted for detailed design. It is currently assumed a pile length of 10 to 25m will suffice for the majority of loading and ground condition scenarios, for the end bearing to achieve sufficient embedded depth within the Structured Chalk. The length of each driven pile cannot be confirmed for driven piles till installations; this is due to the pile requirement to achieve a specification rather than a set length. The impact of open or closed piles is considered of similar influence on the SPZ1.

The detailed designer/piling contractor is to provide a detailed risk assessment for all piling/foundation works within the SPZ1, in addition to a piling specification to Portsmouth Water, Environment Agency and Hampshire County Council for review and approval in-advance of construction.

Pre-cast driven piles allow for both small and large displacement pile option and avoid the injection of concrete or other cast in place alternatives within the SPZ1. Small displacement methods relative to driven pile options, could decrease the likelihood of potential pathways forming along the soil-foundation interaction. The Head Deposits and Topsoil above the Chalk Aquifer has not been identified as contaminated therefore the potential of driven materials to depth are not considered a contamination risk.

Design Responsibility

Specific pile design should remain the responsibility of the detailed designer/piling contractor based on the available ground information, the loads to be carried, the preferred construction sequence and their own propriety techniques. All information relating to the site should be provided to the detailed designer/piling contractor including historical drawings.

The detailed designer/piling contractor should provide an adequate methodology for dealing with potential changes in Superficial Deposit or Earthwork Fill material across the site and undertake any further testing and investigation as required to complete the design.

The detailed pile design will follow regulatory guidelines and take full cognisance of the potential for contaminated soils and groundwater on site.

3.3. EXISTING INFRASTRUCTURE

Consideration should be given to the safeguarding or diversion of existing buried services. All appropriate and reasonable measures including liaison with relevant asset and utility managers shall be incorporated into pile installation to avoid damage to buried services.

A competent contractor shall ensure that piling works do not impact on the third-party utilities, and we would expect this to be included within the method statement of the piling contractor.

4. PILING RISK ASSESSMENT

4.1. GENERAL

The piling risk assessment has been undertaken in accordance with guidance by the Environment Agency, namely, Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention ref NC/99/73 (Ref (1)). In particular the risk assessment refers to the six pollutant scenarios detailed within NC/99/73 which are summarised in **Error! Reference source not found.**.

Table 4-1 - Generic Pollution Scenarios (Ref (1))

Scenario	Details
1	Creation of preferential pathways, through a low permeability layer (an aquitard), to allow potential contamination of an underlying aquifer.
2	Creation of preferential pathways, through a low permeability surface layer, to allow upward migration of landfill gas, soil gas or contaminant vapours to the surface.
3	Direct contact of site workers and others with contaminated soil arisings which have been brought to the surface.
4	Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of pile materials (where the secondary effects are to increase the potential for contaminant migration).
5	The driving of solid contaminants down into an aquifer during pile driving.
6	Contamination of groundwater and, subsequently, surface waters by concrete, cement paste or grout.

4.2. RISK ASSESSMENT

The piling risk assessment for the Aquind UK Converter Station is contained within Table 4-2, the risk has been assessed in accordance with CIRIA C552 (Ref (12)). The risk descriptors are explained in Appendix B.

Table 4-2 - Piling Risk Assessment for Aquind UK Converter Station

Pollution Scenario	Source (S) Pathway (P) Receptor (R)		Review
Creation of preferential pathways, through a low permeability layer (an aquitard), to allow potential contamination of an underlying aquifer.	S	Infilled Land	Impact: Medium - Pollution of sensitive Source Protection Zone 1 aquifer. Probability: Unlikely - There is no record of infilled land or contamination within the area of the SPZ1. The pile lengths are also proposed to have a 10m clearance from the groundwater table and is anticipated to be far greater than 10m. Comment: The groundwater table is at approximately 45m to 55m bgl with pile lengths anticipated to be between 10-25m bgl. The platform level is raised by approximately 6m via an embankment at the southern end of the site, the longest piles are anticipated at the southern end of the site. Risk: Low
	P	Pile/soil interface	
	R	SPZ1 Aquifer	
Creation of preferential pathways, through a low permeability surface layer, to allow upward migration of landfill gas, soil gas or contaminant vapours to the surface.	S	Soil Gas / Vapours	Impact: Medium – Chronic (long-term) risk to human health. Probability: Unlikely – It is considered highly unlikely for ground gasses to have accumulated naturally within the Chalk Comment: - Carbon dioxide is likely to be present as a result of natural process in the weathering of chalk. However, the flow rates are likely to be insignificant and there is no recorded impact in the UK from natural gases within the Chalk. Risk: Low
	P	Pile/soil interface	
	R	Buildings, construction workers and End Users	
Direct contact of site workers and others with contaminated soil arisings which have been brought to the surface.	S	Contaminated infilled/Made Ground	Impact: Minor – Requirement for protective equipment during site works to mitigate health effect. Probability: Unlikely – No infilled or Made Ground was identified within the area of the converter station footprint, and no exceedances were identified in the soil or groundwater samples. Comment: - Usual construction practices outline in the CEMP will mitigate this risk fully. Risk: Very Low
	P	Direct contact, inhalation and ingestion of dust	
	R	Construction workers	
	S	Contaminants is soil and groundwater	

Pollution Scenario	Source (S) Pathway (P) Receptor (R)		Review
Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of pile materials (where the secondary effects are to increase the potential for contaminant migration).	P	Direct contact and aggressive attack	Impact: Medium - Degradation of piles and structures. Probability: Unlikely – Sulphate conditions are not anticipated to be of significant degradation levels. Piles are currently considered to be steel. Comment: The piles are envisaged to be steel. However, if concrete is used the design sulphate and aggressive chemical environment for concrete (ACEC) classifications of DS-1 and AC-1[d] respectively are considered appropriate for preliminary design of concrete, in accordance with BRE Special Digest 1 (Ref (13)), to be confirmed by the contractor/designer. Risk: Low Risk
	R	Below ground structures i.e. piles	
The driving of solid contaminants down into an aquifer during pile driving.	S	Contaminated infilled/Made Ground	Impact: Medium – Pollution of sensitive Source Protection Zone 1 aquifer. Probability: Low Likelihood – The driven pile method has the capability of driving surface material downward. However, no contaminants were detected on site to be driven down and there is an advised minimum 10m clearance of the pile end bearing to the groundwater table. Comment: In parts the site will be cut to achieve platform level, therefore removing superficial deposits and any potential infilled/Made Ground. The earthworks have the potential to remove any areas of concern before piling. Made Ground/infilled ground is considered unlikely to be present on site. The use of open ended piles could reduce surface area contact with any potential contaminants, therefore reducing probability of transferal to depth. Risk: Moderate / Low* *Anticipated to be low risk as no Made Ground or elevated contaminants detected on site from the preliminary ground investigation.
	P	Pile/soil interface	
	R	Principal SPZ1 Aquifer	
	S	Construction materials	

Pollution Scenario	Source (S) Pathway (P) Receptor (R)		Review
Contamination of groundwater and, subsequently, surface waters by concrete, cement paste or grout.	**P**	Migration via permeable strata Rapid migration via solution/karstic features	Impact: Medium – Pollution of sensitive Source Protection Zone 1 aquifer. Probability: Unlikely - Precast driven piles are currently proposed to be used to avoid the requirement for grouting or concrete casting in-situ methods. Clean drilling techniques will be required for any breaking of ground. Suitable testing and surveying for potential contaminants before works to identify any potential areas of contaminates. Piling in the vicinity of a karstic feature will have further considerations, the karstic features are relatively shallow and have a sufficient clearance from the saturated zone limiting the rapid transmittance into the aquifer and thus reducing turbidity. Comment: The treatment of identified infilled karstic features on-site require a separate risk assessment and specification before or during detailed design. Grouting or piling are currently considered potential acceptable solutions, being two of six potential treatments options, in accordance with CIRIA C574 Engineering in Chalk (Ref **(14)**). The identified infilled karstic features are a minimum of 30 metres above the groundwater level, therefore it is considered that the aquifer is unlikely to be directly affected by grouting activities if correctly methodologies are adopted. Risk: Low
	R	Groundwater	

5. CONCLUSIONS & RECOMMENDATIONS

5.1. CONCLUSIONS

The foundations solution for Aquind UK Converter Station is currently proposed to consist of driven piles; the sequencing, grouping, length, diameter and quantity is to be confirmed by the detailed designer/piling contractor. A full review of piling techniques will need to be conducted by the contractor/designer, with consultation with statutory bodies.

As part of this assessment a number of potential adverse environmental impacts have been considered and assessed on a qualitative basis. The overall risk associated with the proposed foundation works are considered to be low and the use of driven piles is considered appropriate for the ground conditions at the site. However, the environmental and ground conditions onsite are suitable for alternative piling solutions which may be considered by the detailed designer/piling contractor.

If the detailed designer/piling contractor considers alternative piling techniques to be more appropriate due to detailed review it is currently considered the overall risk should not be of higher than that of driven piles. It is considered that other solutions are unlikely to be categorised higher than low risk due to no Made Ground or elevated contaminants identified on site and the groundwater table being at sufficient depth (~45m bgl) to avoid pile interaction. However, any detailed design will require an updated or new 'piling risk assessment' as defined by Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention ref NC/99/73 (Ref (1)).

5.2. RECOMMENDATIONS

On the basis of this assessment, the following recommendations are made:

- Upon detailed design an updated or new 'piling risk assessment' to NC/99/73 is to be undertaken (Ref (1)).
- Obtain groundwater data from Portsmouth Water, if available, feasible and practicable.
- Further ground investigation to support the detail/final design is potentially required at the discretion of the detailed designer/piling contractor.
- Three-dimensional ground model production, at the desecration of the detailed designer.
- Detailed review of the extent of the unsaturated zone of the SPZ1 and commented on in the final 'piling risk assessment'.
- Consultation with local authorities, notably Portsmouth Water and Environment Agency, for approval of construction techniques within the SPZ1 designations (notably acceptable earthworks and foundation techniques).
- Quality Assurance and Quality Control (QA/QC) measures should be identified and adopted prior to piling works being undertaken. These are primarily for construction quality and structural performance. However, they are also equally relevant to mitigate environmental risk. The relevant measures should ensure that the foundation pile solution techniques are carried out correctly and in an appropriate manner so that the risk assessment and conclusions remain valid. Such QA/QC procedure will normally be agreed between contractor, client and relevant regulators.

The detailed designer/piling contractor should be provided with copies of the previous reports relating to the ground conditions, so that they can be incorporated into method statements and risk assessments, which should be approved by the appropriate person.

6. REFERENCES

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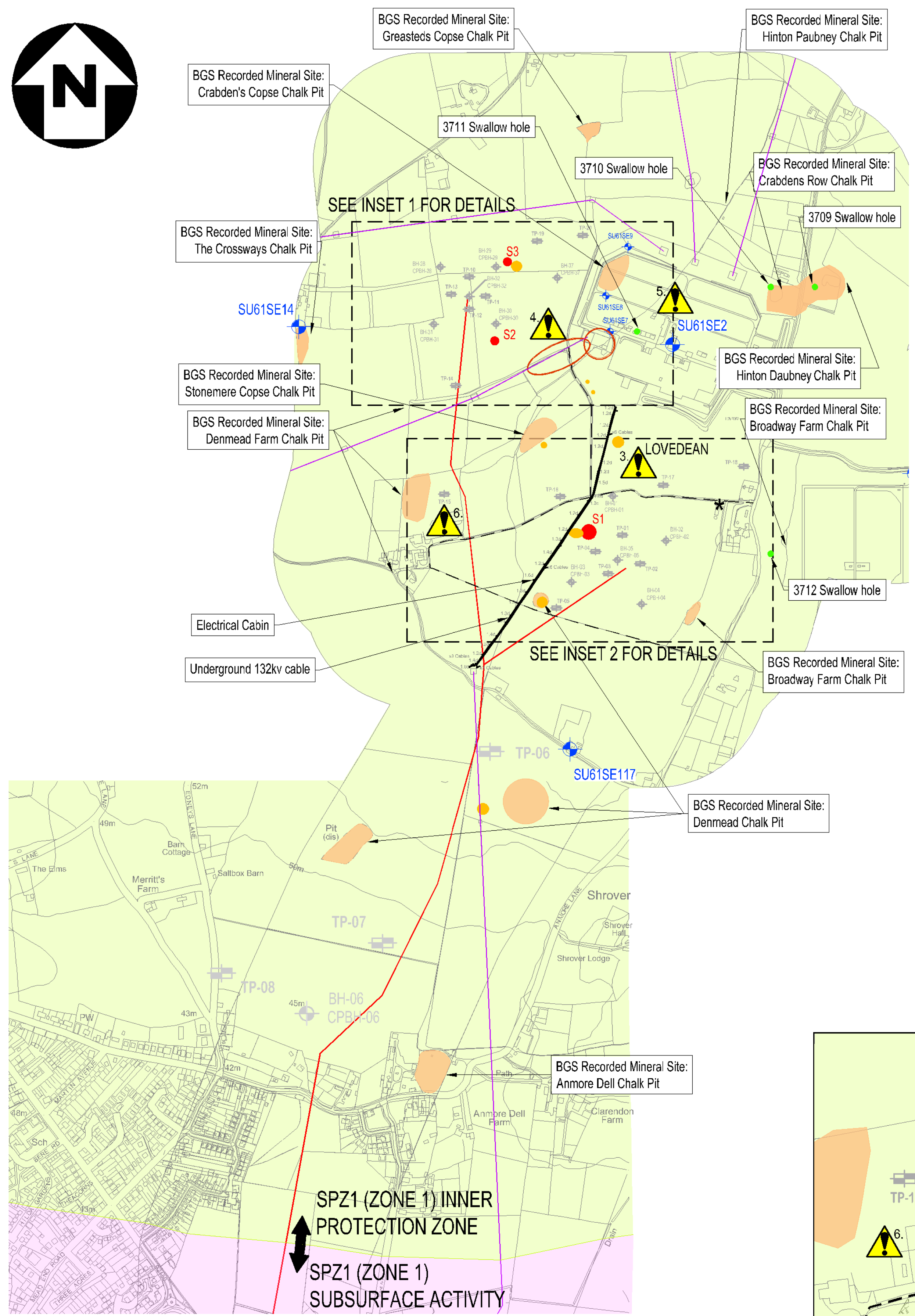
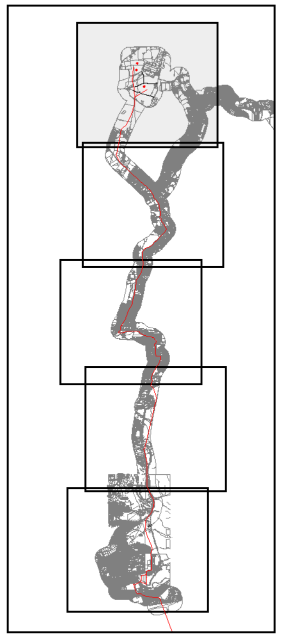
APPENDIX A - CONVERTER STATION CONSTRAINTS PLAN (EXTRACT FROM GIDDR (REF (10))



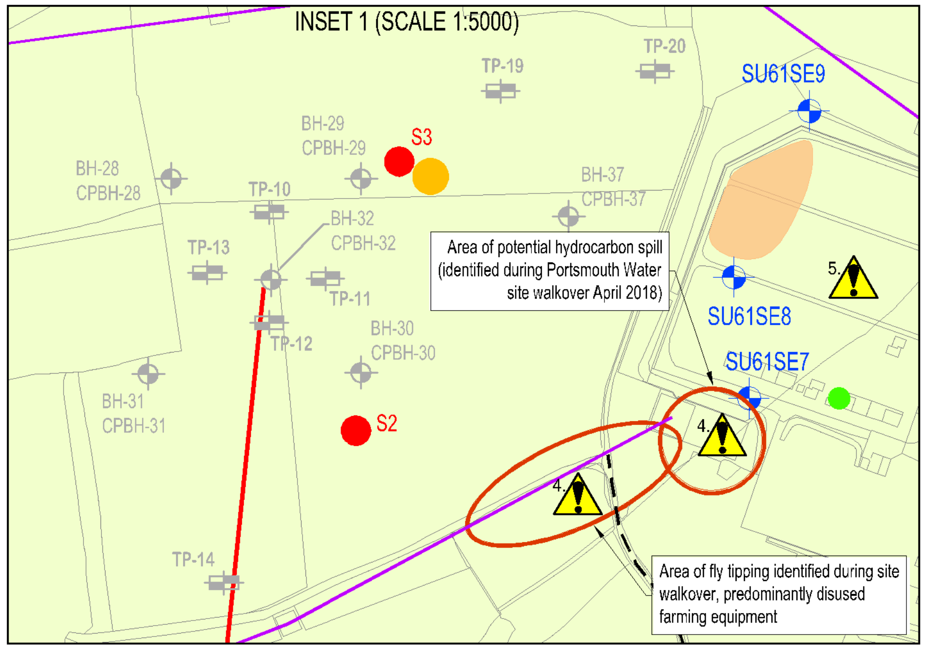
HEALTH AND SAFETY INFORMATION

SIGNIFICANT OR EXCEPTIONAL RISKS ARE IDENTIFIED BELOW

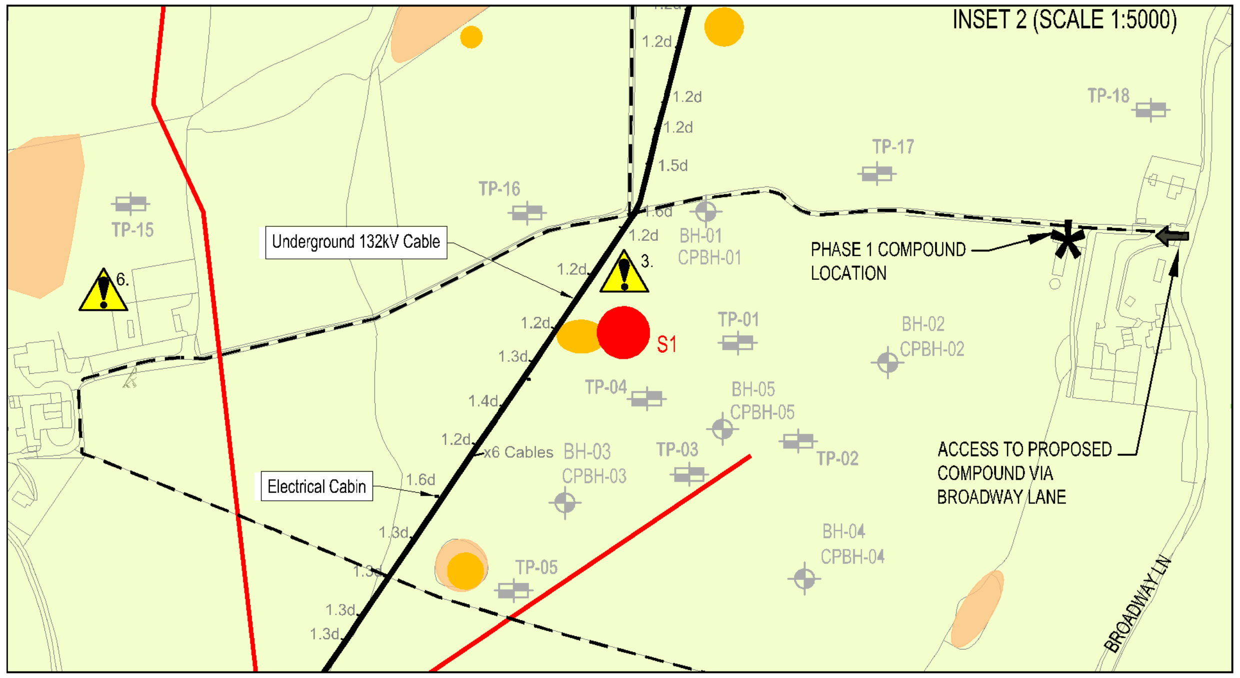
1. POSSIBLE SOFT GROUND
2. OVERHEAD HIGH VOLTAGE TRANSMISSION LINES
3. UNDERGROUND HIGH VOLTAGE 132kV CABLE
4. POTENTIAL AREAS OF CONTAMINATION
5. SUBSTATION OF NATIONAL SIGNIFICANCE
6. KNOWN STABLE YARD AND HORSE EXERCISE AREA



INSET 1 (SCALE 1:5000)



INSET 2 (SCALE 1:5000)



DO NOT SCALE

GI KEY

- PROPOSED CABLE ROUTE
- BH-01 CPBH-01 — BOREHOLE AND CPT LOCATION AND NUMBER
- TP01 — TRIAL PIT AND CPT LOCATION AND NUMBER
- WS-01 CPWS-01 — WINDOW SAMPLE AND CPT LOCATION AND NUMBER
- SU61SE14 — HISTORICAL BOREHOLE LOCATION
- 1. HISTORICAL SAND OR CHALK PIT
- 1. KARSTIC FEATURE (GEOPHYSICAL REPORT)
- 1. WSP KARSTIC MAPPING. AREAS OF DEPRESSION OR APPARENT FILLING, THEREFORE ARE POTENTIAL SOLUTION FEATURES PROPAGATED TO SURFACE OR HISTORICAL PIT
- 1. PBA KARSTIC FEATURE AS DETAILED IN THE MEMO 'PBA NATURAL CAVITIES AND MINING CAVITIES DATABASES SEARCH FOR THE SITE AT AQUIND CONVERTER STATION, BROADWAY LANE, PO9 0SJ'
- 2. OVERHEAD TRANSMISSION LINES
- TRACK/FOOTPATH

REV	DATE	BY	DESCRIPTION	CHK	APP
P03	28/02/2019	SMA	KARSTIC FEATURES ADDED, SPZ ZONES ADDED	JK	
P02	10/07/2018	SMA	EXPLORATORY HOLE POSITIONS AMENDED	JK	
P01	02/03/2018	SMA	FIRST ISSUE	TM	

DRAWING STATUS: S0 - WORK IN PROGRESS

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ARCHITECT:

PROJECT: UK FRANCE INTERCONNECTOR

TITLE: UK CABLE ROUTE
ROUTE OPTION 3D
EXPLORATORY HOLE LOCATIONS AND CONSTRAINTS
SHEET 5 OF 5

SCALE @ A3:	CHECKED:		APPROVED:
1:12500	TM		
PROJECT No: 70019402	DESIGNED: JK	DRAWN: SA	DATE: March 19

DRAWING No: FIGURE A2 — REV: P03

File name \\UK.WSPGROUP.COM\CENTRAL DATA\PROJECTS\62100XXX\62100616 - AQUIND VO NO.3\E MODELS AND DRAWINGS\300 - SITE\320 - TASK 7 UK ROUTE GEOTECHNICAL REVIEW\DRAWINGS\CURRENT\GI SPEC\ROUTE 3D GI AS DUG\3D EXPLORATORY HOLE LOCATION AND CONSTRAINTS PLAN REV 3.DWG, printed on 01 March 2019 14:31:35, by Appleby, Sue

APPENDIX B – RISK DESCRIPTORS

The identification of potential "pollutant linkages" is a key aspect of the evaluation of potentially contaminated land. An approach based on the UK CIRIA report C552 (Contaminated Land Risk Assessment: A Guide to Good Practice, 2001) has been adopted within this report. For each of the pollutant linkages, an estimate is made of:

→ The potential severity of the risk; and

→ The likelihood of the risk occurring.

Table B-1 presents the classification of the severity of the risk:

Table B-1: Severity of Risk

Severe	Acute risks to human health; Major pollution of controlled waters (watercourses or groundwater)
Medium	Chronic (long-term) risk to human health; Pollution of sensitive controlled waters (surface waters or aquifers)
Mild	Pollution of non-sensitive water resources.
Minor	Requirement for protective equipment during site works to mitigate health effects; Damage to non-sensitive ecosystems or species

The probability of the risk occurring is classified by criteria given in Table B-2.

Table B-2: Probability of Risk Occurring

High Likelihood	Pollutant linkage may be present, and risk is almost certain to occur in the long term, or there is evidence of harm to the receptor.
Likely	Pollutant linkage may be present, and it is probable that the risk will occur over the long term.
Low Likelihood	Pollutant linkage may be present and there is a possibility of the risk occurring, although there is no certainty that it will do so.
Unlikely	Pollutant linkage may be present but the circumstances under which harm would occur are improbable.

An overall evaluation of the level of risk is gained from a comparison of the severity and probability as presented in Table B-3

Table B-3: Comparison of Severity and Probability

		Severity			
		Severe	**Medium**	**Mild**	**Minor**
Probability	**High Likelihood**	Very high risk	High risk	Moderate risk	Moderate / low risk
	Likely	High risk	Moderate risk	Moderate/ low risk	Low risk
	Low Likelihood	Moderate risk	Moderate/ low risk	Low risk	Very low risk
	Unlikely	Moderate / low risk	Low risk	Very low risk	Very low risk

Table B-4 then provides a description of the typical consequences and potential actions required following each risk definition.

Table B-4: Qualitative Risk Assessment - Classification of Consequence

Classification	Definition
Very High Risk	Severe harm to a receptor may already be occurring, or a high likelihood severe harm will arise to a receptor, unless immediate remedial works / mitigation measures are undertaken.
High Risk	Harm is likely to arise to a receptor, and is likely to be severe, unless appropriate remedial actions / mitigation measures are undertaken. Remedial works may be required in the short-term, but likely to be required over the long-term.
Moderate Risk	Possible that harm could arise to a receptor, but low likelihood that such harm would be severe. Harm is likely to be mild. Some remedial works may be required in the long-term.
Moderate / Low Risk	Possible that harm could arise to a receptor, but where a combination of likelihood and consequence results in a risk that is above low, but is not of sufficient concern to be classified as mild. Limited further investigation may be required to clarify the risk. If necessary, remediation works are likely to be limited in extent.
Low Risk	Possible that harm could arise to a receptor. Such harm, at worst, would normally be mild.
Very Low Risk	Low likelihood that harm could arise to a receptor. Such harm is unlikely to be any worse than mild.